

**Darwin and the Evolution Revolution:
Audiences, Culture, Worldview, Transformative
Learning**

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Abstract

Although in current practice many cultural institutions are collaborating, sharing and promoting their work on an international scale, visitor studies in internationally travelling exhibitions has been very limited. Performing audience research in the American Museum of Natural History's travelling exhibition *Darwin: The Evolution Revolution* at two partner venues, the Royal Ontario Museum, Toronto and the Natural History Museum London, the thesis establishes a new line of inquiry, addressing the cultural aspects of communication and learning through the exhibition medium within a novel context. Furthermore, the thesis focus on the influence of culture, worldview and perspectives in evolution learning and the evaluation of transformative learning in the museum required the creation of new methods of audience research.

The empirical research of both museum staff and local adult audiences in London and Toronto demonstrated the critical influence of culture on communication and meaning-making in the context of internationally travelling exhibitions. The study also provided significant evidence of the interrelationship of culture, worldview, perspectives and assumptions and their vital role in transformative learning. Moreover, the evaluation of transformative learning served to establish that visitors had engaged in critical reflection as well as subjective reframing, which leads to perspective transformation.

Further research is required in order to provide a basis of comparison and to build a significant body of knowledge on the influence of culture on museum communication and learning in order to effectively guide future practices. Although the thesis intentionally focuses on the analysis of transformative learning and perspective transformation in evolutionary biology, the approach to learning and research methods proposed have a much wider application in audience research of exhibits that present issues of significant social and cultural relevance such as difficult history, social equality, diversity and social justice, as well as in art, history and ethnography museums.

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Abbreviations

AAAS	American Association for the Advancement of Science
AMNH	American Museum of Natural History
<i>Darwin</i>	<i>Darwin: The Evolution Revolution</i>
GTA	Greater Toronto Area
HPS	History and Philosophy of Science
ICOM	International Council of Museums
NAS	National Academy of Sciences, USA
NCC	British National Curriculum Council
NHM	Natural History Museum, London
NOMA	Non-overlapping Magisteria
NOS	Nature of Science
<i>Origin</i>	Darwin's <i>On the Origin of Species</i>
PMV	Prime Message Vectors
ROM	Royal Ontario Museum, Toronto
UK	United Kingdom
UofT	University of Toronto
USA	United States of America

Introduction

Contemporary “global society” places high importance on mass media and cross-cultural communication. Following this trend, many cultural institutions, both small and large, are currently collaborating, sharing and promoting their work in museums with a common mission and thus communicating with new audiences through travelling exhibitions, often on an international level. Largely, aside from the treatment of the managerial, administrative, technical and design aspects of travelling exhibitions which can be found in several practical guides,¹ few publications are available to cultural institutions currently striving to “branch out” and effectively communicate their knowledge and messages to audiences that are not their own. Although research into museum learning has advanced over the decades, for example, key publications on evaluating learning in exhibitions have been published by the University of Leicester’s Research Centre for Museums and Galleries and the American Association of

¹ Significant publications in travelling exhibitions include Buck, Rebecca A. and Allman Gilmore, Jean. 2003. *On the Road Again: Developing and Managing Traveling Exhibitions*. Washington: American Association of Museums; Kelly, Sara. 2002. *Travelling Exhibitions: A Practical Handbook for Metropolitan and Regional Galleries and Museums*. Victoria: NETS.

Museums², evaluations of learning tend to be carried out in exhibitions produced by a cultural institution for their own specific audience or visitor segments. By contrast, the travelling exhibit aims to communicate with “other” audiences, perhaps “unknown” to the museum creating the exhibit. As the institutions creating these “international cultural products” attempt to communicate messages, transfer knowledge and encourage learning for multiple audiences within numerous cultures, the important questions are: How effective are their communication and education strategies when applied to a ‘foreign’ audience? Do truly international strategies and methods for communication and learning in travelling exhibitions exist?

Perhaps inspired by areas of mass communication, the focus in museums has turned to the “visitor experience” and audience research has become a key element in the evaluation of communication effectiveness and learning. Certain forms of media, such as the internet, are already taking into account the diversity of their audiences on an international level in

² Significant research by the Research Centre for Museums and Galleries (RCMG), University of Leicester such as: Dodd, Jocelyn and Jones, Ceri. 2013. ‘The impact, success and significance of Mapping the Change: Evaluating Mapping the Change, Hackney Museum’s project for the 2012 Cultural Olympiad’. March. London: Hackney Museum; Dodd, Jocelyn, Jones, Ceri, Sawyer, Andy and Tseliou, Maria-Anna. 2012. ‘Voices from the Museum: Qualitative Research Conducted in Europe’s National Museums’. *EuNaMus Report*. No 6. European Commission, Socio-economic Sciences and Humanities: Linköping University Electronic Press, The Authors; Graham, J. 2013. ‘Evidencing the impact of the GLOs: 2008-2013’. Learning Unlimited. January. And by the American Association of Museums: Serrell, Beverly. 1998. *Paying Attention: Visitors and Museum Exhibitions*. Adams, Roxana (ed). Professional Practice Series. Washington: American Association of Museums, Technical Information Service; Borun, Minda and Korn, Randi (eds). 1999. *Introduction to Museum Evaluation*. Adams, Roxana (ed). Committee on Audience Research and Evaluation of the American Association of Museums, Professional Practice Series.

order to better target user groups and thus ensure a more efficient “end product”. Museums with an international vocation also face the challenge of defining an appropriate target audience toward which their ‘messages’ are directed which requires recognition of variable cultural perspectives and contexts and an acknowledgement of the cultural aspects of communication and learning within the exhibition development process. Thus, as free-choice learning environments and communicators, museums engaging in international travelling exhibition projects are facing new challenges for which pertinent and congruent research is required. Through the evaluation of communication and learning in an international travelling exhibition and an analysis of cultural aspects, this thesis aims to make a unique contribution to the field of museum audience research.

The purpose of this research is twofold: first to develop knowledge in the field of visitor studies in international travelling exhibitions (as little information or research is available in this specific area of focus) and secondly; to increase understanding and knowledge of the theoretical and practical implications of effective communication and learning in internationally travelling exhibitions. The main research question driving the line of inquiry is therefore: How do culture and context affect the exhibition medium itself, the communication of messages, the “reading” of the exhibition and museum learning?

From a communications perspective, the exhibition medium is a specific form of media that combines objects, text and multimedia in order to convey messages to the public within the museum context. Flora Kaplan,

in her article “Exhibitions as communicative media” posits the view that exhibitions communicate primarily through the visual senses using a process that is both cognitive and cultural:

This process encompasses the way people think about what they see and the meanings they attach to it. Thus, within given historical and cultural contexts, exhibitions are kinds of public, secular rituals in the Durkenheimian sense of social representation of collective “self”. This view leads us to enquire about the nature of the collectivity being presented: who is presenting what? for whom? and why?³

Thus, according to context, the museum exhibition can constitute varying representations of the collective “self”. As communication is “an integral part of culture”⁴ which comprises both the “production and reproduction of culture”,⁵ it is crucial that museum staff begin to reflect on the impact of culture on the exhibition medium, especially in the field of travelling exhibitions. As culture influences both how exhibitions are produced as well as how they are interpreted, the effect of culture both on the “front-end” and the “receiving-end” of the communication process must be understood.

This thesis applies theoretical implications of cross-cultural communication to the analysis of visitor reception of an international travelling exhibition in order to better understand the relationship between culture, communication and learning. The aim is to emphasize the importance of

³ Kaplan, Flora E.S. 1995. ‘Exhibitions as communicative media’. In Hooper-Greenhill, Eilean. (ed). *Museum, Media, Message*. 2nd Ed. London: Routledge, p37.

⁴ Hooper-Greenhill, Eilean. 2000. *Museums and the Interpretation of Visual Culture*. London: Routledge, p139.

⁵ Ibid, p138.

education and learning as central to the museum's public function and to promulgate social and cultural relevance as both a core value, and one that is vital for (international) travelling exhibitions. These essential values are based on significant ideological shifts, over time, of museum philosophy or museology: the establishment of education as a key role of the museum reflected in the International Committee of Museum's definition (ICOM) of the museum and the New Museology⁶ movement which emphasises the museum's social role in providing opportunities for informal learning and identity development.

ICOM's current definition of the museum is "a non-profit, permanent institution in the service of society and its development, open to the public, which acquires, conserves, researches, communicates and exhibits the tangible and intangible heritage of humanity and its environment for the purposes of education, study and enjoyment."⁷ Although today the public relevance and role of the museum appears to be widely accepted, historically this was not always the case: in the early 1960's the Education Committee of the International Council of Museums was actually dissolved due to diverging views on the place of education in cultural institutions.⁸

⁶ "New Museology": a term first used in 1958 by Mills and Grove S. De Borhegyi's book, *The modern museum and the community*.

⁷ International Council of Museums. 2010-2012. 'Museum Definition'. icom.museum/who-we-are/the-vision/museum-definition.html (accessed 3.11.2011).

⁸ Boylan, Patrick J. 1999. 'Forward'. In Moffatt, Hazel and Woollard, Vicky (eds). *Museum and Gallery Education: A Manual of Good Practice*. London: The Stationery Office, pvii.

The current ICOM definition of the museum therefore represents a change in focus. While the functions of preservation and display of collections are fundamental in defining the museum as an institution, the purpose of this function is the transmission of knowledge. Thus the educational role of the museum has developed over time, taking on new importance in recent history as museum publics and visitor experience have achieved greater importance in museum practices. However, it is important to keep in mind that although the functions of the museum are significant, as stated by Edwina Taborsky, “what a system does cannot necessarily be turned into the reasons for that system: a museum is not simply the sum of its functions.”⁹

The New Museology movement, as described by Peter van Mensch in Peter Vergo’s *The New Museology*¹⁰, although written more than 20 years ago, is relevant to contemporary museums in placing the public at the centre of the museum’s function. As explained by Lois H. Silverman in “The Social Work of Museums”, museums have “facilitated the expression and transformation of individuals and their sense of identity”¹¹ as well as “aimed to influence public knowledge, attitudes and behaviour; deliver public health and social welfare campaigns; reduce stigma and bias; empower citizens and communities; and mobilize other forms of social

⁹ Taborsky, Edwina. 1982. ‘The Sociostructural Role of the Museum’. *The International Journal of Museum Management and Curatorship*. Vol. I. No. 4. Guilford: Butterworths, p339-340.

¹⁰ Vergo, Peter (ed.). 1989. *The New Museology*. London: Reaktion Books.

¹¹ Silverman, Lois H. 2010. *The Social Work of Museums*. Milton Park, Abingdon, Oxon: Routledge, p13.

action and change.”¹² Based on these values, today’s museum should serve society by playing a role both in individual and social development. The “new museum” should be socially relevant, reflect on cultural phenomena, promote cultural identity and understanding as well as encourage participation and exchange. However, effectively upholding these core values remains a challenge for international travelling exhibitions.

There are many challenges in museum practice in international travelling exhibitions which may explain why studying cross-cultural learning, as an area of museum studies research, has remained untouched. Conceivably, due to the significant museographical complexity of touring exhibits, research or publications specifically addressing communication and cross-cultural learning are lacking. Exhibition design is “drastically influenced by the need to travel”,¹³ hence the decision to have an exhibition tour must be made in the exhibit’s initial planning phase; furthermore, “solutions to installation problems must be universal, not specific to the configuration of the original site”¹⁴ in order to avoid serious technical issues. “Careful and continuous oversight of all exhibition details and communication among developers and between the developing institution and the exhibiting

¹² Silverman, Lois H. 2010. *The Social Work of Museums*. Milton Park, Abingdon, Oxon: Routledge, p13.

¹³ Buck, Rebecca A. and Allman Gilmore, Jean. 2003. *On the Road Again: Developing and Managing Traveling Exhibitions*. Washington: American Association of Museums, p7.

¹⁴ Ibid, p8.

institutions are essential for successful, effective traveling exhibitions.”¹⁵

As touring logistics are arguably complex and the mere physical implementation of a travelling exhibition in a ‘different’ venue with site-specific physical and technical constraints frequently involves numerous presentation issues requiring quick resolution, a concentration on practical management, design aspects and forward planning is perhaps justified. Additionally, as travelling exhibitions represent a commercial venture involving a financial investment by host museums, hence implicating contractual obligations, organising institutions strive to meet the expectations of hiring institutions and ensure ‘customer satisfaction’. But essentially, the ability of successful travelling exhibitions to “attract publicity and increase attendance” has somewhat transformed this curatorial practice into “an income-generating business”.¹⁶ A focus on the marketing and commercial aspects of travelling exhibitions is therefore also warranted; however, this essentially serves to once again divert attention away from effective visitor engagement and learning.

Consequently, to-date, ensuring efficient design techniques for producing a highly adaptable and easily transportable travelling exhibition, creating

¹⁵ Buck, Rebecca A. and Allman Gilmore, Jean. 2003. *On the Road Again: Developing and Managing Traveling Exhibitions*. Washington: American Association of Museums, p7.

¹⁶ Pollock, Wendy. 2012. “The Shadow Side of Traveling Exhibitions”. In *Travelling Exhibitions: Where are They Going? Exhibitionist*. Spring. National Association for Museum Exhibition (NAME), p65. http://name-aam.org/uploads/downloadables/EXH.spr_12/13%20EXH_spg12_The%20Shadow%20Side%20of%20Travelling%20Exhibitions_Pollock.pdf (accessed 21.10.2013)

productive marketing strategies and effectively managing complex touring logistics have remained the primary focus of practice.

Travelling exhibitions are “coherent exhibition experiences that are brought to a museum or other venue for a finite amount of time”¹⁷ and travel from venue to venue. Travelling exhibits are mainly devised as ‘turn-key’ exhibits - meaning they are “built, supplied, or installed complete and ready to operate.”¹⁸ As ‘complete’ exhibitions, ready for use (to buy or rent) without adaptation, ensuring appropriate contextualisation of exhibition discourses and maintaining cultural relevance remains a significant issue. Although touring exhibits are generally produced with a highly adaptable design in order to ease installation in multiple venues, exhibitions are comprised of fixed supports; the capacity for the modification of exhibition discourse and narratives is therefore limited. Yet these “cultural products” are contracted for presentation in various venues regionally, nationally and/or internationally, and hence are meant to communicate and transfer knowledge to both multiple and diverse audiences through a single, pre-defined and relatively static medium.

In current practice, travelling exhibitions are mainly programmed based on a common mission and shared educational goals between organising and “borrowing” institutions. Travelling exhibit developers generally rely on

¹⁷ West, Robert “Mac” and Runge, Christen E. 2006. ‘Traveling Exhibitions: Rationales and Strategies for the Small Museum’. In Yao, Cynthia C, Dierking, Lynn D., Anderson, Peter A., Schatz, Dennis and Wolf, Sarah (eds). *Handbook for Small Science Centers*. Plymouth: Altamira Press, p135.

¹⁸ Merriam-Webster Online Dictionary. 2005. ‘turnkey’. Merriam-Webster Online Inc. <http://www.merriam-webster.com/dictionary/turnkey> (accessed 18.06.2013).

hiring institutions to effectively evaluate the relevance of travelling exhibition discourses according to their respective mission and to devise an adaptation plan, if required, according to knowledge of their particular audiences and institutional practices. When travelling exhibitions are adapted for local cultures, such as the Victoria and Albert Museum's *Vivienne Westwood* exhibit presented at the Taipei Fine Arts Museum in 2005, success can even be exceptional.¹⁹ The ideal adaptation process, as demonstrated by the *Vivienne Westwood* exhibit, is both a joint effort between institutions as well as an effort to render content pertinent through references to local culture.²⁰ However, for host institutions to do so, sufficient time and planning is required for research (including an analysis of content and texts) and production (the creation of new text labels and panels). Additionally, exhibit adaptations have supplementary financial implications for host institutions and may be restricted by measures regarding intellectual property in contractual agreements.

Furthermore, programming motives, the underlying reasons for museums to hire travelling exhibits, may also serve to direct focus away from ensuring cultural relevance and essentially discourage host museums

¹⁹ Huang, Kuang-Nan and Lai, Ying-Ying. 2006. "International exhibitions and Taiwan experience – An analysis of three successful cases". November. Intercom Conference Paper, p5. <http://www.intercom.museum/documents/4-5Lai.pdf> (accessed 20.01.2013)

²⁰ Wang Jun-jieh, a prominent local artist designed the installation of the exhibit. Furthermore, it was discovered that younger visitors came in masses to the exhibit as a locally admired Japanese Manga heroine wears a dress designed by Vivienne Westwood. See Huang, Kuang-Nan and Lai, Ying-Ying. 2006. "International exhibitions and Taiwan experience – An analysis of three successful cases". November. Intercom Conference Paper, pp 5-6. <http://www.intercom.museum/documents/4-5Lai.pdf> (accessed 20.01.2013)

from performing related research or devising effective exhibit adaptation plans. As will be demonstrated in the thesis, externally produced exhibits are frequently a solution for “in-house” staff availability issues such as substantial renovation projects that occupy staff members’ schedules. The added value of hiring a touring exhibition is the presentation of a quality exhibit with ‘minimal’ time and staff investment. Thus host institutions may be willing to invest a rental fee in order to offset staff availability issues and limit staff involvement. Within this mind-set, the cultural adaptation of exhibition discourses is often confined to language translation, if required, and the supplement or substitution of artworks, objects, specimens and artefacts from local collections; site-specific adaptations are therefore usually minimal, *ad hoc* and may lack foresight.

“The worst situation is that museums become the venues for commercialized exhibitions and the needs of the audience are neglected.”²¹ Culturally relevant front-end research performed by exhibit producers at established host institutions is ideal for addressing issues of relevance and cross-cultural communication, although not always feasible as this may be hindered by undefined touring schedules. Fundamentally, travelling exhibitions are a commercial venture: a return on investment (or at least cost recovery) is usually an objective for exhibit producers and host institutions aim to reduce both time and money invested, especially after paying rental fees, insurance and travel costs. The question is which

²¹ Huang, Kuang-Nan and Lai, Ying-Ying. 2006. “International exhibitions and Taiwan experience – An analysis of three successful cases”. November. Intercom Conference Paper, p2. <http://www.intercom.museum/documents/4-5Lai.pdf> (accessed 20.01.2013)

institution should invest in the evaluation of the travelling exhibit?

Partnerships and front-end evaluation of cultural relevance and appropriate contextualisation provide optimum conditions for forwarding research in search of more effective practice.

Focus of Research

The context for this study is an analysis of the effect of culture (including perspectives and worldview) on communication and learning of science, focusing on the American Museum of Natural History's (AMNH) international travelling exhibition *Darwin: The Evolution Revolution*. The exhibition was organized by the AMNH, New York, in collaboration with four partner institutions: the Royal Ontario Museum (ROM), Toronto, the Museum of Science, Boston, The Field Museum, Chicago, and the Natural History Museum (NHM) London. The principal reasons for selecting this exhibition concerned the production process employed. Headed by the AMNH, the project's partner institutions participated in the exhibit's development phase which included defining learning objectives in order to guide exhibit content production, selecting exhibit themes and establishing the exhibit narrative and discourse. Although curated by Niles Eldredge, an eminent evolutionary biologist and AMNH curator, exhibit objectives, content and design were conjointly approved. This collaborative process was significant as the transparency of communicational and educational objectives between partners was implemented with the intention of creating content according to combined objectives and to maintain relevance of discourses both across cultures and institutions. The collaborative nature of the project, the clarity of (shared) learning and

communication objectives and the front-end critical reflection on cultural relevance of exhibit messages served as essential defining factors for inclusion in the research.

The touring schedule for *Darwin: The Evolution Revolution*, established amongst the five partner institutions, began with a premier at the AMNH in New York from November 2005 to May 2006, was followed by showings at the two American partner institutions, was subsequently presented at the ROM from 8 March 2008 to 4 August 2008, and finally was featured during the Darwin200 celebrations at the NHM - where it was presented with the title "Darwin: Big Idea, Big Exhibition" - from 14 November 2008 to 19 April 2009.²² The confirmed touring schedule allowed inclusion of the Canadian and British partner venues within the established period of thesis fieldwork.

Concentrating on Darwin and his work was particularly relevant during the period surrounding the global celebration in 2009 of the bicentenary of Darwin's birth and the 150th anniversary of the publication of Darwin's seminal work: *On the Origin of Species*. The selection of this exhibit was

²² The AMNH produced a duplicate version of *Darwin: The Evolution Revolution* that was presented at the Instituto Sangari in Brazil, the Auckland War Memorial Museum in New Zealand, the National Science Museum in Japan, the Osaka Museum of Natural History in Japan, the National Museum of Australia and the National Museum of Natural Science in Taiwan. According to the interview of Lorraine Cornish at the NHM, the duplicate consisted of a copy of the original show, implemented as a 'turn-key exhibit' (i.e. without significant adaptation). Although Cornish the complex logistics of the duplicate show were mentioned, the effectiveness of the collaboration was not discussed. Unfortunately, the presentations (or an analysis of adaptations to content) of the duplicate version at the previously mentioned host institutions were not included in the thesis researched.

therefore a “timely” choice due to a peak of audience interest in Darwin’s life and work and substantial media attention on an international level. Furthermore, the project’s main constituents are leading institutions in natural history and, perhaps most importantly, from different cultures: American, Canadian and British. Performing audience research in *Darwin: The Evolution Revolution* thus presented a unique opportunity for a case study of a “cultural product” created by several cultures, for several cultures.

The main theme of the exhibit was Charles Darwin’s life (1809 – 1882) and scientific research. The exhibit focused both on the man and the scientist, highlighting the scientific work he undertook, his five-year voyage on the *HMS Beagle*, the analysis of his findings, and his development of the theory of evolution and natural selection, followed twenty years later by his publication of *On the Origin of Species*.

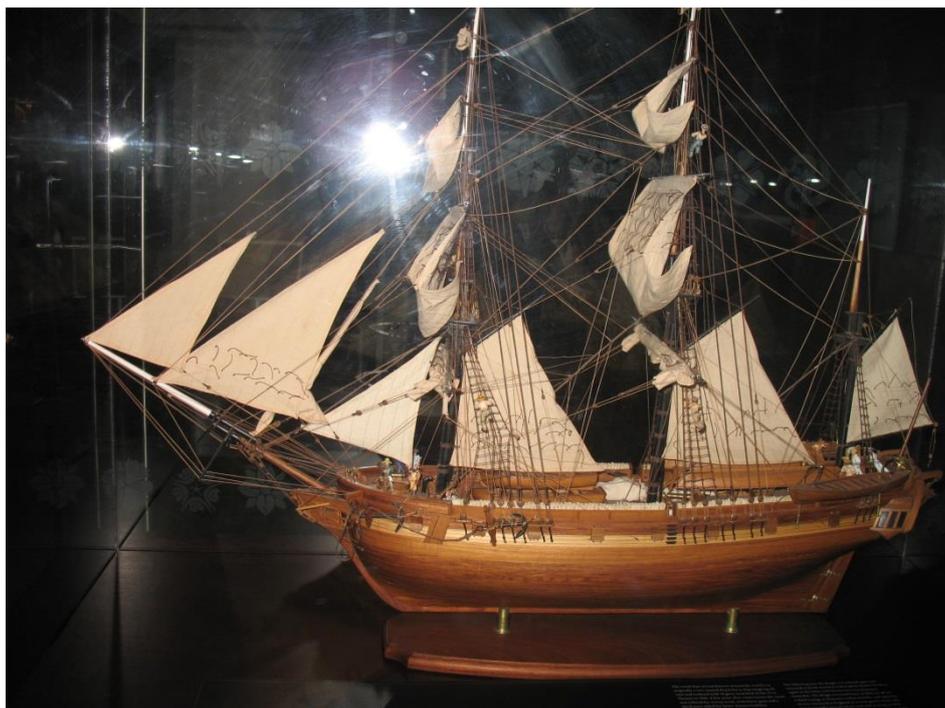


Figure 1.0: Model of the *HMS Beagle* in *Darwin: Big idea, big exhibition*.

Source: American Museum of Natural History. Photo by Afshan Heuer.

The exhibit featured Darwin's personal voyage from young to accomplished scientist, from youth to family man, as well as the trials and tribulations surrounding the publication of his findings. The "exhibit producers" made a conscious effort to both humanise and contextualize the theory of evolution through the application of an "HPS method" – the history and philosophy of science - which is based on "a conviction that the learning of science needs to be accompanied by learning about science"²³. The approach to the exhibit theme comprised the history and philosophy of science (HPS) as it relates to the theory of evolution and included the nature of science (NOS) by providing information on 'what science is' and the 'way science works' as a method of inquiry. The exhibit

²³ Matthews, Michael R. 1994. *Science Teaching: The Role of History and Philosophy of Science*. Howard, V. A. and Scheffler, Israel (eds). Harvard Graduate School of Education. London and New York: Routledge, p xiii.

content was scientific, historical and autobiographical and could therefore appeal to a wide audience with interests ranging from nature and science to history and philosophy. An analysis of learning in this exhibition, within the Canadian and British contexts, provides insight into the effectiveness of the HPS method of science teaching in the international museum context.

The *Darwin* exhibit also included content on social reactions to Darwin and thus explicitly addressed contentious aspects of both the historical and current 'religion versus science debate'. As "the idea of evolution challenges received wisdom on how we humans got here, and thus who and what we are",²⁴ evolution can therefore be seen as disputing the Divine Creation narrative, or vice versa... As Niles Eldredge, the exhibit curator explains:

As Darwin himself saw, there is no necessary conflict between the two. Only the insistence on strict biblical literalism – the belief that everything in the Bible must be true, including the mutually inconsistent accounts in Genesis on the origin of the earth, life, and human beings – forces a collision between the worlds of biology and Judeo-Christian religion.²⁵

Nevertheless, social and cultural contention and 'issues of debate' continue to 'surround' evolution, especially regarding the teaching of evolution in formal, public educational institutions in the United States. This has led to many legal challenges, beginning with the Tennessee versus John Scopes "Monkey Trial" in 1925 and continuing today. The

²⁴ Eldredge, Niles. 2005. *Charles Darwin. Discovering the Tree of Life*. New York: W.W. Norton, p12.

²⁵ Ibid, p13.

exhibition was thus likely to provoke reactions from audiences because of the diversity of views, many of them strongly held. Additionally, visitor perspectives, perceptions and opinions on the theory of evolution, as well as of Darwin himself, potentially vary according to culture and worldview, thus providing added interest for addressing this topic in cross-cultural museum learning. Divergent attitudes to evolution also exist within cultures as well as the more fundamental reasons for accepting or refuting evolutionary science. Michael Shermer, in *Why Darwin Matters*, reviews the main reasons individuals resist or reject evolution: “a general resistance to science”; “belief that evolution is a threat to specific religious tenets”; “the fear that evolution degrades our humanity”; “the equation of evolution with ethical nihilism and moral degeneration”; and “the fear that evolutionary theory implies we have a fixed human nature”.²⁶ An objective of the audience research was to analyse visitors’ pre-visit and post-visit perspectives, knowledge and understanding of the theory of evolution as well as their opinions and points of view in order to better understand meaning-making processes in evolution learning. The research therefore explores personal perceptions of the relationship between ‘science’ and ‘truth’ with the intention to better understand the museum’s role and function in providing effective free-choice, evolution learning experiences.

²⁶ Shermer, Michael. 2006. *Why Darwin Matters, The Case Against Intelligent Design*. New York: Henry Holt and Company, LLC, p21.

Applying an inductive approach based on grounded theory and implementing a post-modernist, pluralistic view, this research analyses the influence of culture and worldview on the acceptance of evolution and related meaning-making processes while aiming to promote understanding and respect for individual perspectives and to avoid value-judgments on the supremacy or dominance of one specific perspective. Constructivism is fundamental to the research methodology as it is employed to analyse visitors' acquisition of knowledge and incorporates the relationship between prior knowledge, visitor engagement and newly acquired knowledge and understandings. Transformative learning theory, a sub-set of constructivism, is also essential to the research methodology but is most important in its application to the area of study - culture, worldview and evolution learning - providing the theoretical framework for understanding and analysing visitors' meaning perspectives or habits of the mind and meaning schemes which are expressed as points of view.

Jack Mezirow's transformative learning theory provides the relevant theoretical framework required for including culture, worldview and perspectives as fundamental aspects in adult learning. Based on Brazilian educator Paulo Freire's theory of "conscientization", understood as critical consciousness leading to a more in-depth comprehension of the world, Mezirow defines learning from his perspective:

Transformative learning refers to the process by which we transform our taken-for-granted frames of reference (meaning perspectives, habits of mind, mind-sets) to make them more inclusive, discriminating, open, emotionally capable of change, and reflective so that they may generate beliefs and opinions that will prove more true or justified to guide action.²⁷

Mezirow's theory highlights the importance of cultural context in learning as frames of reference (cultural paradigms or worldview) provide "the structure of assumptions and expectations through which we filter sense impressions".²⁸ A 'worldview' is perceived as comprised of habits of the mind – which include "knowledge, cognition, concepts of the self (psychology), philosophy and religion" – that are expressed as points of view.²⁹ Applying Mezirow's theory of transformative learning, the research aims to answer the following question: How are culture, worldview, frames of reference, habits of the mind, meaning schemes (beliefs or attitudes), tacit assumptions and points of view implicated or involved in meaning-making processes in evolution learning?

Mezirow differentiates between the learning of information or ideas that correspond to or are supported by individual frames of reference and transformative learning where "taken-for-granted norms and practices are confronted and challenged, and frames of reference become more

²⁷ Taylor, Edward W. 2009. 'Fostering Transformative Learning'. In Mezirow, Jack and Taylor, Edward W. (eds). *Transformative Learning in Practice: Insights from Community, Workplace and Higher Education*. San Francisco: Jossey Bass Inc., pp 3-18, p 7-8.

²⁸ Ibid, p8.

²⁹ Ibid, p18.

differentiated, open and inclusive”.³⁰ He considers meaning-making that includes critical reflection on personal tacit assumptions and expectations in relation to those of others and an evaluation and/or negotiation of these assumptions during the process of interpretation as the most important type of adult learning.³¹ The application of transformative learning theory to museum audience research is therefore perhaps most relevant where it contributes to the study’s evaluation of the exhibit’s ability to foster critical reflection on tacit assumptions and relationships between cultural, philosophical, religious and scientific frameworks that combine to form a worldview. As science both interacts with and contributes to worldviews and the exhibition provides an HPS approach to learning “about evolution” as well as multiple perspectives presented as variable attitudes toward the theory of evolution through time and within European and American cultures, visitors were encouraged to critically reflect. Furthermore, as presented in the exhibit, the scientific theory of evolution by natural selection itself has implications for culture, society and worldview, having served to fundamentally modify previous commonly-held views on man’s origin, history and position in nature through scientific understanding of the earth’s processes and the age of the earth. A key aspect of this analysis of adult learning is the capacity of adult museum visitors’ capacity to critically

³⁰ Duveskog, Deborah and Friis-Hanson, Esbern. 2009. ‘Farmer Field Schools: A Platform for Transformative Learning in Rural Africa’. In Mezirow, Jack and Taylor, Edward W. (eds). *Transformative Learning in Practice: Insights from Community, Workplace and Higher Education*. San Francisco: Jossey Bass, p 243.

³¹ Mezirow, Jack and Associates. 2000. *Learning as Transformation: Critical Perspectives on a Theory in Progress*. San Francisco: Jossey Bass Inc., p4.

reflect on both their own perspectives and those of “others” in relation to scientific evidence.

Furthermore, as the main constituents of *Darwin: The Evolution Revolution* are American, the research aims to determine whether Canadian and British visitors’ perceptions of frames of reference and perspectives, as expressed in the exhibit, were influenced by the presence of ‘cultural cues’.³² ‘Cultural cues’, understood in the thesis as indicators of the original cultural system or interpretive framework (i.e. ‘code’ of messages), are present in the Darwin exhibit in various ways. For instance, the exhibit texts are written implementing American grammar and spelling, videos feature American scientists with American diction and accents and the cultural contextualisation provided for the current ‘science versus religion debate’ in the exhibit is American. Thus, a subsidiary aim was to determine whether visitors would identify the cultural framework³³ of messages and to analyse the possible effect on interpretation and perceptions of local cultural relevance.

³² The issue of “cultural references” or “cultural cues” in travelling exhibit content was raised in the researcher’s analysis of the travelling exhibition “Mouches” (Flies) produced by The NHM Neuchâtel, Switzerland shown in 2007 in Paris at the National NHM. Portions of the exhibit were “culturally translated” such as a video of Swiss celebrities (well-known actors and journalists) reacting to the presence of a fly that was replaced by a video featuring French celebrities. A two-week study of the Swiss exhibit and French adaptations – including underlying reasons – was performed before the creation of the research objectives and tools.

³³ Eco, Umberto. 1994. *The Limits of Interpretation*. First Midland Book Edition. Bloomington: Indiana University Press, p5.

Based on a post-modernist ontological perspective and a constructivist epistemological position this study implements a cultural approach to communication and learning with the aim of analysing both learning as the acquisition of knowledge and transformative learning. The analysis of learning therefore has a dual focus. It differentiates between two 'types' of learning: the assimilation of new knowledge as a 'gleaning of facts' from exhibit content (and including the relationship between prior knowledge, interest, engagement and learning) and transformational learning. The aim is to identify the 'type' of adult learning experiences taking place, and most importantly, to define 'if', 'when', 'how' and 'why' transformative learning occurs. Combining qualitative and quantitative research measures in visitor studies in a research methodology devised for the thesis, visitors' perceptions of modifications in knowledge levels through engagement and learning are calibrated using a number scale which serves as an indicator of the "level of perceived change". This "transformative learning scale" functions as an indicator of the type and focus of visitor learning in direct relation to content provided in the exhibit.

This analysis of transformative learning also aims to reveal the variability of attitudes toward evolution, including different issues and concerns regarding the implications of the theory of evolution within specific cultural contexts. Acceptance of the scientific theory, including the acceptance of human evolution, and its interaction with religious or philosophical frameworks, will be demonstrated to consist of a negotiation of these frameworks with scientific postulates and findings as worldview input. Visitors' tacit assumptions of Charles Darwin's perspectives and beliefs,

individual understandings of the significance of the theory of evolution and personal views on the implications of the theory of evolution will be shown to have significant impact on meaning-making and understanding. Finally, perspective formulation, affirmation and transformation as a result of critical reflection and learning will be discussed as an essential function or role of the museum in providing transformative learning experiences in informal evolution learning for adults.

The thesis is divided into six chapters. The first two chapters present the theoretical framework upon which the thesis research was based, providing a review of relevant literature and knowledge on the topic of study as well as definitions of key terms and concepts. In *Chapter One: Culture, Communication and Learning*, a definition of the term 'culture' is provided and the communication process is analysed with a focus on the cultural aspects of communication through both a semiotic lens and Eileen Hooper-Greenhill's cultural approach. Metaphysical views of the nature of reality (ontology) as well as philosophical views on the nature of knowledge including methods for producing and acquiring knowledge (epistemology) serve to introduce the topic of museum education and learning. Learning theory upon which the thesis is based is presented: constructivism, the contextual model of learning, the socio-cultural approach to learning and transformative learning theory. Finally, definitions of learning as well as key concepts in learning theory are provided.

Chapter Two: Culture, Worldview and Evolution details the impact of Darwin's scientific contribution, the theory of evolution by means of natural selection, upon science, and analyses the cultural, sociological and anthropological significance of this theory. The nature of science is discussed, including a presentation of historical debates and the current scientific paradigm. 'Science and worldview' are defined and the relationship between these terms is analysed. Finally, Darwin's views on religion and science are presented as an example of perspective transformation.

Chapter Three: Research Methodology and Method of Inquiry explains the focus, scope and limitations, objectives, questions and desired outcomes of the thesis research. Details of the research methodology and the research method of inquiry are provided; the ontological and epistemological positions are justified as well as the approach, strategy and design of research tools.

Chapter Four: Programming Motives, Institutional Goals, Educational Objectives and Exhibit Adaptations examines the context of the research, presenting an analysis of the exhibit studied, the prime message vectors which serve to communicate the main exhibit messages and the institutional and educational objectives. Cultural and site-specific adaptations of the exhibit at host institutions are detailed and issues in design and visitor experience are described.

Chapters 5 and 6 summarise results from the audience research. *Chapter Five: Audience Research of Visitor Experience, Dwell Times and Learning*

as *Acquisition of Knowledge* focuses on the analysis of visitor behaviour, dwell times and the evaluation of learning as the acquisition of knowledge through a comparison of pre-visit and post-visit knowledge. *Chapter Six: Culture, Worldview, Perspectives and Transformative Learning* presents findings from the analysis of worldview and perspectives, also before and after visiting *Darwin*, at both research sites. The exhibit's ability to encourage critical reflection as well as trigger or foster transformative learning experiences and perspective transformation is analysed. Hence, the impact of the exhibit on visitors' perspectives, tacit assumptions and points of view is examined implementing transformative learning theory.

Finally, the thesis conclusion analyses the implications and applications of research findings and provides recommendations for informal adult education, methodology and method of inquiry in museum audience research as well as suggestions for best practices for international travelling exhibitions. Thus the major findings of the thesis research are summarized, research questions are answered and suggestions are made for future research.

The relevance and contribution of the thesis research functions on several levels: through the chosen context of international travelling exhibitions for the audience research, by employing a "theory to practice" approach to the evaluation of communication and learning, by establishing a new line of inquiry which addresses the cultural aspects of communication and learning through the exhibition medium and finally, by devising new methods of audience research to evaluate transformative learning in the

museum and the influence of culture, worldview and perspectives in evolution learning.

The focus on culture, worldview and perspectives in evolution learning through the application of transformative learning theory represents a novel approach to museum audience research. As communities are often multicultural as opposed to mono-cultural, and composed of individuals with diverging perspectives and worldviews, the conclusions of this study may be applied both within diverse cultures as well as across cultures.

The original contribution of the thesis is therefore in the approach to the research question as well as in the theory-based methodology which necessitated the creation of new evaluation tools. Essentially, this thesis has both theoretical and practical relevance by establishing a new line of inquiry and new methods of museum audience research.

Chapter One: Culture, Communication and Learning

1.0 Introduction

This chapter presents a review of relevant literature, research and knowledge from various fields of study that provide the theoretical framework vital to the question of cross-cultural communication and learning in travelling exhibitions upon which the approach of the thesis is based. Studying museums is a complex task, bringing into play diverse academic disciplines, philosophies and approaches: the social and cultural role of museums drawing upon sociological research and the field of cultural studies, analysing meaning-making and learning through the exhibition medium is based in the field of museum studies and education theory and understanding visitor experience is based upon psychology, sociology and visitor studies research.³⁴ As researching the cultural aspects of communication and learning through the exhibition medium on an international scale represents a new line of inquiry in museum studies, the review of literature was driven by a need to effectively identify pertinent theoretical frameworks to apply to the research question, requiring an in-depth investigation of museum studies theory, communication and education theory as well as a more broad-reaching or wide-ranging assessment of publications in associated academic fields within which culture itself is studied such as in philosophy, anthropology, sociology and evidently cultural studies.

³⁴ Hooper-Greenhill, Eilean. 2000. *Museums and the Interpretation of Visual Culture*. London: Routledge, px.

This chapter will therefore present the communication and learning theories upon which the research methodology is based and provide a theoretical analysis of the influence of culture in museum communication and learning. The theoretical implications of the focus of research will be discussed in order to provide justification for the thesis' ontological and epistemological approach essentially guiding the research method and methodology. Additionally, central themes and key concepts in the thesis, such as the intricate and complex term 'culture', will be identified, defined and analysed.

1.1 Culture: The Definition of a Key Concept

The meaning of 'culture' has significantly evolved over time: originally referring to the cultivation of crops and husbandry, in the 16th century, 'culture' developed new meaning as a metaphor to refer to human development³⁵ through education, a meaning which persists today.³⁶ Historically, 'culture' has been equated with "civilisation" and the act of becoming "civilised" or "cultivated", applied to express perceptions of both the superiority and domination of European civilisation.³⁷ Johann Gottfried von Herder in *Ideas on the Philosophy of the History of Mankind* (1784-91) challenged this view as he speaks of 'cultures' in the plural form, referring

³⁵ Williams, Raymond. 1988. *Keywords, A Vocabulary of Culture and Society*. Rev. Ed. London: Fontana Press, p87.

³⁶ Merriam-Webster Online Dictionary. 2005. 'culture'. Merriam-Webster Online Inc. <http://www.merriam-webster.com/dictionary/culture> (accessed 13.02.2007).

³⁷ Williams, Raymond. 1988. *Keywords, A Vocabulary of Culture and Society*. Rev. Ed. London: Fontana Press, p89.

to various nations, periods, as well as social and economic groups.³⁸ This new definition of 'culture' intentionally leans away from the perception of civilisation on a scale, with 'primitive' on one extreme and the 'high-class Europeans' on the other. The term 'culture' has since taken on new meanings, at times diverging, according to academic fields of study³⁹; thus:

The key to understanding 'culture' is to identify the discursive context within which it is used, which may be discourses of anthropology, communication studies, educational theory, art history, curatorship, museum visitor studies, and so on. In each case, the meaning of 'culture' will be determined relationally, according to the other terms within the context of use.⁴⁰

The field of anthropology, the study of human behaviour, societies and cultures defines 'culture' as:

a: the integrated pattern of human knowledge, belief, and behaviour that depends upon the capacity for learning and transmitting knowledge to succeeding generations

b: the customary beliefs, social forms, and material traits of a racial, religious, or social group; *also* : the characteristic features of everyday existence (as diversions or a way of life) shared by people in a place or time <popular *culture*> <southern *culture*>

c: the set of shared attitudes, values, goals, and practices that characterizes an institution or organization <a corporate *culture* focused on the bottom line>

³⁸ Williams, Raymond. 1988. *Keywords, A Vocabulary of Culture and Society*. Rev. Ed. London: Fontana Press, p89.

³⁹ Ibid, p87.

⁴⁰ Hooper-Greenhill, Eilean. 2000. *Museums and the Interpretation of Visual Culture*. London: Routledge, p13.

d: the set of values, conventions, or social practices associated with a particular field, activity, or societal characteristic <studying the effect of computers on print culture>.⁴¹

Culture influences both learning and communication and includes customs, traditions and beliefs of specific social groups while providing shared values and goals as well as conventions and social practices.

According to Hooper-Greenhill, Raymond Williams' definition of culture as a "realized signifying system"⁴² best applies in museum studies as it is perceived as intrinsically linked to "meaning-making". Williams defines culture:

not as a separate domain of high-quality people and artefacts, nor as a whole way of life, but as a dimension of all institutions. 'Culture' is a set of material practices, which in their performance construct meanings, values and subjectivities.⁴³

Hooper-Greenhill expands on this definition, combining the views of Stuart Hall, E. Doyle McCarthy, John Uzo Ogbu and Tim O'Sullivan, explaining culture should be seen as consisting of "processes" or "signifying practices", which "vary according to cultural background, experience and knowledge" and are used in the "production and exchange of meanings". Thus culture is constitutive or generative as oppose to reflective, as "cultural symbols have the power to shape cultural identities at both individual and social levels; to mobilise emotions, perceptions and values;

⁴¹ Merriam-Webster Online Dictionary. 2005. 'culture'. Merriam-Webster Online Inc. <http://www.merriam-webster.com/dictionary/culture> (accessed 13.02.2007).

⁴² Hooper-Greenhill, Eilean. 2000. *Museums and the Interpretation of Visual Culture*. London: Routledge, p12.

⁴³ Ibid, p12.

to influence the way we feel and think”.⁴⁴ Thus knowledge production and meaning construction, through which “reality” is achieved, are at the core of “culture”.⁴⁵

1.1.1 Culture and the Museum as a ‘Cultural’ Institution

As the museum is an integral part of society and is both representative of and serves the individual society that created it, the values represented both in and by a museum are inextricably linked to history and culture.

While the museum as a cultural institution has deep roots in the ancient Greek traditions of displaying votive offerings in a religious context and the ancient Roman display of “public wealth”, as the motivation for the “ancient museum” was “public and religious benefaction” as opposed to “popular education”,⁴⁶ modern museum practice has since significantly evolved.⁴⁷

Certain core values and functions have remained; others have been

⁴⁴ Hooper-Greenhill, Eilean. 2000. *Museums and the Interpretation of Visual Culture*. London: Routledge, p13.

⁴⁵ Ibid, p12-13.

⁴⁶ Strong, Donald. 1973. *Archaeological Theory and Practice*. New York: Seminar Press, p247.

⁴⁷ For a social history of museums, and particularly public education goals and access issues at the British Museum in the late 1780’s see Hudson, Kenneth. 1975. *A Social History of Museums: What the Visitor Thought*. London: The MacMillan Press Ltd., p8-10.

transformed through a shift in focus from conserving and displaying collections to public education.⁴⁸

Throughout history, museum institutions have served as symbols of power and prestige; even today, any city with a renowned museum is seen as culturally or educationally “significant”. These values continue to forge visitors’ concepts of the role, function and significance of the museum institution in current society. As “authorities of knowledge” [...] “museums and their spatiality possess the power of knowledge which may further dominate the shaping of the public’s ideologies and beliefs of what to be considered the ‘truth’.”⁴⁹ The museum is therefore an authority on knowledge and “truth”, which remains a component (of variable degree) of the contemporary museum “voice”. As “arbitrators of knowledge”, museums “subsequently produce *hegemony* in defining culture.”⁵⁰

However, public perceptions of museum institutions within culture and society are neither homogenous nor constant; rather:

⁴⁸ For ICOM’s definition of museum please see International Council of Museums. 2005. ‘ICOM Statutes Article II Definition 1946’. *Development of the Museum Definition according to ICOM Statutes (1946 – 2001)*.

http://icom.museum/hist_def_eng.html (Site accessed 15.03.07). For results of tensions between museum professionals on audience focused or collections focused practices please see Boylan, Patrick J. 1999. ‘Forward’. In Moffatt, Hazel and Woollard, Vicky (eds). *Museum and Gallery Education: A Manual of Good Practice*. London: The Stationery Office, pvii.

⁴⁹ Dai-Rong, W.U. 2006. ‘Cultural Hegemony in the museum world’. *INTERCOM Conference Paper*. INTERCOM <http://intercom.museum/documents/2-5Wu.pdf> (accessed 13.05.2013), p3.

⁵⁰ *Ibid*, p4.

The concept of a 'museum' is in a continuous state of development. It is modified by the politics of the museum's situation, the content of its collections and the audiences it aims to serve.⁵¹

1.2 Exhibitions, communication and culture

Museums can be considered as “mass communicators” and exhibitions analysed as a communication medium serving to present and transfer knowledge to the public, as: “a *medium* can be defined as the physical means by which some system of ‘signs’ [...] for recording ideas can be actualized.”⁵² Communication, or “the activity of dialogue, interaction and intercourse”,⁵³ implies both a “sender” and “receiver” of messages as is evident in Claude Shannon and Warren Weaver’s 1947 general model of communication based on the “transmission view” (cited in Hooper-Greenhill).⁵⁴ Albeit communication entails both sending and receiving messages, effective communication, however, necessitates active meaning-making upon reception or an understanding of messages received, as highlighted in Eilean Hooper-Greenhill’s application of the

⁵¹ Ambrose, Timothy and Paine, Crispin. 1994. ‘Some definitions of Museum’. In Kavanagh, Gaynor (ed.), *Museum Provision and Professionalism*. London and New York: Routledge, p15.

⁵² Danesi, Marcel. 2002. *Understanding Media Semiotics*. London: Arnold, p2.

⁵³ Bennett, Tony, Grossberg, Lawrence and Morris, Meaghan (eds). 2005. *New Keywords: A Revised Vocabulary of Culture and Society*. Malden, Oxford and Victoria: Blackwell Publishing Ltd., p48.

⁵⁴ Hooper-Greenhill, Eilean. 1999. ‘Communication in theory and practice’. In Hooper-Greenhill, Eilean (ed). *The Educational Role of the Museum*. 2nd Ed. London: Routledge, p31.

transmission model of communication to museum exhibitions.⁵⁵

Furthermore, a major flaw in the transmission model applied to museum communication is that the visitor is perceived as a passive as opposed to active agent and, most importantly, if the visitor does not “receive” the exhibition message as intended, then communication fails.⁵⁶

Essentially, the assumption that effective communication through exhibition medium implies visitors’ understanding of messages as intended does not include unintended messages. As it is false to perceive communication as a “one-sided” process, culture must be considered a fundamental factor influencing both the transmission and the reception of messages, thus culture not only influences museum visitors and the reception of messages, but also museum workers themselves and the messages they create. As cultural and social conceptions clearly influence museum communication, this thesis proposes an adapted version of Hooper-Greenhill’s transmission model of communication applied to museum exhibitions (cited in Hooper-Greenhill),⁵⁷ adding specific cultural factors and the integration of visitor feedback in the development process:

⁵⁵ Hooper-Greenhill, Eilean. 1999. ‘Communication in theory and practice’. In Hooper-Greenhill, Eilean (ed). *The Educational Role of the Museum*. 2nd Ed. London: Routledge, p32.

⁵⁶ Ibid, p34.

⁵⁷ Ibid, p32.

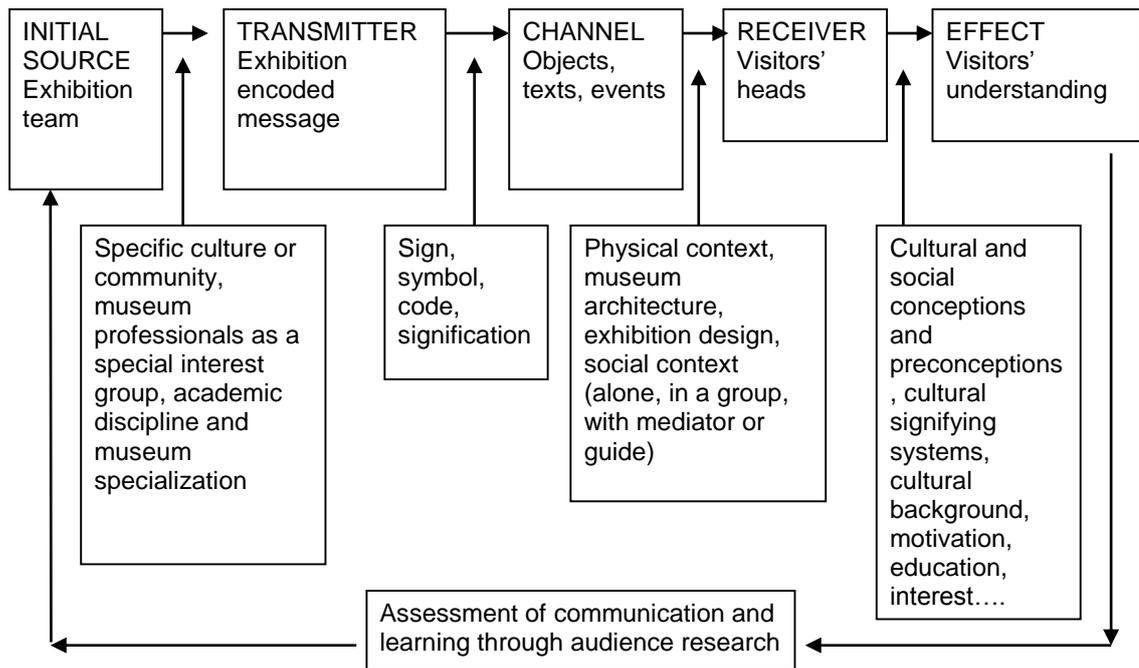


Figure 1.1: Adapted Exhibition Communication Model with cultural aspects of communication and integration of visitor feedback - a modified version of the transmission model of communication applied to museum exhibitions (cited in Eilean Hooper-Greenhill, 1999).

As this thesis implements Raymond Williams' definition of culture as a "realized signifying system"⁵⁸, the adapted version of the "exhibition model" proposed is based on a semiotic analysis of communication as a study of signs, symbols and signification which fundamentally influence the representation and interpretation of messages. Semantics, or the relationships between signs and meanings, may vary according to 'culture'. Within semiotic theory, culture is perceived as creating representations of interpretations or meanings: culture therefore

⁵⁸ Hooper-Greenhill, Eilean. 2000. *Museums and the Interpretation of Visual Culture*. London: Routledge, p12.

“constitutes a network of meaning structures” and can be defined as a “signifying order”.⁵⁹

Within the adapted exhibition communication model proposed in the thesis, the exhibition development team is perceived as a “sub-group” that produces an encoded message consisting of the application of a signifying system on objects and texts, which is then displayed in a specific physical environment to be visited by various social groups who will in turn decode this message according to their own cultural signifying system. Sign systems and codes and specific “cultural” significations are unconsciously (at times consciously) included in the encoded message, more specifically in the treatment of objects and in the creation of the exhibition discourse. As the exhibition itself is an encoded message, visitors must possess the key to the signifying system utilized in order to decode the exhibition messages and actively construct meaning. Museum visitors do not simply receive a transmitted message, but rather “apply” their own cultural and social preconceptions, varying signifying systems as well as motivations, interest, previous knowledge (and much more) to the “message received”, allowing for multiple and diverse interpretations of messages. Although an assessment of whether intended exhibition messages are generally understood continues to be relevant, variation in interpretation requires consideration which includes the visitor as an active agent in meaning-making processes. Furthermore, in order to effectively adapt exhibition messages as necessary in cross-cultural communication, the

⁵⁹ Danesi, Marcel. 2002. *Understanding Media Semiotics*. London: Arnold, p26.

communication process should no longer be perceived as strictly linear, but rather semi-circular, as the findings from evaluations of visitor understandings can be utilised by the exhibition team to modify the original encoded message.⁶⁰

1.2.1 Hooper-Greenhill's Cultural Approach to Communication in the Museum

The cultural approach to communication proposed by Eilean Hooper-Greenhill is essential to present and future museum practices as it places visitor meaning-making processes at the same level of importance as the communication of intended meanings. Hooper-Greenhill highlights the inter-relationship of culture and communication, maintaining the conviction that “communication is cultural to the core, and culture is impossible without communication.”⁶¹

⁶⁰ Hooper-Greenhill, Eilean. 1999. 'Communication in theory and practice'. In Hooper-Greenhill, Eilean (ed). *The Educational Role of the Museum*. 2nd Ed. London: Routledge, p34.

⁶¹ Ibid, p34.

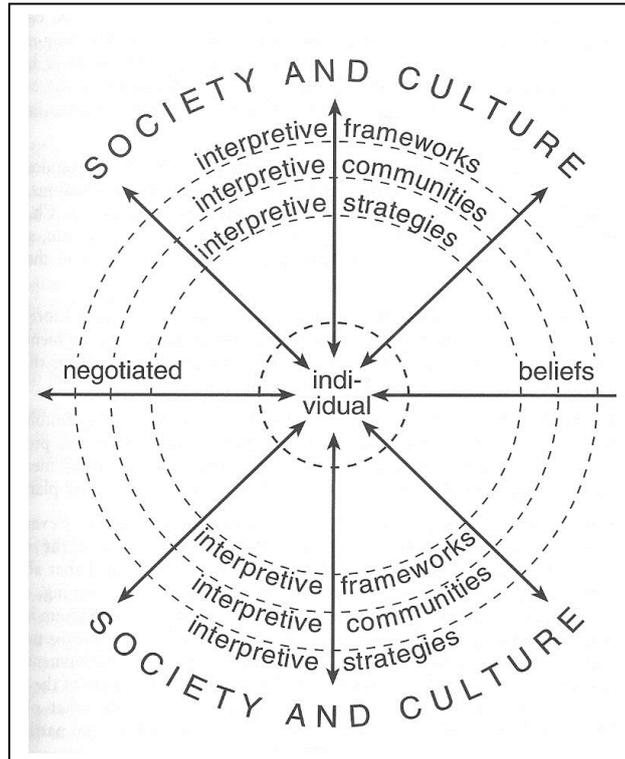


Figure 1.2: The cultural approach to understanding communication based on the constructivist paradigm.

Source: Hooper-Greenhill, Eilean. 1999. 'Education, Communication and Interpretation: Towards a critical pedagogy in museums'. In Hooper-Greenhill, Eilean (ed). *The Educational Role of the Museum*. 2nd Ed. London: Routledge, p17.

The cultural approach to communication Hooper-Greenhill proposes, based on the constructivist paradigm, supplies a broader approach than the previous transmission model as it “understands communication as a society-wide series of processes and symbols through which reality is produced, maintained, repaired and transformed.”⁶² The visitor interpretation process, within a constructivist framework, includes active building where new meanings are both mutually and actively created on the foundations of previous knowledge, perceptions and understandings. Communication is thus perceived as “a cultural process that creates an

⁶² Hooper-Greenhill, Eilean. 1999. 'Education, Communication and Interpretation: Towards a critical pedagogy in museums'. In Hooper-Greenhill, Eilean (ed). *The Educational Role of the Museum*. 2nd Ed. London: Routledge, p16.

ordered and meaningful world of active meaning-makers”⁶³ and when visitor reception or interpretation differs from intended messages, individual or cultural variation can be considered both valid and important.

1.3 Museum Education and Learning: Constructivism, The Contextual Model of Learning and the Socio-cultural Approach

Education through public learning is indisputably an essential and significant component of the museum’s function in today’s society. The educational role of the museum has continually gained importance over time, becoming a major focus for museum work. The “new museology”⁶⁴ movement, as described by Peter van Mensch and in Peter Vergo’s book “The New Museology”, places the public in the centre of the museum’s function as the museum serves society by playing a role both in individual and social development. This shift in focus, from collections to public “free-choice” education, has happened for several reasons: “ranging from changing definitions of learning and pressures on museums to justify their existence, to expanding socio-political roles of museums in increasingly self-conscious societies.”⁶⁵ Undertaking cultural action and communication through the presentation of original objects in a museological setting, the museum serves as mediator between objects (and information) and the

⁶³ Hooper-Greenhill, Eilean. 1999. ‘Education, Communication and Interpretation: Towards a critical pedagogy in museums’. In Hooper-Greenhill, Eilean (ed). *The Educational Role of the Museum*. 2nd Ed. London: Routledge, p17.

⁶⁴ This term was first used in 1958 by Mills and Grove S. De Borghegy’s book *The modern museum and the community*.

⁶⁵ Hein, George E. 1998. *Learning in the Museum*. New York: Routledge, p12.

visitor, ideally promoting comprehension and the assimilation of knowledge. As a socially-inclusive institution accessible to all, the museum's role is to provide the "tools" required for "understanding" the information it presents, thus facilitating meaning-making processes.

In museums, didactic methods implemented in exhibitions are based on the epistemological position of the exhibition developer, education officer as well as the museum institution itself. A curator or education officer's philosophy of knowledge and learning supply the theoretical background as to how the subject should be broken down for visitors while the teaching theory is the actual application of theory to content (educational material) so learning may take place. "If a museum exhibition communicates effectively, it will reveal meanings and relationships, and this in turn may enable learning, the acquisition of knowledge and enhanced understandings."⁶⁶ Ideally, within museum practice, learning theories are applied to exhibition content, displays and educational learning tools.

1.3.1 Constructivist Approach to Knowledge and Learning

During the latter portion of the nineteenth century, while the educational value of the museum institution was recognized, the "pedagogic approach was based both on a formal didacticism and on the conviction that placing

⁶⁶ Black, Graham. 2005. *The Engaging Museum: Developing museums for visitor involvement*, London and New York: Routledge, p147.

objects on view was sufficient to ensure learning.”⁶⁷ This perspective of museum education, grounded in the transmission model of communication, considered visitors as passive learners: “museum displays were used to transmit the universal laws of object-based disciplines (with natural history as the paradigm) presented in formal and authoritative ways to undifferentiated mass audiences.”⁶⁸

George Hein presents learning theory on a continuum with two extremes: the “transmission-absorption” or “empty vessel” notion of learning which implies the absorption of information little by little; and the notion of active learning and the construction of knowledge as described in the writings of Dewey, Piaget and Vygotsky.⁶⁹ The “transmission-absorption” notion often translates to “didactic exhibitions” as explained by Graham Black, where the purpose is for the teacher to transmit knowledge to a group of passive learners and where learning is seen as the assimilation of facts.⁷⁰ How do these notions hold up when applied to exhibitions? “By their very nature, museum exhibitions must cater for a mass audience. Didacticism works best in circumstances where the audience members share a similar level of background interest, knowledge and understanding.” However, this method does not adapt well to exhibitions targeting diverse audiences with

⁶⁷ Hooper-Greenhill, Eilean. 2000. *Museums and the Interpretation of Visual Culture*. London: Routledge, p2.

⁶⁸ Ibid, p2.

⁶⁹ Hein, George E. 1998. *Learning in the Museum*. New York: Routledge, p21-22.

⁷⁰ Black, Graham. 2005. *The Engaging Museum: Developing museums for visitor involvement*, London and New York: Routledge, p130.

varying interests and expectations.⁷¹ Today,

the view of education as a process that prioritises the experience and learning needs of the learner, combined with a greater recognition of the diverse social characteristics and cultural attitudes of differentiated audiences, demands now that museums develop new forms of relationships with visitor and user communities which are based on more interpersonal methods of communication, and on much broader approaches to pedagogy.⁷²

Constructivism recognizes the subjective nature of human knowledge and deems it both important and relevant to understanding reality and truth: the “real world” is no longer separate from the individual thus allowing research to be “subject-centred” as oppose to “object-centred”.

Constructivist epistemology, the notion of active learning and the construction of knowledge from experience, is perhaps one of the most popular and widely accepted learning theories in today’s informal learning environments, especially in science museums. Constructivism opposes the positivist perspective where reality exists separately from human consciousness as it purports that “science is a creative human endeavour which is culturally and historically conditioned, and that its knowledge claims are not absolute.”⁷³ This may appear to contradict the very nature of science as a field of study, however, it is important to distinguish

⁷¹ Black, Graham. 2005. *The Engaging Museum: Developing museums for visitor involvement*, London and New York: Routledge, p131.

⁷² Hooper-Greenhill, Eilean. 2000. *Museums and the Interpretation of Visual Culture*. London: Routledge, p3.

⁷³ Matthews, Michael R. 1994. *Science Teaching: The Role of History and Philosophy of Science*. Howard, V. A. and Scheffler, Israel (eds). Harvard Graduate School of Education. London and New York: Routledge, p139.

between science as a practice and science learning as both science teaching and learning necessarily imply the inclusion of the individual as well as society and culture. Within constructivist epistemology, “knowledge is the result of an individual subject’s constructive activity, not a commodity that somehow resides outside of the knower and can be conveyed or instilled by diligent perception or linguistic communication.”⁷⁴ As individuals learn “actively” and new knowledge is “constructed” based on previous knowledge and experience, learners are considered as individuals from specific historical, political, social and cultural contexts. Individual learning styles are therefore recognised and addressed and visitor motivations, previous knowledge levels and experience are taken into consideration. Thus, constructivism recognizes the effect of both individual and collective experience on meaning-making processes, validating the relevance of analysing of learning and experience in exhibitions within different cultures.

With the shift to visitor-centred approaches through a constructivist paradigm, visitors are perceived as active learners and meaning-makers and the social and cultural aspects of learning are recognised.

Constructivist learning theory applied to exhibitions tends to produce open learning environments where participants actively construct their own paths, meanings and experiences and commonly includes “hands-on” learning opportunities. This method greatly solicits the visitor and counts

⁷⁴ von Glasersfeld, Ernst. 1990. *The Construction of Knowledge*. Salinas: Intersystems Publications, p37 cited in Matthews, Michael R. 1994. *Science Teaching: The Role of History and Philosophy of Science*. Howard, V. A. and Scheffler, Israel (eds). Harvard Graduate School of Education. London and New York: Routledge, p139-140.

on the visitor's motivation: one of the downfalls of the constructivist approach to learning is that it "may be highly effective with structured educational groups, but is likely to require hard work on the part of the casual visitor, not something necessarily sought by someone on a leisurely social outing".⁷⁵ During the process of designing specific "hands on" interactive elements, it is important to highlight that physical interaction with didactic elements does not necessarily induce effective learning as interaction must also be "minds-on".⁷⁶

Once the visitor has entered the museum, the challenge for museums is to provide an appropriate and captivating learning experience. The essential question is, how do visitors construct meaning? Rather than learning from viewing objects, museum pedagogy, according to Hooper-Greenhill, "is structured firstly through the narratives constructed by museum displays and secondly through the methods used to communicate these narratives."⁷⁷ The visual aspect of museum display is still essential to museum learning, as "museum pedagogy produces a visual environment for learning where visitors deploy their own interpretive strategies and repertoires."⁷⁸ However, what is actually learned and how? Must the visitor construct the "intended meanings" defined by the exhibition producers in order to have actually learned something?

⁷⁵ Black, Graham. 2005. *The Engaging Museum: Developing museums for visitor involvement*, London and New York: Routledge, p148-149.

⁷⁶ Ibid, p162.

⁷⁷ Hooper-Greenhill, Eilean. 2000. *Museums and the Interpretation of Visual Culture*. London: Routledge, p3.

⁷⁸ Ibid, p3.

1.3.2 Defining Museum Learning Through a Constructivist Paradigm

As varying philosophies on the nature of knowledge and learning exist, understanding, defining and evaluating museum learning is a complex task. The UK “Campaign for Learning” definition, adopted in 2001 by Resource (The Museums, Library and Archives Council or MLA) is clearly based on constructivist epistemology as it states:

Learning is a process of active engagement with experience. It is what people do when they want to make sense of the world. It may involve the development or deepening of skills, knowledge, understanding, awareness, values, ideas and feelings, or an increase in the capacity to reflect. Effective learning leads to change, development and the desire to learn more.⁷⁹

As noted in John Falk and Lynn Dierking’s “Contextual Model of Learning”, time is a prime factor in evaluating learning, as the aim is to influence knowledge and understanding over time.⁸⁰ “In contemporary conditions, learning becomes not only “lifelong”, suggesting learning as relevant throughout the life course, but also “life-wide”, suggesting learning as an essential aspect of our whole life experience, not just that which we think of as “education”.⁸¹

⁷⁹ Black, Graham. 2005. *The Engaging Museum: Developing museums for visitor involvement*, London and New York: Routledge, p132.

⁸⁰ Falk, John H., Dierking, Lynn D. 2000. *Learning from Museums: Visitor Experiences and the Making of Meaning*. Walnut Creek, California: AltaMira Press, p136-137.

⁸¹ Black, Graham. 2005. *The Engaging Museum: Developing museums for visitor involvement*, London and New York: Routledge, p125.

1.3.3 *The Contextual Model of Learning*

Falk and Dierking's "Contextual Model of Learning" (based on the Interactive Experience Model) defines three essential contexts in free-choice learning which are seen as overlapping throughout time: personal, physical and socio-cultural. Eight main factors that influence learning and experience within these three contexts are defined and should thus be considered in exhibition development: Personal context (individual factors that influence learning) which includes motivation and expectations, interest, prior knowledge and experience and choice and control; socio-cultural context (which describes factors stemming from the fact that learning is related to the social, cultural and historical context of the experience) which involves within-group socio-cultural mediation, facilitated mediation by others and culture; and the physical context (the environment of the learning experience, the real world, objects, contexts, orientation) which encompasses advance preparation, setting, design and subsequent reinforcing events and experiences.⁸² The factor of time is significant in Falk and Dierking's model, thus highlighting the importance of the influence of museum experiences on visitors' knowledge and understanding over time (not just directly after their museum visit) in "lifelong learning" and/or "life-wide learning".

⁸² Falk, John H., Dierking, Lynn D. 2000. *Learning from Museums: Visitor Experiences and the Making of Meaning*. Walnut Creek, California: AltaMira Press, p136-137.

1.3.4 The Socio-cultural Context

Socio-cultural environments or contexts also influence learning. As highlighted by Falk and Dierking, learning and meaning-making often occurs in social groups and can be considered a social experience. Thus the museum, as a free-choice learning institution, plays a socio-cultural role in learning. The process of “enculturation” is also relevant in learning as it serves to teach children cultural beliefs, values and views and most often takes place informally within the home environment. In the socio-cultural view, “the world has meaning for us because of the shared experiences, beliefs, customs, and values of the groups that inhabit it with us. This collection of shared beliefs and customs is what we have come to call *culture*.” Culture can be defined as a social mechanism used for survival and learning and the “internalization” of shared “cultural imperatives”.⁸³ “Enculturation involves the development of identity as a part of a community, and the museum is one of the organizations that influence this activity.”⁸⁴ As institutions for public learning and communication, museums should be considered “as places for building and affirming identity”.⁸⁵

⁸³ Falk, John H., Dierking, Lynn D. 2000. *Learning from Museums: Visitor Experiences and the Making of Meaning*. Walnut Creek, California: AltaMira Press, p38-39.

⁸⁴ Falk, John H., Dierking, Lynn D and Foutz, Susan. (eds). 2007. *In Principle-In Practice: Museums as Learning Institutions*. Lanham: AltaMira Press, p24.

⁸⁵ Ibid, p24.

1.3.5. *The Socio-cultural Approach to Learning*

Social psychologists, such as George Mead and Kurt Lewin, take a socio-cultural approach to learning. Although the focus in today's society is clearly on the individual, Lev Semanovich Vygotsky (1896 – 1934), an important scholar in developmental psychology, has once again gained influence with his cultural-historical (or socio-cultural) theory. Vygotsky supports the view that individual learning is dependent on social context, placing focus on the society within which both the individual lives and the museum exists and finds purpose. He believes that “all learning is built upon previous learning, not just of the individual, but of the entire society in which that individual lives.”⁸⁶ Vygotsky believes that child development is facilitated by interaction with the surrounding society making learning a collaborative process. Emphasising the role of social interaction in cognition and the acquisition of knowledge, Vygotsky therefore highlights the collaborative aspect of the learning process as “individual development must be understood in, and cannot be separated from, its social and cultural-historical context.”⁸⁷

Sylvia Scribner summarises Vygotsky's contribution to the field of education:

⁸⁶ Falk, John H., Dierking, Lynn D. 2000. *Learning from Museums: Visitor Experiences and the Making of Meaning*. Walnut Creek, California: AltaMira Press, p43.

⁸⁷ Rogoff, Barbara. 2003. *The Cultural Nature of Human Development*. New York: Oxford University Press, p50.

Vygotsky's special genius was in grasping the significance of the social in things as well as people. The world in which we live is humanized, full of material and symbolic objects (signs, knowledge systems) that are culturally constructed, historical in origin and social in content. Since all human actions, including acts of thoughts, involve the mediation of such objects ("tools and signs") they are, on this score alone, social in essence. This is the case whether acts are initiated by single agents or a collective and whether they are performed individually or with others.⁸⁸

Barbara Rogoff, basing much of her work on Vygotsky's socio-cultural theory, argues that human development is a cultural process as "people develop as participants in cultural communities. Their development can be understood only in light of the cultural practices and circumstances of their communities – which also change."⁸⁹ In her book *The Cultural Nature of Human Development*, Rogoff discusses schooling as part of a society's cultural traditions, particularly focusing on expectations and learning. As she explains, most people assume that the chosen age at which certain tasks are performed or responsibilities taken on in their specific community is not only at the appropriate stage in development, but also natural.⁹⁰ But what if this too was cultural? Through her research, Rogoff highlights the vast differences in expectations for the care of younger children that exist between cultures: while Guatemalan Mayan communities often give the responsibility of caring for younger children between the ages of 5 and 7 and the Kwara'ae of Oceania as young as 3 years of age. In contrast,

⁸⁸ Daniels, Harry. 2001. *Vygotsky and Pedagogy*. London: Routledge, p30.

⁸⁹ Rogoff, Barbara. 2003. *The Cultural Nature of Human Development*. New York: Oxford University Press, p3-4.

⁹⁰ Ibid, p4.

American children are not considered capable of caring for younger children or for themselves without adult supervision until at least age 10, and in the U.K. the legal age for children to be left alone is age 14. Another telling example of the cultural aspect of age-related learning expectations Rogoff provides is in middle-class American families where children under age 5 are usually not allowed to handle knives while Central African Aka families train their children at age 8 to 10 months to throw mini spears, axes and digging sticks and 11 month old Efe children in the Democratic Republic of Congo learn to skilfully use machetes.⁹¹

Taking in consideration Vygotsky's socio-cultural theory of learning and Rogoff's examples of socio-cultural expectations in learning, it becomes evident that:

individual development must be understood in, and cannot be separated from, its social and cultural-historical context. According to Vygotsky's theory, the efforts of individuals are not separate from the kinds of activities in which they engage and the kinds of institutions of which they are a part."⁹²

Rogoff explains the relationship between individual and collective development:

human development is a process of people's changing participation in socio-cultural activities of their communities. People contribute to the processes involved in socio-cultural activities at the same time they inherit practices invented by others (Rogoff, 1990, 1998).⁹³

⁹¹ Rogoff, Barbara. 2003. *The Cultural Nature of Human Development*. New York: Oxford University Press, p4-6.

⁹² Ibid, p50.

⁹³ Ibid, p52.

Rogoff's valuable work has served to highlight the relationship between acquired skills and culture-based learning expectations. Although the examples of conclusions from her work may appear to focus on cultural differences, her objective is to emphasise the importance of cultural research in order for researchers to move beyond the era when universal hypotheses were made across cultures and communities (usually assuming that other communities functioned in the same way as the researchers') thus moving toward a time when both similarities and differences across cultures are noted in the aim of better "understanding regularities in the cultural nature of human development".⁹⁴ In the analysis of cultural practices in "foreign communities", it is essential for researchers to avoid ethnocentrism and value judgments. In the evaluation of museum learning and experience from a cultural perspective, uncovering similarities in visitor reception across cultures is not only as important as establishing differences, but may actually therefore be more constructive. Cultural similarities can serve to establish a "common ground" for effective international communication and learning, thus leading to the identification of guidelines for best practices for travelling exhibitions. Cultural differences, on the other hand, are still valuable as these variances provide insight on what to avoid or omit from exhibition content and may serve to establish a plan for (site-specific) cultural adaptations.

⁹⁴ Rogoff, Barbara. 2003. *The Cultural Nature of Human Development*. New York: Oxford University Press, p7.

1.4 Transformative Learning Theory

Transformative learning theory, considered a subset of constructivism, serves to explain the “learning process of constructing and appropriating new and revised interpretations of the meaning of an experience in the world”⁹⁵. In *Transformative Dimensions of Adult Learning* (1991), Dr Jack Mezirow, the founding father of the theory of transformative learning, attempts “to redress an apparent oversight in adult learning theory that has resulted from a failure to recognize the central roles played by an individual’s acquired frame of reference, through which meaning is construed and all learning takes place, and by the transformation of these habits of expectation during the learning process.”⁹⁶

Thus, from a transformative perspective and in alignment with the constructivist paradigm, meaning is considered to exist within each individual and is generated through the interpretation of experiences (based on past experience) with objects and people in the external world. Mezirow maintains that meaning making is central to learning⁹⁷ and defines the meaning making process as such:

⁹⁵ Taylor, Edward W. 2008. ‘Transformative Learning Theory’. *New Directions for Adult and Continuing Education*. Imel, Susan and Ross-Gordon, Jovita M. (eds). Issue 119, Fall. Wiley Blackwell Periodicals, Inc., p5.

⁹⁶ Mezirow, Jack. 1991. *Transformative Dimensions of Adult Learning*. Knox, Alan B. (ed). San Francisco: Jossey -Bass Inc., p4.

⁹⁷ Ibid, p11.

As there are no fixed truths or totally definitive knowledge, and because circumstances change, the human condition may best be understood as a continuous effort to negotiate contested meanings. [...] That is why it is so important that adult learning emphasize contextual understanding, critical reflection on assumptions, and validating meaning by assessing reasons. The justification for much of what we know and believe, our values and our feelings, depends on the context – biographical, historical, cultural – in which they are embedded. We make meaning with different dimensions of awareness and understanding...⁹⁸

Thus, within transformative learning theory, meaning is not static or fixed: “since information, ideas and contexts change, our present interpretations of reality are always subject to revision or replacement”⁹⁹.

The theory of transformative learning benefits from a wide range of theoretical influences (from Paolo Freire and Hans-Georg Gadamer to Jürgen Habermas) and can be epistemologically positioned as a sub-set of constructivism founded on a postmodernist ontology. Dr. Mezirow introduced his transformative (or transformational) learning theory in 1978, basing much of his reflection on the work of Brazilian educator, Paulo Freire (1921 – 1997). The roots of transformational learning theory lie in “critical pedagogy”, and more specifically in Freire’s theory of “conscientization” which Mezirow understands as a critical consciousness leading to a more in-depth comprehension of the world. Freire’s work focused on social transformation where “through conscientization, learners can [...] participate in a dialogic educational process that focuses on

⁹⁸ Mezirow, Jack. 1991. *Transformative Dimensions of Adult Learning*. Knox, Alan B. (ed). San Francisco: Jossey -Bass Inc., p3.

⁹⁹ Ibid, pxiv.

validity testing of assumptions concerning social norms, cultural codes and ideologies that foster dependency and oppression. This entails a rigorous critique of the dehumanizing social, political and economic structures supported by ideologies. Through praxis, the union of reflection and action, learners engage in action to bring about social change”¹⁰⁰ and ultimately emancipation. Friere’s major contribution to transformational learning theory is Mezirow’s incorporation of his key concept of conscientization (which Mezirow refers to as critical reflection) and its fundamental role in transformation, however, Mezirow’s focus is not on social transformation but rather on the process of individual or personal transformation.¹⁰¹

The influence of Hermeneutics and Gadamer’s Hermeneutic Circle on transformation theory is incontestable although slightly more difficult to identify. Firstly, transformation theory and Hermeneutics equally embrace the constructivist paradigm’s recognition of the significance of incorporating prior knowledge within the construction of new knowledge. Both theories address issues of interpretation and meaning making, however with certain similarities and differences. Hermeneutics and constructivism are epistemologically aligned in their belief that knowledge is “culturally inflected” and is therefore relative as well as in their opposition of the transmission view in order to “move away from the

¹⁰⁰ Mezirow, Jack. 1991. *Transformative Dimensions of Adult Learning*. Knox, Alan B. (ed). San Francisco: Jossey -Bass Inc., p136.

¹⁰¹ Taylor, Edward W. 1998. *The Theory and Practice of Transformative Learning: A Critical Review*. Information Series No. 374. Columbus: ERIC Clearinghouse, p17.

behaviourist model of learning”.¹⁰² Transformational learning theory also supports this stance; however, Mezirow does not completely dismiss the “hypothesis testing and deductive logic of the natural sciences” as he believes it is “relevant to instrumental learning (learning to manipulate physical objects or other people) but less applicable to understanding the meaning of what is being communicated”.¹⁰³

Transformational learning is perceived as occurring in two domains, the instrumental and the communicative, a division Mezirow takes from the communicative theory of German philosopher and sociologist Jürgen Habermas¹⁰⁴ (1929 -). Mezirow explains that instrumental learning “involves controlling or managing the environment or other persons, including improving performance. Beliefs are validated by empirically testing – as in science and mathematics – to ascertain whether an assertion is true”.¹⁰⁵ Communicative learning, on the other hand, “involves understanding what others mean when they communicate with us. We validate or justify contested beliefs pertaining to communicative learning

¹⁰² Hooper-Greenhill, Eilean. 1999. ‘Learning in Art Museums: Strategies of Interpretation’. In Hooper-Greenhill, Eilean (ed). *The Educational Role of the Museum*. 2nd Ed. London: Routledge, p49.

¹⁰³ Mezirow, Jack. 1991. *Transformative Dimensions of Adult Learning*. Knox, Alan B. (ed). San Francisco: Jossey -Bass Inc., p5.

¹⁰⁴ Taylor, Edward W. 1998. *The Theory and Practice of Transformative Learning: A Critical Review*. Information Series No. 374. Columbus: ERIC Clearinghouse, p5.

¹⁰⁵ Mezirow, Jack. 2009. ‘Transformative Learning Theory’. In Mezirow, Jack and Taylor, Edward W. (eds). *Transformative Learning in Practice: Insights from Community, Workplace and Higher Education*. San Francisco: Jossey Bass Inc., p20.

through discourse.”¹⁰⁶ Within the domain of communicative learning Mezirow considers logic to be less fundamental as “metaphoric analogy replaces hypothesis”¹⁰⁷.

Mezirow incorporates Gadamer’s concept of the Hermeneutic Circle in his analysis of the “confrontation of the unknown” within communicative learning experiences. According to Mezirow Gadamer’s theory is relevant to transformative learning in its specific treatment of subjective issues in interpretation and understanding (*Verstehen*) through the analysis of the relationships between the “I and Thou” and the “parts to the whole” within a circular dialogic process:

When we confront the unknown – that is, when the properties of an experience do not fit our expectations or further differentiation is called for – our reflection may result in the creation of new meaning schemes or habits of expectation to integrate these properties [...] Each datum is a building block of understanding and is clarified and extended by the discovery of other building blocks in a dialectical symbiotic relationship. We continually move back and forth between the parts and the whole of what we seek to understand.”¹⁰⁸

Although Mezirow incorporates this fundamental Hermeneutic concept, in validating the importance of both instrumental and communicative learning within a process of problem solving (or intentional learning), his views on the nature of interpretation and meaning-making not only differ from the

¹⁰⁶ Mezirow, Jack. 2009. ‘Transformative Learning Theory’. In Mezirow, Jack and Taylor, Edward W. (eds). *Transformative Learning in Practice: Insights from Community, Workplace and Higher Education*. San Francisco: Jossey Bass Inc., p20.

¹⁰⁷ Mezirow, Jack. 1991. *Transformative Dimensions of Adult Learning*. Knox, Alan B. (ed). San Francisco: Jossey -Bass Inc., p5.

¹⁰⁸ Ibid, p82-83.

Hermeneutic stance, but may also appear to conflict. The incorporation of both objectivity and subjectivity within transformation theory possibly stems from Emilio Betti's (1890 – 1968) rejection of Gadamer's "overly subjective" Hermeneutic stance and Habermas' critique of Gadamer's "emphasis on the authority of tradition, leaving no room for critical judgment and reflection."¹⁰⁹ Mezirow's position may also be considered an extension of Martin Heidegger's attempt to resolve the "realism versus idealism" debate, by incorporating the objective (rational) and the subjective (affective) within a transformative process of "reframing":

Objective reframing involves critical reflection on the assumptions of others encountered in a narrative or in task-oriented problem solving, as in "action learning" (Revans, 1982). *Subjective reframing* involves critical self reflection of one's own assumptions about the following: a narrative [...], a system [...], an organisation or workplace [...], feelings and interpersonal relations, and the ways one learns, including one's own frames of reference [...].¹¹⁰

The process of transformation in subjective and objective reframing is perceived as a rational process based on critical reflection.

Transformational learning theory, in embracing both the rational and the affective, serves to establish an epistemological "middle ground".

¹⁰⁹ Ramberg, Bjørn and Gjesdal, Kristin. 2013. 'Hermeneutics'. In Zalta, Edward N. (ed). *The Stanford Encyclopedia of Philosophy*. Summer Edition. <http://plato.stanford.edu/archives/sum2013/entries/hermeneutics/> (accessed 19.01.2013)

¹¹⁰ Mezirow, Jack and Associates. 2000. *Learning as Transformation: Critical Perspectives on a Theory in Progress*. San Francisco: Jossey Bass Inc., p23.

1.4.1 Meaning-making, Interpretation, Critical Reflection, Learning and Action

According to Mezirow, learning is defined as “the process of using a prior interpretation to construe a new or revised interpretation of the meaning of one’s experience as a guide to future action.”¹¹¹ In transformative learning theory, meaning is constructed through the interpretation of experience:

Learning is a dialectical process of interpretation in which we interact with objects and events, guided by an old set of expectations. Normally, when we learn something, we attribute an old meaning to a new experience. [...] In transformative learning, however, we reinterpret an old experience (or a new one) from a new set of expectations, thus giving a new meaning and perspective to the old experience.¹¹²

Mezirow labels “the specific beliefs, attitudes and emotional reactions, articulated by an interpretation” as meaning schemes which he believes “serve as specific habits of expectation”.¹¹³ Within transformative theory, interpretation:

involves making a decision that may result in confirmation, rejection, extension, or formulation of a belief or meaning scheme or in finding that that belief or scheme presents a problem that requires further examination.¹¹⁴

Transformative learning may entail a reinterpretation of past experiences. This view of learning ties in with constructivist learning theory as previous

¹¹¹ Mezirow, Jack and Associates. 2000. *Learning as Transformation: Critical Perspectives on a Theory in Progress*. San Francisco: Jossey Bass Inc., p5.

¹¹² Mezirow, Jack. 1991. *Transformative Dimensions of Adult Learning*. Knox, Alan B. (ed). San Francisco: Jossey -Bass Inc., p11.

¹¹³ Ibid, p35.

¹¹⁴ Ibid, p35.

learning and experiences are incorporated in present learning experiences which in-turn affect our future learning and experiences.

The idea that uncritically assimilated habits of expectation or meaning perspectives serve as schemes and as perpetual and interpretive codes in the construal of meaning constitutes the central dynamic and fundamental postulate of a constructivist transformation theory of adult learning.¹¹⁵

The key to transformational learning is critical reflection on assumptions: “transformative learning involves reflective assessment of premises, a process predicted upon still another logic, one of movement through cognitive structures by identifying and judging presuppositions.”¹¹⁶ Thus, “the process of justifying or validating communicated ideas and the presuppositions of prior learning”¹¹⁷ is central to the adult learning experience and adult development. “Transformative learning may be understood as the epistemology of how adults learn to reason for themselves – advance and assess reasons for making a judgement – rather than act on the assimilated beliefs, values, feelings, and judgements of others.”¹¹⁸ Incorporating Freire’s concept of praxis (which he perceives as “the creative implementation of a purpose”¹¹⁹), Mezirow

¹¹⁵ Mezirow, Jack. 1991. *Transformative Dimensions of Adult Learning*. Knox, Alan B. (ed). San Francisco: Jossey -Bass Inc., p4.

¹¹⁶ Ibid, p5.

¹¹⁷ Ibid, p5.

¹¹⁸ Mezirow, Jack. 2009. ‘Transformative Learning Theory’. In Mezirow, Jack and Taylor, Edward W. (eds). *Transformative Learning in Practice: Insights from Community, Workplace and Higher Education*. San Francisco: Jossey Bass Inc., p23.

¹¹⁹ Mezirow, Jack. 1991. *Transformative Dimensions of Adult Learning*. Knox, Alan B. (ed). San Francisco: Jossey -Bass Inc., p12.

considers the transformative process to be incomplete if critical reflection does not result in action. As new interpretations or perceptions must be implicated in action and the transformation process may occur in phases or steps, transformative learning fundamentally influences the transformative learner's life and actions over time and can therefore be considered both "life-long" and "life-wide" learning.

1.4.2 Culture, Frames of Reference and Perspective Transformation

Transformative learning theory addresses meaning making through experience and "attempts to explain how our expectations, framed within cultural assumptions and presuppositions, directly influence the meaning we derive from our experiences."¹²⁰ Mezirow considers cultural and social practices, language and "historical knowledge-power networks" to be essential to the enablement of autonomous meaning-making and understanding.¹²¹ Culture is a fundamental factor in transformative learning theory as the learning process identified includes meaning perspectives as cultural frames of reference: "frames of reference often represent cultural paradigms (collectively held frames of reference) – learning that is unintentionally assimilated from culture."¹²² Mezirow therefore explains how culture impacts learning:

¹²⁰ Taylor, Edward W. 1998. *The Theory and Practice of Transformative Learning: A Critical Review*. Information Series No. 374. Columbus: ERIC Clearinghouse, p6.

¹²¹ Mezirow, Jack and Associates. 2000. *Learning as Transformation: Critical Perspectives on a Theory in Progress*. San Francisco: Jossey Bass Inc., p 7.

¹²² Ibid, p16-17.

“We appropriate symbolic models, composed of images and conditioned affective reactions acquired earlier through the culture or the idiosyncrasies of parents or caretakers – a highly individualistic “frame of reference” – and make analogies to interpret the meaning of our new sensory experience”.¹²³

Furthermore, Mezirow asserts that a frame of reference includes both “habits of the mind” and “points of view”. Habits of mind include knowledge, cognition, concepts of the self (psychology), philosophy and religion which become expressed as a point of view.¹²⁴ “A point of view comprises clusters of meaning schemes – sets of immediate specific expectations, beliefs, feelings, attitudes and judgements – that tacitly direct and shape a specific interpretation and determine how we judge, typify objects, and attribute causality.”¹²⁵

When frames of reference are culturally defined, they are called meaning structures.¹²⁶ Our frame of reference, or our “structure of assumptions and expectations”, is the filter through which we interpret experience.¹²⁷ Thus, the process of enculturation provides us with a framework of references and assumptions through which we interpret our experiences and judge or evaluate appropriate action or behaviour. Transformative learning

¹²³ Mezirow, Jack and Associates. 2000. *Learning as Transformation: Critical Perspectives on a Theory in Progress*. San Francisco: Jossey Bass Inc., p5.

¹²⁴ Ibid, p18.

¹²⁵ Ibid, p18.

¹²⁶ Taylor, Edward W. 1998. *The Theory and Practice of Transformative Learning: A Critical Review*. Information Series No. 374. Columbus: ERIC Clearinghouse, p6.

¹²⁷ Mezirow, Jack and Associates. 2000. *Learning as Transformation: Critical Perspectives on a Theory in Progress*. San Francisco: Jossey Bass Inc., p8.

therefore occurs when we critically reflect on our “uncritically assimilated presuppositions”.

Culture has been shown to influence our frames of reference and is thus central to the process of interpretation and meaning making. Mezirow believes the most crucial mode of meaning-making and learning involves “becoming critically aware of one’s own tacit assumptions and expectations and those of others and assessing their relevance for making an interpretation”.¹²⁸ In transformative learning we “transform our taken-for-granted frames of reference (meaning perspectives, habits of mind, mind-sets) to make them more inclusive, discriminating, open, emotionally capable of change, and reflective so that they may generate beliefs and opinions that will prove more true or justified to guide action.”¹²⁹

1.4.3 The Transformative Learning Process

Mezirow bases his theory of transformative learning on a comprehensive national study he performed in 1978 for the US Department of Education analysing the process of “consciousness raising” when women returned to higher education.¹³⁰ His research identified ten phases in the process of transformative learning:

¹²⁸ Mezirow, Jack and Associates. 2000. *Learning as Transformation: Critical Perspectives on a Theory in Progress*. San Francisco: Jossey Bass Inc., p4.

¹²⁹ Ibid, p7-8.

¹³⁰ Mezirow, Jack. 2009. ‘Transformative Learning Theory’. In Mezirow, Jack and Taylor, Edward W. (eds). *Transformative Learning in Practice: Insights from Community, Workplace and Higher Education*. San Francisco: Jossey Bass Inc., p19.

1. A disorienting dilemma
2. Self-examination
3. A critical assessment of assumptions
4. Recognition of a connection between one's discontent and the process of transformation
5. Exploration of options for new roles, relationships, and action
6. Planning a course of action
7. Acquiring knowledge and skills for implementing one's plans
8. Provisional trying of new roles
9. Building competence and self-confidence in new roles and relationships
10. A reintegration into one's life on the basis of conditions dictated by one's new perspective¹³¹

The first requirement for fostering transformative learning is “an acute internal and personal crisis”¹³² which Mezirow defines as a disorienting dilemma. Disorientation occurs when we encounter an experience that does not match our expectations or meaning structures (previous or current). Both the idea of a disorienting dilemma as a trigger to transformative learning as well as the actual nature of the dilemma itself have been intellectually debated and researched.

Although Mezirow views the disorienting dilemma as a profound and sudden life experience, it has been argued that “the process of triggering a transformation” is very complex and may also include “integrating

¹³¹ Mezirow, Jack. 2009. 'Transformative Learning Theory'. In Mezirow, Jack and Taylor, Edward W. (eds). *Transformative Learning in Practice: Insights from Community, Workplace and Higher Education*. San Francisco: Jossey Bass Inc., p19.

¹³² Taylor, Edward W. 2000. 'Analysing Research on Transformative Learning Theory'. In Mezirow, Jack and Associates. *Learning as Transformation: Critical Perspectives on a Theory in Progress*. San Francisco: Jossey Bass Inc., p298.

circumstances”.¹³³ Triggers such as the search for something that is lacking in an individual’s current life, not necessarily a profound, “life-threatening event”, must also be considered.¹³⁴ Through research, triggering events have been shown to be internal or external, and rather than a sudden event or circumstance, the disorienting dilemma may actually be part of a “long cumulative process”.¹³⁵ However, perhaps most importantly, “one overarching characteristic seems to be that most transformation deals with subjective reframing (critical reflection of one’s assumptions) as opposed to objective reframing (critical reflection of others’ assumptions)”.¹³⁶ Thus, although transformative learning theory attempts to include both objectivism and subjectivism, transformation mostly occurs and is most significant within the process of critical self-reflection.

1.4.4 Perspective transformation: A revision of meaning structures

In transformational learning theory: “Learning occurs in one of four ways: by elaborating existing frames of reference, by learning new frames of reference, by transforming points of view, or by transforming habits of the mind.”¹³⁷ According to Mezirow, the transformational learner will:

¹³³ Taylor, Edward W. 2000. ‘Analysing Research on Transformative Learning Theory’. In Mezirow, Jack and Associates. *Learning as Transformation: Critical Perspectives on a Theory in Progress*. San Francisco: Jossey Bass Inc., p299.

¹³⁴ Ibid, p299.

¹³⁵ Ibid, p299-300.

¹³⁶ Ibid, p298.

¹³⁷ Mezirow, Jack and Associates. 2000. *Learning as Transformation: Critical Perspectives on a Theory in Progress*. San Francisco: Jossey Bass Inc., p19.

examine his/her own understandings, assumptions, beliefs and understand the implications of his/her beliefs; explore an alternative set of beliefs (meaning scheme) and; critically reflect on the validity of these meaning schemes. The objective of this type of experience is to lead the learner to be more open to perspectives other than their own, becoming more accepting of alternative view-points.¹³⁸

Within transformative learning, both meaning schemes (beliefs and attitudes) and meaning perspectives may be transformed, however, as Mezirow explains, the transformation of meaning schemes does not necessarily involve self-reflection; rather it is when we transform meaning perspectives that we must critically assess our own presuppositions in relationship with those of others, becoming critically aware of how these assumptions serve to “constrain” our perception and structure our expectations.¹³⁹ Perspective transformation requires a critical awareness of the self as well as others. The steps involved in the process of perspective transformation are: a triggering event (a disorienting dilemma), critical reflection, rational discourse and action or praxis. The transformation of meaning schemes does not necessarily entail a transformation of meaning perspective.

Perspective transformation, simply defined as “the revision of meaning structures from experiences”¹⁴⁰ is probably Mezirow’s most important

¹³⁸ Mezirow, Jack. 1991. *Transformative Dimensions of Adult Learning*. Knox, Alan B. (ed). San Francisco: Jossey -Bass Inc., p196 – 226.

¹³⁹ Ibid, p167.

¹⁴⁰ Taylor, Edward W. 1998. *The Theory and Practice of Transformative Learning: A Critical Review*. Information Series No. 374. Columbus: ERIC Clearinghouse, p6.

contribution to contemporary learning theory. When meaning perspectives (frames of reference) are transformed, we experience a shift in worldview: When adults become critically aware of their own particular frames of reference (which include habits of the mind and points of view), the critical reflection on accepted meaning perspectives “can lead developmentally toward a more inclusive, differentiated, permeable, and integrated perspective”.¹⁴¹

1.4.5 The Expanded Definition of Transformative Learning

Since Mezirow introduced his transformative theory, there has been much reflection on the definition of transformative learning as well as its realm of impact. Elizabeth Kasl and Dean Elias, in the article “Creating New Habits of Mind in Small Groups” explain that mainly due to strong “Eurocentric cultural traditions” in the United States, educators mainly focus their teaching, and thus the assessment of learning, on the individual to the detriment of the possibility of group learning.¹⁴² Basing their views on two main concepts, isomorphism (the individual as part of a “human system”) and the “group mind”¹⁴³, Kasl and Elias propose an expanded definition of transformative learning that includes the individual as a part of a group or human system:

¹⁴¹ Mezirow, Jack. 1991. *Transformative Dimensions of Adult Learning*. Knox, Alan B. (ed). San Francisco: Jossey -Bass Inc., p155.

¹⁴² Kasl, Elizabeth and Elias, Dean. 2000. ‘Creating New Habits of Mind in Small Groups’. In Mezirow, Jack and Associates. *Learning as Transformation: Critical Perspectives on a Theory in Progress*. San Francisco: Jossey Bass, p 229.

¹⁴³ Ibid, p230.

Transformative learning is the expansion of consciousness in any human system, thus the collective as well as the individual. This expanded consciousness is characterized by new frames of reference, points of view or habits of the mind as well as by a new structure for engaging the system's identity.¹⁴⁴

Kasl and Elias believe that through engagement with complex cultural environments, transformation occurs when individuals must modify their personal identities in relation to the identity of the group.¹⁴⁵ This view allows for both an evolution of individual and group identities. If culture is perceived as collective frames of reference comprised of multiple group meaning perspectives, the inclusion of the collective in transformative theory is highly relevant in the assessment of learning as it allows researchers not only to analyse the effect of culture on learning through the transformation of individual meaning perspectives, but also to recognise the affect learning may have on the group meaning perspectives of culture itself.

1.5 Conclusion: The Implications of Culture in Museum Communication and Learning and the Application of Transformative Learning Theory

The analysis of exhibitions as a communication medium has served to demonstrate the complexity of museum meaning-making in relation to communication processes which include issues of representation and interpretation. Museums can be viewed as communicating messages

¹⁴⁴ Kasl, Elizabeth and Elias, Dean. 2000. 'Creating New Habits of Mind in Small Groups'. In Mezirow, Jack and Associates. *Learning as Transformation: Critical Perspectives on a Theory in Progress*. San Francisco: Jossey Bass, p233.

¹⁴⁵ Ibid, p233.

through texts and “designated” or “assigned meanings” of objects within exhibition discourses and narratives which therefore consist of intended messages. As visitors actively constructing meaning: they may “understand” the intended meanings within learning processes or create (or reinforce) alternative meanings or based on prior knowledge, understandings and assumptions.

Methods for the presentation of information to be learned are based on the application of the epistemological position supported by the institution and its staff members; philosophy of knowledge and learning supplies the theoretical background as to how exhibitions’ subjects are presented or “broken down” for visitors and teaching theory is applied in order to foster learning and optimise educational experience:

The analysis of [educational] theories is a necessary component of educational practice but it is not sufficient. A complete educational program consists of more than a theory; it requires application of that theory through a specific pedagogy. It also includes an educational policy: what is the aim of the education? To whom is it directed? How does it relate to other social and political institutions?¹⁴⁶

As museums “interact” with multiple and diverse audiences, it appears essential to reflect on our own assumptions, presuppositions, values, beliefs and perspectives that we uphold, especially in the domain of internationally travelling exhibitions. Within communication and interpretation processes, we naturally communicate from our own frame of reference, which in the case of museums will often be comprised of a group identity and/or collective frame of reference connected to a specific

¹⁴⁶ Hein, George E. 1998. *Learning in the Museum*. New York: Routledge, p12.

academic field. Visitors engage in interpretation during their museum experience, implementing individual and group frames of reference as well as habits of expectation. If cultural institutions aim to offer the possibility of transformative learning experiences, the museum must not only provide adequately adapted exhibition content that addresses and presents multiple perspectives allowing for visitors to critically reflect on meaning perspectives and meaning schemes, museum professionals themselves must also become critically aware of their own frames of reference (both individual and group) aiming at “a more inclusive, differentiated, permeable, and integrated perspective”¹⁴⁷ within the institution itself. Consciousness and awareness must therefore be raised through critical reflection on museum practice in order to recognise the potential impact of culture on communication and learning through exhibitions, not only regarding local culture but also on an international scale.

Several important questions in the field are therefore raised: How does culture affect communication and learning processes in the museum, and more specifically, in travelling exhibitions? What is the museum’s educational role in relation to the cultural aspects of communication and learning? Do museums represent an authoritative traditional voice or should we aim at the presentation of multiple voices and perspectives? Will the implementation of a transformative learning paradigm in audience research serve to contribute to a better understanding of the effect of culture and frames of reference in museum learning? Can and should

¹⁴⁷ Mezirow, Jack. 1991. *Transformative Dimensions of Adult Learning*. Knox, Alan B. (ed). San Francisco: Jossey -Bass Inc., p155.

museums foster transformative learning and possible perspective transformation experiences? And if so, how...? And finally, how can museums best assure effective communication and learning, especially in cross-cultural practices?

Chapter Two: Culture, Worldview and Evolution

2.0 Introduction

Darwin has remained a figure of controversy since the publication of *On the Origin of Species*; although the theory of evolution has long been fully accepted within science, public debate surrounding validity (in whole or in part) due to worldview implications and social inferences of Darwin's "dangerous ideas" continues today. Consequently, individual points of view regarding the theory of evolution and Darwin himself are often strong, polarised and oppositional. Thus, highly important to the implementation of transformative learning theory, constructivism and a postmodernist perspective in museum audience research is the exhibit's theme: Charles Darwin's life, his work and the theory of evolution by natural selection. Furthermore, as Darwin appears to have experienced a disorienting dilemma and perspective transformation, his personal life story takes on particular importance within research based on a constructivist transformative paradigm.

This chapter aims to demonstrate the cultural, sociological and anthropological significance of Darwin's major contribution to science, the theory of evolution by natural selection, and to examine the relationship between science and worldview. As science interacts with culture, religion, philosophy, politics and thus worldview, an analysis of these relationships will be provided. The nature of science will be discussed as well as the debate of whether science itself constitutes a worldview or can be

considered worldview independent while significantly contributing to worldview.

2.1 Darwin's Scientific Contribution

First and foremost, Charles Darwin (1809 – 1882) has made a major contribution to science due to the fundamental importance of the theory he presented – evolution by natural selection – as well as in establishing modern biology as an academic field of study. The significance of Darwin's work is phenomenal as his publication *On the Origin of Species* provides sufficient evidence for the scientific acceptance of his theory of the “transmutation of species” (known today as the theory of evolution) which served to fundamentally “transform the prevailing view of stability – of the earth, of all the species on the earth, and not least the stability of society's strata – into a picture of motion.”¹⁴⁸

Natural selection, the mechanism of evolution, is based on the idea that in nature a larger number of offspring are born than can actually survive, and those that survive have inherited attributes and traits which make them more fit for survival in their direct environment.¹⁴⁹ Essentially, the process of natural selection can be understood as nature's power to “select” the “most adequate” of a given species for survival; through regeneration, inherited positive attributes beneficial to survival are perpetuated. Species

¹⁴⁸ Eldredge, Niles. 2005. *Charles Darwin. Discovering the Tree of Life*. New York: W.W. Norton, p8.

¹⁴⁹ Ibid, p45.

“less adapted” for survival in their environment decrease in number or die off. However, when dramatic changes in the environment occur, the requirements for survival may be modified and the former “fittest” species may no longer have the necessary attributes for survival. Thus, variation in nature allows species to survive over time. Fundamentally, by providing evidence for the underlying mechanism of evolution (natural selection), the scientific explanation for the diversity of species observed in nature, Darwin imparts the process by which species evolve.

Darwin’s work also has methodological significance for all of scientific practice. Working in ways uncommon for his time, his method shines as an example of the validity of the current hypothetico-deductive method, representing a shift in scientific reasoning and practice.¹⁵⁰ Essentially, due to the fact that Darwin perceived the scientific paradigm of his time to be limiting as well as perhaps non-adapted to his research objectives, he can be perceived as having initiated a scientific revolution through ‘paradigm shift’ where “an older paradigm is replaced in whole or in part by an incompatible new one”.¹⁵¹

Although Darwin is considered the founder of the theory of evolution, he had a worthy contemporary competitor for the scientific attribution of the

¹⁵⁰ Ayala, Francisco J. 2009. ‘Darwin and the Scientific Method’. *Proceedings of the National Academy of Sciences (PNAS)*. Vol 106, suppl. 1, June 16. USA. pp. 10033-10039, p3.

¹⁵¹ Kuhn, Thomas S. 1970. ‘The Structure of Scientific Revolutions’. *International Encyclopedia of Unified Science*. 2nd Ed. Enlarged. Vol. II, N. 2. Chicago: The University of Chicago Press, p92.

“discovery” of natural selection: Alfred Russel Wallace (1823 – 1913).

While Darwin worked on his “magnum opus” for a period of approximately 20 years within which he continually perfected his theory and solidified his evidence, Wallace independently “discovered” the transmutation of species by natural selection and presented his ideas directly to Darwin, sending him a manuscript of his work; as a result, a presentation of both scientists’ work was held at the Linnean Society on 1 July 1858 in order designate attribution of the scientific discovery of natural selection (taking into consideration that Darwin had made the discovery first but had not yet published his findings).¹⁵² The outcome was decisive: Darwin was given priority¹⁵³ and could now officially be recognised as the “father of evolution”. The publication of Darwin’s extensive research, twenty-three years after his return from his voyage on the HMS Beagle, soon followed. *On the Origin of Species* was finally issued.

With the publication of *On the Origin of Species* on 24 November 1859¹⁵⁴ Darwin successfully presented sufficient evidence and proof for the acceptance (though neither instantaneously nor unanimously) of the theory of evolution by natural selection as a valid scientific theory. As

¹⁵² Tort, Patrick. 2001. *Darwin and the Science of Evolution*, Sinaiko, Eve (ed). Bahn, Paul G. (Trans). New York: Harry N. Abrams Inc. and Thames and Hudson, p73.

¹⁵³ Eldredge, Niles. 2005. *Charles Darwin. Discovering the Tree of Life*. New York: W.W. Norton, p68.

¹⁵⁴ Tort, Patrick. 2001. *Darwin and the Science of Evolution*, Sinaiko, Eve (ed). Bahn, Paul G. (Trans). New York: Harry N. Abrams Inc. and Thames and Hudson, p75.

Darwin's theory is a fundamental component of biology, essentially serving to establish it as a field of study in the natural sciences, the utmost significance of the theory of evolution to biology alone warrants Darwin's title as the "father of modern biology". However, evolution by natural selection continues to be both central and relevant in today's practice of science: according to eminent geneticist and evolutionary biologist Theodosius Dobzhansky (1900 – 1975): "Nothing in biology makes sense except in the light of evolution".¹⁵⁵

2.2 The Cultural Significance of the Theory of Evolution by Natural Selection

Darwin's research not only represents a shift in scientific paradigm, but as the theory of evolution by natural selection has implications for culture and society, a transformation of the commonly held worldview of the Victorian Age also ensued. In the Victorian Age, "the "scientific" view was essentially a religious view: "the rising tide of rationalism - in science, such achievements as Newtonian physics and the beginnings of chemistry - had yet to influence ideas on the living world. Religious doctrine dominated biological thinking."¹⁵⁶ The acceptance of evolution and natural

¹⁵⁵ For information on Darwin's implementation of the hypothetic-deductive method see Ayala, Francisco J. 2009. 'Darwin and the Scientific Method'. *Proceedings of the National Academy of Sciences (PNAS)*. Vol 106, suppl. 1, June 16. USA. pp. 10033-10039, p1-4 as well as Eldredge, Niles. 2005. *Charles Darwin. Discovering the Tree of Life*. New York: W.W. Norton, p 57 and for scientific revolutions see Kuhn, Thomas S. 1970. 'The Structure of Scientific Revolutions'. *International Encyclopedia of Unified Science*. 2nd Ed. Enlarged. Vol. II, N. 2. Chicago: The University of Chicago Press, p92.

¹⁵⁶ Eldredge, Niles. 2005. *Charles Darwin. Discovering the Tree of Life*. New York: W.W. Norton, p11.

selection had resounding implications for religious belief in Divine Creation. Essentially, the acceptance of an evolutionary view of nature transformed of the prevailing view of reality:

The influence of evolution on the general culture is so pervasive it can be summed up in a single observation: *We live in the age of Darwin*. Arguably the most culturally jarring theory in history, the theory of natural selection gave rise to the Darwinian revolution that changed both science and culture in ways immeasurable.¹⁵⁷

2.2.1 *The Age of the Earth*

Charles Darwin, first and foremost a geologist, was “heavily influenced by geologist Charles Lyell, whose notion of “uniformitarianism” is central to the theory of evolution.¹⁵⁸ Uniformitarianism meant that the earth’s processes (erosion, earthquakes etc...) have slowly and constantly functioned over time and thus provide the scientific explanation for the all the perceivable changes on the surface of the earth.¹⁵⁹ Darwin “recognized that a great deal of time must have been necessary for the world’s diversity of plants and animals to evolve – more time, certainly, than the 6,000 years allowed by the leading biblical interpretation of earth’s age, but more also than many scientists then accepted.”¹⁶⁰ Darwin

¹⁵⁷ Shermer, Michael. 2006. *Why Darwin Matters, The Case Against Intelligent Design*. New York: Henry Holt and Company, LLC, pxxii.

¹⁵⁸ Eldredge, Niles. 2005. *Charles Darwin. Discovering the Tree of Life*. New York: W.W. Norton, p85.

¹⁵⁹ Ibid, p85.

¹⁶⁰ Hayden, Thomas. 2009. ‘What Darwin Didn’t Know’. *Science and Nature*. Smithsonian Magazine. February. <http://www.smithsonianmag.com/science-nature/What-Darwin-Didnt-Know.html> (accessed 20.02.2012).

presented a view of the earth, its history and age in stark contrast to the prevailing biblical view of catastrophism, where the “Great Flood” was considered to be the explanation for the formation of the earth’s surface as we now see it. Darwin’s scientific confirmation of a very “old earth” and universe, continues to be supported by current scientific discovery. ¹⁶¹

2.2.2 Man’s Origin, History and Position in Nature

As evolution upholds the claim that new species have evolved over time through the process of natural selection, the acceptance of Darwin’s scientific theory presupposes a refute of the belief that God created all living species in their current observable form, another direct “attack” on the biblical view of creation including the account of the “Great Flood” and Noah’s ark. Evolution “posits that *modern organisms should show a variety of structures from simple to complex, reflecting an evolutionary history rather than an instantaneous creation.* The human eye, for example, is the result of a long and complex pathway that goes back hundreds of millions of years.”¹⁶² This subject has been an issue of contention within Intelligent Design based on William Paley’s watchmaker analogy arguing of the inevitable existence of a Designer or Divine Creator in his 1802 publication “Natural Theology: or Evidences of the Existence and Attributes of the

¹⁶¹ Shermer, Michael. 2006. *Why Darwin Matters, The Case Against Intelligent Design*. New York: Henry Holt and Company, LLC, p16.

¹⁶² Ibid, p16-17.

Deity, Collected from the Appearances of Nature”.¹⁶³ Could the laws of nature be responsible for such high complexity? Essentially yes, evolution through the mechanism of natural selection refutes the claim of Intelligent Design.

Darwin’s ideas on the transmutation of species over time, the effects of geographic isolation on speciation - “the formation of new and distinct species in the course of evolution”¹⁶⁴ - and his theory of common descent not only challenged the religious view of Divine Creation of immutable animal species, but perhaps more significantly, if man is considered to be a part of nature as all other animal species, Darwin’s research findings also brought into question man’s history and his place in the natural world. Human evolution, a persisting issue for the acceptance of the theory of evolution, is problematic due to the implication that man, as with all species on earth, has evolved from previous forms over time and thus shares common descent with other animal species. Although questions on human evolution are implicit in Darwin’s treatise, his 1859 publication did not directly address the implications of evolution for man as only one line in *On the Origin of Species* is actually dedicated to this question:

¹⁶³ Paley, William. 1802. *Natural Theology: or, Evidences of the Existence and Attributes of the Deity, Collected From the Appearances of Nature*. London: E. Paulder. Cited in Shermer, Michael. 2006. *Why Darwin Matters, The Case Against Intelligent Design*. New York: Henry Holt and Company, LLC, p5-6.

¹⁶⁴ Oxford Dictionaries. 2012. ‘speciation’. Oxford University Press. <http://oxforddictionaries.com/definition/english/speciation?q=Speciation> (accessed 06.03.2012)

In the distant future I see open fields for far more important researches. Psychology will be based on a new foundation, that of the necessary acquirement of each mental power and capacity by gradation. Light will be thrown on the origin of man and his history.¹⁶⁵

Darwin, perhaps strategically, tackled the greatest hurdle, the implications of evolution for man, in his subsequent publication in 1871. Darwin demonstrated “man’s genealogical connection with the animal kingdom” [...] “attempted to explain the evolution of the human species, and prove that natural selection had also modelled our biological history.”¹⁶⁶ Thus, *The Descent of Man* revoked humankind’s privileged position in the hierarchy of nature.

Darwin’s revelation of sufficient evidence for the acceptance of the theory of evolution represented a power shift away from religion towards science in the construction of the public’s view of the earth, its processes and man’s position in nature. By engendering a transformation of the prevailing theistic worldview of the Victorian Age, Darwin’s theory had the potential to remove power from the church and religious leaders as providers of truth and answers about the world and man’s role in the universe. Perhaps the strongest cultural implications of the theory of evolution reside in a significant shift in views of the “position” held by human beings within the “hierarchy of nature” and the belief of a purposeful universe:

¹⁶⁵ Darwin, Charles. 1859. *On the Origin of Species by Means of Natural Selection*. London: John Murray, p428.

¹⁶⁶ Tort, Patrick. 2001. *Darwin and the Science of Evolution*, Sinaiko, Eve (ed). Bahn, Paul G. (Trans). New York: Harry N. Abrams Inc. and Thames and Hudson, p94.

The anthropocentric view of humans as special creations placed by a divine hand above all others was replaced with the view of humans as just another animal species. The view of life and the cosmos as having direction and purpose from above was replaced with the view of the world as the product of the necessitating laws of nature and the contingent events of history.¹⁶⁷

2.2.3 Science, Religion and Truth

The significant cultural implications of the theory of evolution and natural selection brings into question the relationship between science and religion and the existence of diverging views, and thus conflict, on the fundamental issue of 'truth'. Sir Arthur Keith (1866 – 1955), a Scottish anthropologist and anatomist, highlights the connection between science, religion and worldview that contributes to this historical and contemporary debate:

Religious leaders and men of science have the same ideals; they want to understand and explain the universe of which they are a part; they both earnestly desire to solve, if a solution ever be possible, that great riddle: Why are we here? ¹⁶⁸

Specific viewpoints of where knowledge lies entail a postulation of where truth resides. Religion, as opposed to science, is based on faith, and as such, adopting a religious view means accepting and maintaining an “unobservable truth”. Scientific theories are accepted based on empirical evidence, yet evolution has also been argued to be “unobservable”, consisting of an “historical theory”. Michael Shermer, in *Why Darwin*

¹⁶⁷ Shermer, Michael. 2006. *Why Darwin Matters, The Case Against Intelligent Design*. New York: Henry Holt and Company, LLC, pxxii.

¹⁶⁸ Keith, Sir Arthur. 1927. *Concerning Man's Origin*. First Edition. London: Watts & Co, pviii.

Matters, analyses the relationship between religion and science including the possibility of reconciliation of scientific and religious perspectives. Rather than focusing on the issue of a possible epistemological overlapping between the nature of science and religion as the subsequent source of conflict, he highlights the personal “attitude one takes to the relationship of science and religion: conflict, harmony, or indifference.”¹⁶⁹ This is significant in understanding public views on evolution as religious belief itself is not the deciding factor in the acceptance of the theory; rather it is the individual as an active agent in a reflection on the conflicting or harmonious nature of religious and scientific postulates. Shermer proposes a ‘three-tiered model’ of approaches to science and religion composed of: ‘the conflicting-worlds model’, the ‘same-world model’ and the ‘separate-worlds model’.¹⁷⁰

In the conflicting-worlds model, a “warfare approach” is taken between science and religion as they are perceived as “mutually exclusive ways of knowing, one being right and the other wrong”.¹⁷¹ Within this view, science and religion are conflicting and irreconcilable. Both scientists and followers of religion may be included in this category as the “conflicting-worlds model is embraced by extremists on both sides of the divide”.¹⁷² Shermer uses the example of the hostility toward science of Young Earth

¹⁶⁹ Shermer, Michael. 2006. *Why Darwin Matters, The Case Against Intelligent Design*. New York: Henry Holt and Company, LLC, p119.

¹⁷⁰ Ibid, p119-120.

¹⁷¹ Ibid, p119-120.

¹⁷² Ibid, p120.

creationists who often believe truth lies in a literal reading of Genesis, versus the beliefs of militant atheists who are vehemently antagonistic to religion, religious values and religious postulates on truth.¹⁷³ Two main figures who adopt the conflicting-worlds model come to mind: Ken Ham, the President of Answers in Genesis (perhaps the most influential Young-Earth creationist movement also responsible for the funding of the Creation Museum that opened its doors to the public in 2007 in the US State of Kentucky to provide a presentation of a literal reading of the Bible where dinosaurs not only lived side-by-side with humans, but were also present on Noah's Ark); and Richard Dawkins, the eminent evolutionary biologist, ethologist, Vice-President of the British Humanist Association, militant advocate of atheism and best-selling author of *The Selfish Gene* (1976), *The Blind Watchmaker* (1986) and *The God Delusion* (2006). The conflicting-worlds model, perhaps more prevalent, in North America, has fuelled an open public debate: "Pointing to the social dichotomy" that persists today, the warfare mind-set of the conflicting-worlds model is evident in the very public display of adherents of religious and scientific views of the world in American society through "the famous "Battle of the Fishes" played out on bumper stickers and refrigerator magnets all over the United States".¹⁷⁴

¹⁷³ Shermer, Michael. 2006. *Why Darwin Matters, The Case Against Intelligent Design*. New York: Henry Holt and Company, LLC, p120.

¹⁷⁴ Eldredge, Niles. 2005. *Charles Darwin. Discovering the Tree of Life*. New York: W.W. Norton, p12.

The same-world model “holds that science and religion are two ways of examining the same reality, and that as science progresses to a deeper understanding of the natural world, it will reveal that many ancient religious tenets are true. The same-world model is embraced by many mainstream theologians, religious leaders and believing scientists who prefer a more flexible cognitive approach to science and religion, allowing them to read biblical passages metaphorically.”¹⁷⁵ Shermer cites Pope John Paul II and the Dalai Lama as examples of religious leaders who adopt the same-world model. Certain eminent scientists also adopt this model: for instance, Charles Hard Townes (1915 -), the 1964 Nobel Prize winner in Physics, was also author of *The Convergence of Science and Religion* (1966). Thus the same-world model represents a reconciliation of scientific and religious perspectives within a single framework or view of the world.

In the separate-worlds model, “science and religion are neither in conflict nor in agreement”¹⁷⁶. Shermer explains that within this model, both religion and science are perceived as having purpose which can therefore exist and thrive side-by-side as, quoting influential evolutionary biologist Stephen Jay Gould, science and religion are “nonoverlapping magisteria”.¹⁷⁷ Shermer provides Charles Darwin, founder of the theory of evolution by natural selection, as the prime example of a scientist

¹⁷⁵ Shermer, Michael. 2006. *Why Darwin Matters, The Case Against Intelligent Design*. New York: Henry Holt and Company, LLC, p120.

¹⁷⁶ Ibid, p120.

¹⁷⁷ Ibid, p120-121.

upholding a separate-worlds model attitude.¹⁷⁸ However, it can be argued that Darwin's views on religion changed throughout his lifetime and although he may have begun his fieldwork with a separate-worlds model outlook, permitting him to perform his research while maintaining his religious faith, he appears to have experienced significant internal conflict which eventually lead to a "loss of faith". Darwin's loss of faith, therefore considered a result of perspective transformation, may have resulted in the adoption of a conflicting-worlds attitude within which evolution and creation are incompatible and irreconcilable.

2.3 Darwin's Views on Religion and Science: A Perspective Transformation

Charles Darwin, aware of the religious implications of his scientific theory, waited 20 years to publish the theory of evolution by natural selection, expressing (perhaps justified)¹⁷⁹ reticence and fear of possible personal repercussions he could suffer due to the religious implications of his findings in a letter to Joseph D. Hooker in 1844:

At last gleams of light have come, and I am almost convinced (quite contrary to the opinion I started with) that species are not (it is like confessing a murder) immutable.¹⁸⁰

¹⁷⁸ Shermer, Michael. 2006. *Why Darwin Matters, The Case Against Intelligent Design*. New York: Henry Holt and Company, LLC, p122.

¹⁷⁹ For example, Galileo Galilei's (1564 – 1642) commitment to Copernicanism (the view that the earth was not the centre of the universe but rather rotated around the sun) led to his heresy trial.

¹⁸⁰ Charles Darwin, Letter to Joseph D. Hooker, 11 January 1844 in Eldredge, Niles. 2005. *Charles Darwin. Discovering the Tree of Life*. New York: W.W. Norton, p59.

It is significant that Darwin studied theology at Cambridge, as his father had hoped he would become a clergyman.¹⁸¹ Thus, boarding the *HMS Beagle* as a naturalist and creationist, Darwin brought a personally signed copy of the New Testament with him.¹⁸² Although Darwin initially set out on the Beagle to learn about the natural world as God's creation,¹⁸³ at a later point, his personal views on religion fundamentally changed, having 'suffered' a 'loss of faith'.

Several issues contributed to Darwin's loss of religious faith: the implications of his research, the presence of pain and suffering in nature, questions of morality and his own personal loss or tragedy. Firstly, "up until the return from the Beagle in 1836, Darwin considered himself an "orthodox" Christian",¹⁸⁴ however, in "discovering" evolution, or "the fate of transmissible information over time"¹⁸⁵, Darwin's findings had "implications for resolving the Reverend William Paley's edict that anything with apparent complexity of design in nature must necessarily presuppose the

¹⁸¹ Eldredge, Niles. 2005. *Charles Darwin. Discovering the Tree of Life*. New York: W.W. Norton, p23.

¹⁸² A copy of Darwin's Bible was displayed in the ROM exhibit *Darwin: The Evolution Revolution* in Toronto, yet was significantly absent from the London exhibit.

¹⁸³ Eldredge, Niles. 2005. *Charles Darwin. Discovering the Tree of Life*. New York: W.W. Norton, p55.

¹⁸⁴ Spencer, Nick. 2009. 'Darwin's Complex Loss of Faith'. *The Guardian*. September 17. London: Guardian Media Group. <http://www.guardian.co.uk/commentisfree/belief/2009/sep/17/darwin-evolution-religion?INTCMP=SRCH> (accessed 8.03.2012).

¹⁸⁵ Eldredge, Niles. 2005. *Charles Darwin. Discovering the Tree of Life*. New York: W.W. Norton, p69.

existence of a supernatural Designer”.¹⁸⁶ Hence “when his emerging theory began to undermine these ideas [of Divine Design], it also undermined the Christianity that was built on them.”¹⁸⁷

However, Darwin also showed signs of internal conflict caused in the attempt to reconcile the reality of suffering he observed in nature with a view of an omniscient, omnipotent and fundamentally benevolent God, as articulated in his 1860 letter to Asa Gray:

With respect to the theological view of the question; this is always painful to me. – I am bewildered. – I had no intention to write atheistically. But I own that I cannot see, as plainly as others do, and as I should wish to do, evidence of design and beneficence on all sides of us. There seems to me too much misery in the world. I cannot persuade myself that a beneficent and omnipotent God would have designedly created the *Ichneumonidae* with the express intention of their feeding within the bodies of Caterpillars, or that a cat should play with mice.¹⁸⁸

Darwin also struggled with the “justification” of suffering in light of moral improvement as “the presence of much suffering agrees well with the view that all organic beings have been developed through variation and natural selection”.¹⁸⁹ As Darwin considered humans no more “an exception” than

¹⁸⁶ Eldredge, Niles. 2005. *Charles Darwin. Discovering the Tree of Life*. New York: W.W. Norton, p70.

¹⁸⁷ Spencer, Nick. 2009. ‘Darwin’s Complex Loss of Faith’. *The Guardian*. September 17. London: Guardian Media Group. <http://www.guardian.co.uk/commentisfree/belief/2009/sep/17/darwin-evolution-religion?INTCMP=SRCH> (accessed 8.03.2012).

¹⁸⁸ Darwin, Charles. 1860. Letter from Charles Darwin to Asa Gray. May 22. Darwin Correspondence Project. www.darwinproject.ac.uk/entry-2814 (accessed 12.03.2012).

¹⁸⁹ Darwin, Francis (ed). 1887. *The Life and Letters of Charles Darwin*. Vol 1. London: John Murray, p280 – 281.

any other species,¹⁹⁰ sharing the same “lowly origin”, man is also influenced by evolution and natural selection, good and evil were not moral absolutes rooted in a spiritual realm, but primate attributes on which humans have stumbled.¹⁹¹

Although it was demonstrated that Darwin engaged in critical reflection on the implications of his research for religious perspectives, including his own, Darwin’s loss of religious faith can be considered as resulting from perspective transformation after experiencing a tragic, life-forming, disorienting event. Applying the process of transformative learning Mezirow identified, Darwin suffering of great personal tragedy and pain at the death of his daughter, therefore likely triggering a process of “self-examination” and “a critical assessment of assumptions”¹⁹²

¹⁹⁰ Spencer, Nick. 2009. *Darwin’s Religious Beliefs*. Faraday Institute for Science and Religion. www.st-edmunds.cam.ac.uk/faraday/issues/Nick_Spencer.pdf (accessed 15.03.2012).

¹⁹¹ Ibid.

¹⁹² Mezirow, Jack. 2009. ‘Transformative Learning Theory’. In Mezirow, Jack and Taylor, Edward W. (eds). *Transformative Learning in Practice: Insights from Community, Workplace and Higher Education*. San Francisco: Jossey Bass Inc., p19.

When [...] his daughter Annie died in 1851, aged 10, suffering moved from being a theoretical problem to an agonisingly personal one. Most Victorian families lost children (Darwin himself lost two others in infancy) but Annie was his favourite and, unlike most Victorian fathers, he had witnessed every last, degrading moment of her short life. The experience destroyed what was left of his Christian faith.¹⁹³

Darwin appears to have gone through a process of critical reflection on both his own assumptions and those prevalent in his culture: the conflicting issues between science and religion he outlines in his letters and notebooks indicate a “reflective assessment of premises [...] [based on a] movement through cognitive structures by identifying and judging presuppositions”¹⁹⁴ in “a continuous effort to negotiate contested meanings”.¹⁹⁵ Significantly, Darwin’s loss of religious faith “happened gradually – even reluctantly – over many years”;¹⁹⁶ as “the death of Darwin’s beloved ten-year old daughter Anne put an end to whatever confidence he had in God’s benevolence, omniscience, and even existence,”¹⁹⁷ this tragic, disorienting event essentially served to culminate the process.

¹⁹³ Spencer, Nick. 2009. ‘Darwin’s Complex Loss of Faith’. *The Guardian*. September 17. London: Guardian Media Group. <http://www.guardian.co.uk/commentisfree/belief/2009/sep/17/darwin-evolution-religion?INTCMP=SRCH> (accessed 8.03.2012).

¹⁹⁴ Mezirow, Jack. 1991. *Transformative Dimensions of Adult Learning*. Knox, Alan B. (ed). San Francisco: Jossey -Bass Inc., p5.

¹⁹⁵ Mezirow, Jack and Associates. 2000. *Learning as Transformation: Critical Perspectives on a Theory in Progress*. San Francisco: Jossey Bass Inc., p3.

¹⁹⁶ Shermer, Michael. 2006. *Why Darwin Matters, The Case Against Intelligent Design*. New York: Henry Holt and Company, LLC., p117.

¹⁹⁷ Ibid, p117.

Finally, Darwin's growing scepticism and eventual loss of faith lead him to identify himself as an agnostic, not as an atheist. In a letter to John Fordyce written on May 7th, 1879 (when Darwin was 70 years old) Darwin writes:

It seems to be absurd to me to doubt that a man may be an ardent Theist & an evolutionist. [...] What my own views may be is a question of no consequence to anyone but myself. – But as you ask, I may state that my judgement often fluctuates. [...] In my most extreme fluctuations I have never been an atheist in the sense of denying the existence of a God. – I think that generally (& more and more so as I grow older) but not always, that an agnostic would be the most correct description of my state of mind.¹⁹⁸

In maintaining an agnostic position, Darwin essentially “protected” his wife and family from public scrutiny while also accepting, as oppose to refuting, perspectives or worldviews that were different from his own.

2.4 The Sociological and Anthropological Significance of the Theory of Evolution by Natural Selection

The social implications of the theory of evolution lay in the human significance of Darwin's ideas on ‘the struggle for existence’, a fundamental concept he found in British sociologist and economist Reverend Thomas Robert Malthus' *Essay on the Principle of Population* (1798) which states "the power of population is indefinitely greater than the

¹⁹⁸ Darwin, Charles. 1879. Letter from Charles Darwin to John Fordyce. May 7. Darwin Correspondence Project. www.darwinproject.ac.uk/entry-12041 (accessed 8.03.2012).

power in the earth to produce subsistence for man".¹⁹⁹ For Malthus, the poor laws of England created a possibility for population increase without substantial or sufficient increase in food supply.²⁰⁰ Darwin²⁰¹ applied Malthus' concept of the 'struggle for existence' to all living species understanding "favourable variations would tend to be preserved, and unfavourable ones to be destroyed" resulting in "the formation of new species", hence providing Darwin "a theory by which to work".²⁰² After Darwin's publication, the core concept of the 'struggle for existence' is once again seen as relative to the human sphere, leading to misconstrued conceptions and distortions of evolution by natural selection to such an extent as to provide justification (in the name of "survival of the fittest") of gravely erroneous and immoral philosophies and actions.

2.4.1 Social Darwinism: A Misconception and Distortion of the Theory of Evolution

Although Darwin chose not to directly address the evolution of Man or the implications of natural selection for humans in his 1859 publication *On the Origin of Species*, other thinkers of his time did not refrain from doing so: in the eleven year period between Darwin's first publication and that of

¹⁹⁹ Malthus, Thomas Robert. 1798. *An Essay on the Principle of Population*. 1st Edition. London: J. Johnson., Chapter I, p4.

²⁰⁰ Ibid, Chapter V, p26.

²⁰¹ Both Darwin and Wallace saw a connection between Malthus' sociological ideas and the laws of the natural world as stated in Eldredge, Niles. 2005. *Charles Darwin. Discovering the Tree of Life*. New York: W.W. Norton, p53.

²⁰² Darwin, Charles. *Autobiography*. cited in Eldredge, Niles. 2005. *Charles Darwin. Discovering the Tree of Life*. New York: W.W. Norton, p52.

The Descent of Man (1871), Herbert Spencer (1820 – 1903), and Francis Galton (1822 – 1911) presented their ideas respectively of Social Darwinism and Eugenics.²⁰³ It is Spencer who first used the well-known saying “survival of the fittest” in relation to the social reality and harsh inequalities of Victorian society, allotting “moral rectitude” to the privileged position of the social elite.²⁰⁴ In Darwin’s research on evolution and natural selection, “Spencer found a naturalistic scaffolding upon which to buttress his own interpretations of social organization and, in so doing, converted Darwin’s descriptive observations into prescriptive arguments about an ideal society. This became the crux of Social Darwinism.”²⁰⁵ Spencer’s “philosophical evolutionism” became a “synthetic system” which subsequently had global influence, generating significant repercussions at the end of the 19th century.²⁰⁶ Essentially, Social Darwinism is “an odious misapplication of Darwinian thinking in defence of political doctrines that

²⁰³ Tort, Patrick. 2001. *Darwin and the Science of Evolution*, Sinaiko, Eve (ed). Bahn, Paul G. (Trans). New York: Harry N. Abrams Inc. and Thames and Hudson, p77.

²⁰⁴ Ulm, J. Wes. 2010. ‘Cachet of the Cutthroat’. *Democracy: A Journal of Ideas*. Issue 16, Spring. www.democracyjournal.org/16/6740.php?page=all (accessed 1.2.2011).

²⁰⁵ Ibid.

²⁰⁶ Tort, Patrick. 2001. *Darwin and the Science of Evolution*, Sinaiko, Eve (ed). Bahn, Paul G. (Trans). New York: Harry N. Abrams Inc. and Thames and Hudson, p77.

range from callous to heinous.”²⁰⁷ Darwin did not support Spencer’s social adaptation and modification of his ideas.²⁰⁸

Eugenics, an extreme form of Social Darwinism and an anthropological distortion of the theory of evolution by natural selection, is generally attributed (at least in part) to Charles Darwin’s cousin, Francis Galton, who was the first to use this term.²⁰⁹ Eugenics “is the science which deals with all influences that improve the inborn qualities of a race; also with those that develop them to the utmost advantage.”²¹⁰ Galton’s anthropological rationale was to apply natural selection to society “since natural selection ensured the diversity of species and the promotion of advantageous variations within the living world”:²¹¹ believing civilisation’s “hampering” of natural selection through the protection of “mediocre beings” has serious “degenerative” consequences for society, Galton advocated artificial

²⁰⁷ Dennett, Daniel C. 1996. *Darwin’s Dangerous Idea: Evolution and the Meanings of Life*. London and New York: Penguin Books, p393.

²⁰⁸ Tort, Patrick. 2001. *Darwin and the Science of Evolution*, Sinaiko, Eve (ed). Bahn, Paul G. (Trans). New York: Harry N. Abrams Inc. and Thames and Hudson, p78.

²⁰⁹ Wright Gillham, Nicholas. 2001. *A Life of Sir Francis Galton: From African Exploration to the Birth of Eugenics*. New York: Oxford University Press, p1.

²¹⁰ Galton, Francis. 1904. ‘Eugenics: It’s Definition, Scope, and Aims’. *The American Journal of Sociology*. Vol X, July, Number 1. P1. <http://galton.org/essays/1900-1911/galton-1904-am-journ-soc-eugenics-scope-aims.htm> (accessed 12.06.2013).

²¹¹ Tort, Patrick. 2001. *Darwin and the Science of Evolution*, Sinaiko, Eve (ed). Bahn, Paul G. (Trans). New York: Harry N. Abrams Inc. and Thames and Hudson, p78-79.

selection.”²¹² Darwin is said to have rejected Galton’s views, not supporting his misinterpretation and distortion of evolution by natural selection.²¹³

A subject of contention today is the connection of the work of Ernst Haeckel (1834 - 1919), German zoologist, morphologist and embryologist, to Darwin’s theory of evolution by natural selection and Nazism. Haeckel “popularized the ‘fundamental biogenetic law’²¹⁴ in various publications such as *Weltraetzel* (1899), significantly influencing the National Socialist movement of Nazi Germany by providing a “scientific justification” for racism and artificial selection. The argued responsibility and contribution of Haeckel’s ‘scientific findings’ to the ideology of the Nazi regime,²¹⁵ along with the forged embryo diagrams, is often used by Creationists and followers of the Intelligent Design movement to dissuade acceptance of the theory of evolution as scientific fact²¹⁶ as Darwin also presented his “understanding of the facts of comparative anatomy to embryological development”,²¹⁷ however with noted differences from Haeckel’s position.

²¹² Tort, Patrick. 2001. *Darwin and the Science of Evolution*, Sinaiko, Eve (ed). Bahn, Paul G. (Trans). New York: Harry N. Abrams Inc. and Thames and Hudson, p78-79.

²¹³ Ibid, p79.

²¹⁴ Ibid, p133.

²¹⁵ Richards, Robert. 2009. ‘Myth: That Darwin and Haeckel Were Complicit in Nazi Biology’. In Number, Ronald L. (ed). *Galileo Goes to Jail and Other Myths About Science and Religion*. Cambridge: Harvard University Press, p1.

²¹⁶ Shermer, Michael. 2006. *Why Darwin Matters, The Case Against Intelligent Design*. New York: Henry Holt and Company, LLC, p84-85.

²¹⁷ Eldredge, Niles. 2005. *Charles Darwin. Discovering the Tree of Life*. New York: W.W. Norton, p144.

Haekel's falsified drawings²¹⁸ highlighted an ancestral evolutionary link where stages of embryo development directly correspond to stages of evolution while Darwin's "point is rather that there is progressively more similarity the earlier in development embryos are compared".²¹⁹ Stephen J. Gould "investigated the consequences of Haekel's "biogenetic law", in his 1977 publication *Ontogeny and Phylogeny* asserting that Charles Darwin (1809 – 1882) had refrained from adopting the principal, although many biologists had subsequently accepted it as part of the Darwinian heritage."²²⁰ "Though their emphases certainly differed, Haekel and Darwin essentially agreed on the technical issues of evolutionary theory",²²¹ however, "most historians, save for Richard Weikart [...], have refused to indict Darwin for complicity in the crimes of the Nazi's."²²² Thus, "Darwin is often rightly vindicated against the pernicious social Darwinist

²¹⁸ Shermer, Michael. 2006. *Why Darwin Matters, The Case Against Intelligent Design*. New York: Henry Holt and Company, LLC, p85.

²¹⁹ Eldredge, Niles. 2005. *Charles Darwin. Discovering the Tree of Life*. New York: W.W. Norton, p145.

²²⁰ Richards, Robert. 2009. 'Myth: That Darwin and Haekel Were Complicit in Nazi Biology'. In Number, Ronald L. (ed). *Galileo Goes to Jail and Other Myths About Science and Religion*. Cambridge: Harvard University Press, p2.

²²¹ Ibid, p3.

²²² Richards, Robert. 2009. 'Myth: That Darwin and Haekel Were Complicit in Nazi Biology'. In Number, Ronald L. (ed). *Galileo Goes to Jail and Other Myths About Science and Religion*. Cambridge: Harvard University Press, p2.

off-shoots of his work, but his writing did contribute in some ways to the political paradigm.”²²³

2.4.2 Darwin, the Theory of Evolution, the Ladder of Progress and Slavery

Asserting a Eurocentric position of superiority in the “ladder of progress”, anthropological and sociological views of evolution in Darwin’s time supported a hierarchical view of human-kind and cultural evolution on a scale with the “savage” and the “civilised” on opposite ends of progression:

Social evolutionism had theoretical links to the Great Chain of Being and progressivist ideologies dominant in the eighteenth century and the early nineteenth. This disparate collection of ideas was synthesized and articulated into a bio-cultural explanation of human races that relied fundamentally on notions of evolutionary progress.²²⁴

The concept of cultural evolution on a scale in the ladder of progress, a colonialist view of culture and society, had direct implications in slavery as “anthropological science validated pre-existing racial hierarchies and – as the emergence of Darwinian anthropology coincided significantly with the emergence of the Victorian exhibitions bestializing Africans – authorized an image of Africa as both culturally and biologically inferior to Europe.”²²⁵ Beginning in 1874 in Germany, Karl Hagenbeck, (1844 – 1913) pioneered the ‘human zoo’ exhibition, giving the public access to staged shows of

²²³ Scott, Monique. 2007. *Rethinking Evolution in the Museum: Envisioning African Origins*. Hooper-Greenhill, Eilean and Kaplan, Flora (eds). Museum Meanings Series. London and New York: Routledge, p27.

²²⁴ Ibid, p26.

²²⁵ Ibid, p17.

aboriginals in their living environments.²²⁶ Due to high public interest, other colonialist empires such as France, Britain (as well as in America) created their own versions of these exhibitions.²²⁷ The exhibition of the ‘exotic and savage other’ served to support colonialist thought and action (including the ‘morally and intellectually justified’ domination of European civilisation and the ‘betterment’ of ‘inferior races and cultures’ through colonisation), slavery ideologies as well as to satisfy public curiosity. As Monique Scott argues, historical representations of Africa as ‘evolutionarily inferior’ persist in the modern-day collective consciousness.²²⁸

While Darwin’s theory was used as ‘scientific validation’ of the views of his time, ‘Social Darwinism’ can be considered a misnomer as Charles Darwin himself was not the direct ideological source for the sociological and anthropological doctrines that followed the publication of his seminal work. Although his name is often associated with “scientific racism”, Darwin

²²⁶ Bancel, Nicolas, Blanchard, Pascal and Lemaire, Sandrine. 2000. ‘Ces zoos humains de la République coloniale’. *Le Monde Diplomatique*. August, p16, <http://www.monde-diplomatique.fr/2000/08/BANCEL/14145> (accessed 22.03.2013).

²²⁷ Ibid, p16.

²²⁸ Scott, Monique. 2007. *Rethinking Evolution in the Museum: Envisioning African Origins*. Hooper-Greenhill, Eilean and Kaplan, Flora (eds). Museum Meanings Series. London and New York: Routledge, p17.

espoused the progressive abolitionist views²²⁹ of his grandfather²³⁰ Erasmus Darwin (1731 - 1802), as made evident in his manuscripts from his voyage on the *HMS Beagle*. Notably, the *HMS Beagle* served to transport three Fuegian passengers, Jemmy Button, Fuegia Basket and York Minister, as part of a sociological/anthropological experiment in 'civilisation' that in the eyes of Captain Robert FitzRoy had "failed": "To Darwin, it was a clear example of how superficial the potentially transient differences between gentleman and naked savage can be. On the surface, there seems to be all the difference in the world; but underneath lies an indication of the common experience of *Homo sapiens*, no matter the state of 'civilisation'".²³¹ Darwin curator Niles Eldredge recounts Darwin's heated argument with the Beagle's captain, Robert FitzRoy, over the "horrifying brutality" and "sheer inhumanity" of the treatment of slaves he witnessed in Brazil and explains Darwin's point of view: "Though he was to remain throughout his life typically Victorian in his elitist views toward women and "savages", in another sense he also keenly felt the essential humanity of all the people he encountered on the voyage – be they "savages," slaves, or colonists."²³²

²²⁹ See Darwin, Charles. 1832. *Journal of Researches*. 14 April. Cited in Tort, Patrick. 2001. *Darwin and the Science of Evolution*, Sinaiko, Eve (ed). Bahn, Paul G. (Trans). New York: Harry N. Abrams Inc. and Thames and Hudson, p32.

²³⁰ Tort, Patrick. 2001. *Darwin and the Science of Evolution*, Sinaiko, Eve (ed). Bahn, Paul G. (Trans). New York: Harry N. Abrams Inc. and Thames and Hudson, p14.

²³¹ Eldredge, Niles. 2005. *Charles Darwin. Discovering the Tree of Life*. New York: W.W. Norton, p25.

²³² Ibid, p25.

Regardless of Darwin's personal perspective, Darwin's name continues to be associated with immoral, racist ideologies. Without a doubt, Darwin's theory of evolution seems to have provided the necessary 'scientific proof' of the advancement and improvement of species through natural selection, with a progression toward perfectionism. Darwin had come to the conclusion that humans had evolved from apes and "so predicted that Africa would prove to be the cradle of human evolution".²³³ This scientific notion (or fact), once applied to a unileal evolutionist ladder of progress, gave rise not only to a 'scientific explanation' and thus 'justification' of the position of power of the European Caucasian elite, but also engendered one of the most powerful and memorable images of human evolution still in use today, a notably erroneous and racist representation of evolution.

2.4.3 Evolution Iconography: The March of Progress and the Victorian Zeitgeist

The iconography of evolution is significant as a visual representation or expression of views of society, culture and race throughout history.

"Although the first graphic representation of men marching single-file is dated to F. Clark Howell's 1965 Time-Life book *Early Man* (Shelley, 1996), images of species evolving linearly have been in place since the first Darwinian discourses of the late nineteenth century, which were themselves anticipated by the eighteenth-century Great Chain of

²³³ Eldredge, Niles. 2005. *Charles Darwin. Discovering the Tree of Life*. New York: W.W. Norton, p227.

Being.”²³⁴ Providing the background for Enlightenment thought and reasoning, the Great Chain of Being, also referred to as the “Scala Naturae” or ladder of nature, “represented an imposition of medieval European political relations upon the natural world” derived from ancient Greek philosophy.²³⁵ By imposing the Principle of Gradation on natural order, a ‘linear ranking’ of life from ‘lowest’ to ‘highest’ is provided²³⁶: thus God’s creation is shown on a scale in which cultures are placed hierarchically from simplest form to perfection, from primitive to highest forms, those most like God himself.²³⁷

Darwin’s publication of *On the Origin of Species* revoked the supremacy of this view, as without a Divine Designer, the “highest forms” no longer resemble God and humans no longer held a privileged position in nature. However, even after its refutation, The Great Chain of Being was somewhat maintained as it provided a view that supported the religious and anthropological paradigm of the time. “The Great Chain of Being could be appropriated by both polygenist and monogenist arguments. For example, monogenists could claim that humans share one origin yet have

²³⁴ Scott, Monique. 2007. *Rethinking Evolution in the Museum: Envisioning African Origins*. Hooper-Greenhill, Eilean and Kaplan, Flora (eds). Museum Meanings Series. London and New York: Routledge, p49.

²³⁵ Marks, Jonathan. 2007. ‘Great Chain of Being’. In Hartwell Moore, John. *The Encyclopaedia of Race and Racism*. 1st Ed. Vol. 2. Detroit, New York, San Francisco, New Haven, Waterville and London: Thomson Gale, p68.

²³⁶ Ibid, p69.

²³⁷ Scott, Monique. 2007. *Rethinking Evolution in the Museum: Envisioning African Origins*. Hooper-Greenhill, Eilean and Kaplan, Flora (eds). Museum Meanings Series. London and New York: Routledge, p22.

since differentiated into various steps on the ladder of progress with “Negroes” in distinct phylogenetic proximity to apes.”²³⁸ Polygenist ideas maintaining the separate descent of human races, although negated by the acceptance of the scientific theory of evolution, persisted “largely for political reasons – to satisfy currents in colonialism and slavery”²³⁹. Thus, once again, as a form of “justification”, Africans were “conveniently placed” as proto or sub-humans on the evolutionary scale, or were even perceived as the “missing link”.²⁴⁰ Perhaps even after scientific proof of the contrary, Man was not ready to give up his “special place” in nature and the elite had no desire to relinquish ideas of their moral and cultural “superiority”.

Although images and diagrams of human evolution have been plentiful, one image attributed to the theory of evolution, a scientifically false depiction of evolution (not created by Darwin), is the most pervasive both in scientific iconography and in the public consciousness. “The single most powerful and persuasive image of human evolution is the linear march of progress – forward-facing men marching single-file toward the future with a progressive gain in stature, brain size, tool refinement, and striding posture, and progressive decrease in hair and skin color.”²⁴¹

²³⁸ Scott, Monique. 2007. *Rethinking Evolution in the Museum: Envisioning African Origins*. Hooper-Greenhill, Eilean and Kaplan, Flora (eds). Museum Meanings Series. London and New York: Routledge, p23.

²³⁹ Ibid, p101.

²⁴⁰ Ibid, p20.

²⁴¹ Ibid, p49.

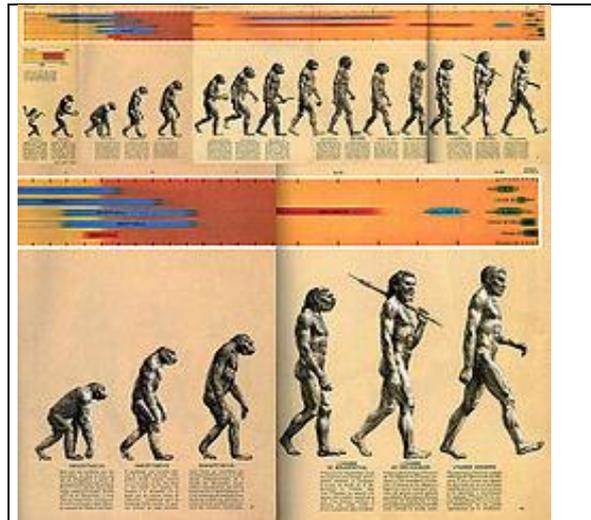


Figure 2.1: The original ‘March of Progress’ illustration from anthropologist F. Clark Howell’s (1925–2007) *Early Man* (1965) with spread extended (top) and folded (bottom).²⁴²

Source http://en.wikipedia.org/wiki/File:The_March_of_Progress.jpg (accessed 15.02.2012).

The March of Progress has been shown to be representative of a racist view of cultural progress in society and has been proven to be scientifically false. Man has evolved in a complex tree-like, non-linear fashion, and Caucasians are not a “more-evolved” human species with “savages” representative of a “less-evolved” stage. “Ironically, the progression [or the “ascent of man” as it was called by F. Clark Howell in *Early Man*] was known to be fake when it was first published. The book that included it, after noting only that fragmentary fossil evidence exists for human evolution, openly admitted that the progression was drawn from largely manufactured or distorted evidence.”²⁴³ Although scientists such as Stephen J. Gould have attempted to discredit this image of evolution by

²⁴² The March of Progress was originally commissioned by Time-Life Books for the *Early Man* volume (1965) of its popular Life Nature Library.

²⁴³ Bergman, Jerry. 2009. ‘The Ape-to-human Progression: The Most Common Evolution Icon is a Fraud’. *Journal of Creation*. 23 (3), p16.

exposing its scientific inaccuracies, the icon is still used today in popular culture and even on front covers of scientific publications.²⁴⁴ Thus, regardless of the scientific falsity of the “March of Progress” and the obvious racist connotations of these images, erroneous evolutionary iconography continues to be used and endures in the public collective consciousness. This image is therefore intentionally markedly absent in *Darwin: The Evolution Revolution*.

The theory of evolution has been transformed, distorted and misrepresented throughout time in order to serve political, social and cultural purposes, leading to a depiction of Darwin, the public icon of evolution, as ‘guilty’ of the numerous moral and ethical atrocities ‘his theory’ was utilised to ‘justify’. “Darwin’s work emerged at an apex of European colonialism, when the British, French, and Russian Empires, in particular, were marching steadily throughout much of Eurasia, Africa, and the Americas. In such a climate, tweaks upon Darwin’s ideas provided an ideal rationale to condone policies that, under almost any ethical system, would be considered abhorrent”.²⁴⁵ Social Darwinism has been used to justify colonialism, slavery and Nazi ‘philosophy’, including ideas of artificial human selection, genocide and ethnic cleansing. Images of evolution on a linear scale of progression are a ‘fallacy’ as organisms do

²⁴⁴ Bergman, Jerry. 2009. ‘The Ape-to-human Progression: The Most Common Evolution Icon is a Fraud’. *Journal of Creation*. 23 (3), p20.

²⁴⁵ Ulm, J. Wes. 2010. ‘Cachet of the Cutthroat’. *Democracy: A Journal of Ideas*. Issue 16, Spring. www.democracyjournal.org/16/6740.php?page=all (accessed 1.2.2011).

not progress from simple to complex towards complexity or an ‘ideal form’ due to an ‘inherent progressive tendency’ as argued by Spencer and Jean-Baptiste Lamarck (1744 – 1829).²⁴⁶ Thus, images of evolution on a linear scale are intentionally and markedly absent in *Darwin: The Evolution Revolution*. However, although based on a misconception of evolution, the visual impact of these images, such as the March of Progress, is so powerful that they persist today within the collective consciousness.

2.5 Science, Worldview and Culture

Science can be seen as interacting with culture, religion, philosophy, politics and thus worldview. “The mutual interaction of science with cultural worldviews has been a feature of the history of science. The world’s major religions have had an on-going engagement with science, investigating how their own ontological, epistemological and ethical commitments – their worldviews – are to be reconciled with both scientific findings and putative scientific worldviews.”²⁴⁷ In an evaluation of evolution learning that incorporates the influence of culture, an analysis of the inter-relationship of science and worldview is necessary within which the following questions are addressed: What is science? What is worldview? What is the relationship between science and worldview? Can science constitute a

²⁴⁶ Smith, John Maynard and Szathmáry, Eörs. 1995. *The Major Transitions in Evolution*. Oxford, New York, Tokyo: Oxford University Press, p4.

²⁴⁷ Matthews, Michael R. 2009. ‘Science, Worldviews and Education: An Introduction’. In Matthews, Michael R. (ed). *Science, Worldviews and Education*. 1st edition. Springer, p2.

worldview, a scientific worldview? Does the practice of science (hence the use of the scientific method) require a specific ontology? and Does science have worldview import?

2.5.1 Defining Science and Worldview

The term worldview is derived from a direct translation of the German philosophical term *Weltanschauung*, *welt* meaning world and *anschauung* meaning view or outlook. Worldview can be simply defined as:

1. The overall perspective from which one sees and interprets the world. [and]
2. A collection of beliefs about life and the universe held by an individual or a group.²⁴⁸

This definition serves to highlight both the individual and cultural (or group) aspects of worldviews, as a connection can often exist between individually-held perspectives and interpretations of the world (i.e. reality) and group perspectives or collectively-held worldviews. In their joint article “Worldviews and their relation to science”, the philosophers Gürol Irzik and Robert Nola explain the definition of worldview varies according to field of study: for instance, in the social sciences worldview is defined as “the total system of values and beliefs that characterize a given culture or group”²⁴⁹ and within philosophy, as “an overall perspective of life that sums up what we know about the world, how we evaluate it emotionally, and how we

²⁴⁸ The Free Dictionary, Farlex Inc. 2011. “worldview”.
<http://www.thefreedictionary.com/worldview> (accessed 30.05.2011).

²⁴⁹ *The Dictionary of the Social Sciences* cited by Irzik, Gürol and Nola, Robert. 2009. ‘Worldviews and their relation to science’. In Matthews, Michael R. (ed). *Science, Worldviews and Education*. 1st edition. Springer, p82.

respond to it volitionally”.²⁵⁰ Gürol Irzik and Robert Nola elaborate:

Worldviews are characterized by their generality and their tendency to be comprehensive. They provide a framework for the way a person or a whole community makes sense of life and the world (understood to include the entire universe) in its most significant aspects and dimensions. Of course, what counts as significant also depends on the worldview we hold...²⁵¹

Due to the breadth in variety of existing worldviews, labelling or categorising worldviews is challenging. Worldviews are often categorised by the cultures within which they arose (i.e. the Western worldview, the European worldview, the African worldview...) while at other times, worldview is classified according to philosophy, politics or religion.²⁵² Implementing and adapting Gürol Irzik and Robert Nola’s “working definition” of worldview²⁵³ the following definition of worldview is proposed:

Worldview is constituted of a set of beliefs which address worldview issues in the form of a coherent, unified “frame of reference” (in a comprehensive, complete or all-encompassing way) which is utilised to make sense of life, reality and the universe. Worldview is comprised of cultural, spiritual, political, philosophical, ethical (moral) frames of reference and habits of the mind which may also include scientific facts about nature and reality that are expressed as “points of view”.

Science, on the other hand, is “the intellectual and practical activity

²⁵⁰ *The Cambridge Dictionary of Philosophy* cited by Irzik, Gürol and Nola, Robert. 2009. ‘Worldviews and their relation to science’. In Matthews, Michael R. (ed). *Science, Worldviews and Education*. 1st edition. Springer, p82.

²⁵¹ Irzik, Gürol and Nola, Robert. 2009. ‘Worldviews and their relation to science’. In Matthews, Michael R. (ed). *Science, Worldviews and Education*. 1st edition. Springer, p82.

²⁵² *Ibid*, p83.

²⁵³ *Ibid*, p83.

encompassing the systematic study of the structure and behaviour of the physical and natural world through observation and experiment.”²⁵⁴ The term science refers to “any form of knowledge, but more particularly the body of empirical knowledge obtained through observation and experiment”.²⁵⁵ The word science is attributed to the body of knowledge derived from the application of the scientific method to the physical world, thus denoting simultaneously a method of study and a field of knowledge.

2.5.2 The Nature of Science and the Current Scientific View or Paradigm

Views on the relationship of observable (and unobservable) phenomena with reality “bears significantly on the nature of science”²⁵⁶ and is therefore relevant in defining what constitutes science as “what is at issue are the goals of scientific investigation and the reality or otherwise theoretical entities and mechanisms postulated in scientific theories to explain observable events and phenomena.”²⁵⁷ Diverging views on the relationship of phenomena to reality can be traced back to Plato and Aristotle and the use of theory or hypothesis in science have varied in throughout time, giving rise to the historical epistemological debate

²⁵⁴ Oxford Dictionaries. 2012. ‘science’. Oxford University Press. www.oxforddictionaries.com/definition/science (accessed 10.02.2012)

²⁵⁵ Trigg, Roger. 2001. *Understanding Social Science*. 2nd Ed. Oxford: Blackwell Publishers, p259.

²⁵⁶ Matthews, Michael R. 1994. *Science Teaching: The Role of History and Philosophy of Science*. Howard, V. A. and Scheffler, Israel (eds). Harvard Graduate School of Education. London and New York: Routledge, p163.

²⁵⁷ *Ibid*, p163.

between empiricism and realism.²⁵⁸

Although claiming to utilise the scientific method of his time, Baconian induction, Darwin was working in a contradictory methodological way²⁵⁹ implementing a hypothetico-deductive process based on the approach that “all observation must be for or against some view if it is to be of any service”.²⁶⁰ Modern scientists no longer follow the principals of empiricist Baconian induction and thus congratulate Darwin for his modern hypothetico-deductive process and preoccupation with the falsifiability of his theory. With theory driving observations, Darwin’s methodology indicates a shift in scientific reasoning and practice representative of the current scientific paradigm.

Current scientific practice is based on realism²⁶¹ although historically this was not always the case. Ontologically, realism “merely assumes that

²⁵⁸ For more information see Matthews, Michael R. 1994. *Science Teaching: The Role of History and Philosophy of Science*. Howard, V. A. and Scheffler, Israel (eds). Harvard Graduate School of Education. London and New York: Routledge, p163-164; Eldredge, Niles. 2005. *Charles Darwin. Discovering the Tree of Life*. New York: W.W. Norton, p56; Shermer, Michael. 2006. *Why Darwin Matters, The Case Against Intelligent Design*. New York: Henry Holt and Company, LLC, p2; and Trigg, Roger. 2001. *Understanding Social Science*. 2nd Ed. Oxford: Blackwell Publishers, p259.

²⁵⁹ Eldredge, Niles. 2005. *Charles Darwin. Discovering the Tree of Life*. New York: W.W. Norton, p56.

²⁶⁰ Darwin, Charles. Letter to Henry Fawcett. 18 September 1861. Cited in Shermer, Michael. 2006. *Why Darwin Matters, The Case Against Intelligent Design*. New York: Henry Holt and Company, LLC, p2.

²⁶¹ Matthews, Michael R. 2009. ‘Science, Worldviews and Education: An Introduction’. In Matthews, Michael R. (ed). *Science, Worldviews and Education*. 1st edition. Springer, p16.

there is a reality of some sort”.²⁶² Realism can be further defined as maintaining the view that the “real world” exists externally of the human mind; epistemologically knowledge is obtained through an interaction of the human mind with the external physical world.²⁶³

Using the position papers of the American Association for the Advancement of Science (AAAS) - an international, non-profit organisation founded in 1848 seeking to promote scientific advancement with international benefit for all²⁶⁴ - and the US National Research Council (NRC), Hugh G. Gauch Jr. in *Science, Worldviews and Education* (2009), identifies the seven essential “pillars of science”:

Pillar P1: *Realism*. The physical world, which science seeks to understand, is real.

Pillar P2: *Presuppositions*. Science presupposes that the world is orderly and comprehensible.

Pillar P3: *Evidence*. Science demands evidence for its conclusions.

Pillar P4: *Logic*. Scientific thinking uses standard and settled logic.

Pillar P5: *Limits*. Science has limits in its understanding of the world.

Pillar P6: *Universality*. Science is public, welcoming persons from all cultures.

²⁶² Lombardo, T. J. 1987. *The Reciprocity of Perceive and Environment: The Evolution of James J. Gibson's Ecological Psychology*. Hillsdale: Lawrence Erlbaum Associates, p159.

²⁶³ Schuh, Kathy L. and Barab, Sasha A. 2007. ‘Philosophical perspectives’. In Spector, J.M., Merrill, M. D., van Merriënboer, J. and Driscoll, M. P. (eds). *Handbook of research on educational communications and technology*. New York: Lawrence Erlbaum Associates, p71.

²⁶⁴ American Association for the Advancement of Science, “What is AAAS?” www.aaas.org/aboutaaas/ (accessed 24.03.2012).

Pillar P7: *Worldview*. Science hopefully contributes to a meaningful worldview.²⁶⁵

Gauch explains that the AAAS pillars of science are based on Stephen J. Gould's 1999 influential position of NOMA according to which science and religion are *non-overlapping magisteria*, thus allowing for science to be considered as "worldview independent"²⁶⁶. The AAAS adopts the separate-worlds model which allows both science and religion to exist in parallel without conflict. This position is important in that it permits science to be "practiced by all" as science is no longer bound by cultural worldviews or specific ontological positions.

However, Gauch points out a significant discrepancy within the AAAS position on the limits of scientific research in relation to the supernatural and the purpose of life. In his study of several (different) AAAS position papers, the claim that certain beliefs (one must understand here supernatural, religious questions on life and its purpose) can neither be scientifically proved or disproved due to their nature, conflicts with another (separate) AAAS statement, that understanding science includes the acceptance of a directional, non-teleological universe.²⁶⁷ Thus, "awkwardly, one AAAS position paper claims that science cannot examine the purposes of life, whereas another declares emphatically that science

²⁶⁵ Matthews, Michael R. 2009. 'Science, Worldviews and Education: An Introduction'. In Matthews, Michael R. (ed). *Science, Worldviews and Education*. 1st edition. Springer, p16.

²⁶⁶ Ibid, p16.

²⁶⁷ Gauch, Hugh G. Jr. 2009. 'Science, Worldviews and Education'. In Matthews, Michael R. (ed). *Science, Worldviews and Education*. 1st edition. Springer, p30.

reveals a purposeless universe.”²⁶⁸ Even within the American Association for the Advancement of Science, opinions on whether science presupposes a specific worldview (or a naturalistic ontology) are not unanimous. Can we conclude that science is not worldview independent?...that a “scientific worldview” exists?...or that science itself constitutes a worldview?

Through the implementation of the scientific method, science is considered objective. However fundamentally, the practice of science is a human endeavour: “science is a human and thus historically-embedded truth seeking enterprise that has many features: cognitive, social, commercial, cultural, structural, ethical, psychological etc.”²⁶⁹ While “Western science tends to isolate itself in *eidos* (idealised pure knowledge), rendering itself superior to praxis”,²⁷⁰ “relativists [...] claim that the whole edifice of Western science is a mere sociological fact”²⁷¹ and can therefore not be dissociated from culture and society. Furthermore, Western science – “embedded in a culture that has

²⁶⁸ Gauch, Hugh G. Jr. 2009. ‘Science, Worldviews and Education’. In Matthews, Michael R. (ed). *Science, Worldviews and Education*. 1st edition. Springer, p30.

²⁶⁹ Matthews, Michael R. 2012. ‘Changing the Focus: From Nature of Science to Features of Science’. In Myint S. Khine (ed). *Advances in Nature of Science Research*. Dordrecht: Springer, p3.

²⁷⁰ Aikenhead, Glen S. 2001. ‘Science Communication with the Public: A Cross Cultural Event’. In Stocklmayer, Susan M., Gore, Michael M. and Bryant, Chris R. (eds). *Science Communication in Theory and Practice*. Dordrecht: Kluwer Academic, p29.

²⁷¹ Trigg, Roger. 2001. *Understanding Social Science*. 2nd Ed. Oxford: Blackwell Publishers, p24.

colonised large portions of the planet” - has exerted international dominance and authority over non-Western science.²⁷² Thus:

to do science is not to hold a mirror to nature but to participate actively in the interpretive conventions and practices of a particular culture. The major question that must be asked of scientific account, then, is not whether they are true to nature but what these accounts (and the practices in which they are embedded) offer to the culture more generally.²⁷³

If science is not ‘culture-free’, interpretations of science will inevitably vary both across and within cultures. Hence within science communication, cultural contextualisation - including “local truths of scientific cultures”²⁷⁴ - takes on particular relevance within meaning-making processes.

2.5.3 Science as Worldview, Contributing to Worldview or as Worldview Independent

A contentious issue of debate is whether science presupposes a naturalistic worldview. Opinions on whether science itself constitutes a worldview or whether science dictates a particular ontology are not unanimous. According to the Stanford Encyclopaedia of Philosophy, naturalism cannot be allotted a single definition it encompasses a variety of positions both philosophically yet “its current usage derives from debates in America in the first half of the last century” of naturalists such

²⁷² Aikenhead, Glen S. 2001. ‘Science Communication with the Public: A Cross Cultural Event’. In Stocklmayer, Susan M., Gore, Michael M. and Bryant, Chris R. (eds). *Science Communication in Theory and Practice*. Dordrecht: Kluwer Academic, p38.

²⁷³ Gergen, Kenneth J. 2001. ‘Psychological Science in a Postmodern Context’. *American Psychologist*. American Psychological Association. October, Vol 56, Inc., p806.

²⁷⁴ Ibid, p806.

as John Dewey and Ernest Nagel who advanced a view that “reality is exhausted by nature, containing nothing ‘supernatural’, and that the scientific method should be used to investigate all areas of reality”.²⁷⁵ Gürol Irzik and Robert Nola’s philosophical analysis of the naturalist position and its philosophical capability of constituting a comprehensive worldview that accounts for the meaning of human existence concludes as naturalists “re-construe worldview questions about life’s meaning by locating meaning not in some other worldly transcendent purpose, say, laid down by God, but rather in human volition”,²⁷⁶ without the addition of another philosophical aspect, such as humanism, atheism, or altruism, the scientific worldview can be perceived as incomplete.²⁷⁷

Three distinctive positions exist within naturalism: ontological naturalism, materialism and methodological naturalism: ontological naturalism, or naturalism as a philosophy, maintains “the view that there is a scientific explanation for all events; that supernatural explanations (e.g. Divine interventions, miracles) are simply ruled out;”²⁷⁸ materialists “grant existence only to material, physical, ‘three-dimensional’ objects [...] [and]

²⁷⁵ Papineau, David. 2009. ‘Naturalism’. In Zalta, Edward N. (ed). *The Stanford Encyclopedia of Philosophy*. Spring Edition. <http://plato.stanford.edu/archives/spr2009/entries/naturalism/> (accessed 10.02.2012).

²⁷⁶ Irzik, Gürol and Nola, Robert. 2009. ‘Worldviews and their relation to science’. In Matthews, Michael R. (ed). *Science, Worldviews and Education*. 1st edition. Springer, p85.

²⁷⁷ Ibid, p85.

²⁷⁸ Matthews, Michael R. 2009. ‘Science, Worldviews and Education: An Introduction’. In Matthews, Michael R. (ed). *Science, Worldviews and Education*. 1st edition. Springer, p8.

they reject the postulation of non-material entities” [...];²⁷⁹ methodological naturalism - “the view that, when doing science, whatever occurs in the world is to be explained by natural mechanisms and entities; and that these entities and mechanisms are the ones either revealed by science or in-principal discoverable by science”²⁸⁰ - on the other hand, is not a philosophical view and serves to allow for the practice of science without the imposition of a specific ontological perspective. Ontological naturalism is not a requirement or presupposition of science; however, the practice of science, which includes the scientific method, “presupposes at least methodological naturalism”²⁸¹ within which the *non-overlapping magisteria* of science and religion is maintained and no particular ontological perspective is imposed. Methodological naturalism, an epistemological stance as oppose to an ontological stance, is the “minimum requirement” for the practice of science; “traditional religious believers must reject ontological naturalism [within which materialism is located], but of course religious scientists routinely adopt methodological naturalism in the

²⁷⁹ Matthews, Michael R. 2009. ‘Science, Worldviews and Education: An Introduction’. In Matthews, Michael R. (ed). *Science, Worldviews and Education*. 1st edition. Springer, p8.

²⁸⁰ Trigg, Roger. 2001. *Understanding Social Science*. 2nd Ed. Oxford: Blackwell Publishers, p257.

²⁸¹ Matthews, Michael R. 2009. ‘Science, Worldviews and Education: An Introduction’. In Matthews, Michael R. (ed). *Science, Worldviews and Education*. 1st edition. Springer, p8.

laboratory; to do otherwise would put them outside of the scientific enterprise.”²⁸²

Realism, as opposed to naturalism, according to the AAAS, is the first pillar of science.

Although often confused, there is a difference between Realism and Naturalism (including Materialism). Realism simply asserts that there is a world independent of human thought. Such an independent world might include spirits, minds, universals, Forms, or any other independent existent. Realism neither rules in or out any particular ontology. Naturalism is a subspecies of Realism, Materialism in turn is a subspecies of Naturalism.²⁸³

Realism, thus defined, can also be considered an “incomplete worldview” as in order to answer existential questions such as the meaning of life, realism must be accompanied by another philosophical aspect. The claim that the nature of science presupposes a singular ontology is hence refuted; science, as a method for obtaining facts about the world, does not constitute a worldview in itself. The current scientific paradigm, combining realism with methodological naturalism, serves to ensure the significance of scientific findings as truth and knowledge of the natural world while allowing variable ontological positions within science practice. Science, from this perspective, is able to encompass or embrace multiple philosophical perspectives and worldviews, upholding the sixth AAAS pillar of universality.

²⁸² Matthews, Michael R. 2009. ‘Science, Worldviews and Education: An Introduction’. In Matthews, Michael R. (ed). *Science, Worldviews and Education*. 1st edition. Springer, p8.

²⁸³ Ibid, p8.

Although it has been argued that science does not impose a singular ontological perspective and does not constitute a worldview in itself, science undoubtedly has worldview import. However, reverting back to the AAAs pillars of science, science has “limits in its understanding of the world” (P5) while contributing “to a meaningful worldview” (P7). If we consider the AAAS position, as stated by Gauch, that “science cannot examine the purposes of life”,²⁸⁴ science can be perceived as having limits in the worldview questions it can address.²⁸⁵ This raises the issue of whether science operates within limits and is thus incapable of addressing supernatural worldview questions or whether science refutes any theistic or supernatural claim.

Scientific theory, such as the theory of evolution by natural selection, has significant worldview input. While debate over the facts of evolution within science is essentially non-existent, these facts are interpreted through and according to various worldviews and are thus ‘negotiated’ within meaning perspectives and frameworks, even by scientists themselves.²⁸⁶ Thus, even within evolutionary biology, divergent views of random processes in nature exist: atheist biologists maintain an implied purposelessness and theist biologists maintain purposefulness, a debate based on conflicting

²⁸⁴ Gauch, Hugh G. Jr. 2009. ‘Science, Worldviews and Education’. In Matthews, Michael R. (ed). *Science, Worldviews and Education*. 1st edition. Springer, p30.

²⁸⁵ Ibid, p27.

²⁸⁶ Ibid, p27.

philosophical interpretations of undisputed scientific facts.²⁸⁷ This discrepancy is not scientific, it is worldview-related. As science provides theories such as evolution and natural selection that answer questions related to origins and history, it can be stated that science evidently and inevitably has worldview import; yet the way scientific facts are interpreted, and thus the manner in which science impacts worldview, depends on our frames of reference, habits of the mind and points of view.

2.6 Conclusion: Culture, Society, Evolution Learning and Perspective Transformation as Individual and Collective Expansion of Consciousness

The distortions of the theory of evolution and its heinous, historical uses are relevant both in the past and today as the fundamental question of ethics is raised in relation to the practice of science within culture and society. What man has done 'in the name of science' is etched in history, but essentially, is Darwin 'guilty' or 'guilty by association' in our collective memory? Regardless of the views on slavery Darwin expressed in his journals, it is a combination of the Victorian zeitgeist and the 'scientific racism' of his time that seems to perpetuate a view of Darwin as a racist, and of evolution as a racist theory. As made evident in his Answers in Genesis talk at Westminster Chapel in March 2009 that constituted a 'Christian response' to the world-wide celebration of the year of Darwin, a simple reference to the original title of Darwin's publication, *On the Origin of Species by Means of Natural Selection, or The Preservation of*

²⁸⁷ Gauch, Hugh G. Jr. 2009. 'Science, Worldviews and Education'. In Matthews, Michael R. (ed). *Science, Worldviews and Education*. 1st edition. Springer, p27.

Favoured Races in the Struggle for Life, seems to suffice for Ken Ham and his Young Earth, Christian fundamentalist followers to indict Darwin of the world's most atrocious crimes against humanity.²⁸⁸

Ken Ham was not the only public religious figure to propagate an oppositional response to the international celebration of Darwin's scientific contribution in the 'Year of Darwin'. Reverend Charles McVety, a Canadian Evangelical Minister, President of the Canada Family Action Coalition and of the Canada Christian College in Toronto, accused ROM staff members – in an open letter to ROM CEO William Thorsell²⁸⁹ - of “sugar coating” the theory of evolution by not addressing elements of the theory that “propagate genocide and hatred” in the Darwin exhibit.²⁹⁰ On 12 June 2008 McVety organised an “anti-racism rally” in front of the ROM's entrance directly after a special screening of *Expelled: No Intelligence Allowed*, a controversial documentary written by and starring American lawyer/comedian Ben Stein which argues “that Charles Darwin's

²⁸⁸ Ken Ham, President of Answers in Genesis-US, gave a (AIG) speech on Darwin, Religion and the Theory of Evolution at Westminster Chapel in London on Thursday, March 13, 2009 in response to Richard Dawkins' speaking tour in the US and the traveling exhibition Darwin: The Evolution Revolution (Darwin, Big Idea Big Exhibit in London at the Natural History Museum). I attended this talk as part of my fieldwork. Answers in Genesis claims that approximately 700 people attended the talk (blogs.answersingenesis.org/blogs/ken-ham/2009/03/14/700-at-westminster-chapel-london/) however I believe there were significantly less. As it was a two-part talk, perhaps they added the attendance figures from both talks.

²⁸⁹ McVety, Charles. 2008. 'Letter to the Royal Ontario Museum'. *Institute for Canadian Values*. March 4. www.canadianvalues.ca/kmitan/048-letter_to_the_royal_ontario_museum.php (accessed 10.10.2013).

²⁹⁰ Klein, Adina. 2008. 'ROM's exhibit is 'sugar coating' Darwin's theory, McVety charges'. *Jewish Tribune*. June 19. www.jewishtribune.ca/wp-content/uploads/PDF/jt061908.pdf (accessed 12.10.2013).

theory of evolution paved the way for the Holocaust.”²⁹¹ Approximately 20 individuals participated in McVety’s *Darwin* demonstration.

While no public anti-evolution demonstrations were held at the NHM during the *Darwin* exhibit, the ‘science versus religion debate’ took on particular relevance in Britain in September 2008. Professor Michael Reiss – “a biologist and ordained Church of England clergyman”²⁹² - resigned as Director of Education at the Royal Society due to controversy over statements he had made on the relationship between science and religion in regards to science teaching.²⁹³ Professor Reiss had highlighted a significant issue for science educators: how to deal with questions raised by students during a science lesson based on creationist beliefs or Intelligent Design.²⁹⁴ He suggested science teachers treat creationist beliefs “not as a misconception but as a world view”.²⁹⁵ Although Professor Reiss was not promoting equal scientific validity of creationism and

²⁹¹ Rennie, John. 2008. ‘Ben Stein’s *Expelled*: No Integrity Displayed’. *Scientific American*. Nature America Inc. April 19. www.scientificamerican.com/article.cfm?id=ben-steins-expelled-review-john-rennie (accessed 15.10.2013).

²⁹² Smith, Lewis and Henderson, Mark. 2008. ‘Royal Society’s Michael Reiss resigns over creationism row’. *The Times*. September 17. www.thetimes.co.uk/tto/faith/article1967068.ece (accessed 12.10.2013).

²⁹³ Ibid.

²⁹⁴ See Reiss, Michael. 2011. ‘How should Creationism and Intelligent Design be Dealt with in the Classroom?’ *Journal of Philosophy of Education*. Volume 45. August. Number 3. Philosophy of Education Society of Great Britain, Blackwell Publishing, pp399-415.

²⁹⁵ Smith, Lewis and Henderson, Mark. 2008. ‘Royal Society’s Michael Reiss resigns over creationism row’. *The Times*. September 17. www.thetimes.co.uk/tto/faith/article1967068.ece (accessed 12.10.2013).

evolution, the Royal Society concluded his remarks were “open to misinterpretation”.²⁹⁶ Thus, after substantial dispute amongst Royal Society Fellows, Reiss resigned as Director of Education.

Hence, the ‘science versus religion debate’ can be said to have current resonance, not only in the United States, but also in Canada and Britain. Fundamentally, accepting evolution continues to be equated with atheism and immorality, perhaps even capable of leading to the ultimate decline of all humankind. However, just as with the atomic theory and its implication in the creation of the atomic bomb, the often devastating uses of scientific discovery in society do not negate the scientific accuracy of the theories themselves, they rather serve to highlight the pertinent and essential ethical issues of science. Thus, regardless of its difficult history, the theory of evolution by natural selection shall continue to stand as an accepted scientific theory, or rather, an established scientific fact.

Embarking on a five-year journey around the world, Darwin’s research would culminate in one of the most profound scientific theories to ever affect man’s view of himself and his position in nature. Evolution, a scientific theory, has had resounding influence on worldview and culture and as such is often feared by followers of religion; accepting evolution has the possibility of leading to a perspective transformation and a loss of faith, which ‘appears confirmed’ by Darwin’s personal experience. Over

²⁹⁶ Smith, Lewis and Henderson, Mark. 2008. ‘Royal Society’s Michael Reiss resigns over creationism row’. *The Times*. September 17. www.thetimes.co.uk/tto/faith/article1967068.ece (accessed 12.10.2013).

the course of his life, Darwin's personal perspective fluctuated and radically changed, culminating in perspective transformation with the death of his daughter. Hence evolution alone may not have the power to transform personal worldviews.

Studying visitor reception of the international travelling exhibition *Darwin: The Evolution Revolution* in Canadian and British contexts presents a valuable opportunity for analysing how science and worldview interact within both individual and cultural frames of reference. For it is within a certain tension between science and worldview, both past and present, that Darwin's work takes on great significance and encounters resistance, both historically and currently. The "global" celebration of the 150th anniversary of the publication of Charles Darwin's *On the Origin of Species*, was not simply a recognition of "significant scientific achievement", but rather consisted of a commemoration and celebration of "the birth of a new worldview" as Darwin's seminal publication "initiated a transformation of modern worldviews and a new understanding of the place of human beings in the natural world."²⁹⁷

²⁹⁷ Matthews, Michael R. 2009. 'Science, Worldviews and Education: An Introduction'. In Matthews, Michael R. (ed). *Science, Worldviews and Education*. 1st edition. Springer, p1-2.

Chapter Three: Research Methodology and Method of Inquiry

3.0 Introduction

The focus of the thesis is audiences, culture, worldview and informal evolution learning. The main topics addressed through audience research in the international travelling exhibition *Darwin: The Evolution Revolution* are: learning and experience in the exhibit through a constructivist and transformative learning paradigm and the effect of culture and worldview on adult, informal evolution learning. The aim of this chapter is to provide a thorough description of research methodology and method of inquiry and will therefore review the research problem and explain research focus, questions, objectives and desired outcomes. Through a clarification of motivations and methodology, this chapter also intends to demonstrate the purpose and relevance of the research in the field of museum studies as well as the perceived impact for current museum practice. Thus the ontological and epistemological approaches that best support the research are defined and justified and both the theoretical and practical implications of the research explained.

3.1 Research Focus, Scope and Purpose

The focus of the research is an analysis of communication, learning and visitor experience in *Darwin: The Evolution Revolution* based on communication and learning objectives identified by partner institutions during the joint creation or production process as well as site-specific

objectives and subsequent adaptations by participating host institutions: the ROM and the NHM. The scope of the thesis is a study of meaning-making and learning in the travelling exhibition through a qualitative and quantitative visitor study of UK and Canadian adult audience reception which includes an analysis of the effectiveness of specific communicative strategies and methods implemented in this exhibit produced for and shown to a multitude of audiences on an international level.²⁹⁸

The purpose of the research is twofold: first to fill in gaps of knowledge in the field of visitor studies in travelling exhibitions as very little information is available and insufficient research in this specific area of focus has been performed, and secondly; to increase understanding and knowledge of the theoretical implications of effective communication and learning through international travelling exhibitions, thus including the effect of culture on the exhibition medium.

3.2 Research Aims, Questions and Desired Outcomes

This project aims to:

- Analyse the theory and practice of communicative methods of a travelling exhibit specifically designed for an ‘international audience’ created by the AMNH, New York in a collaborative process integrating four partner institutions (American, Canadian and British).
- Study communication, learning and visitor experience in the London and Toronto venues of the international collaborative travelling exhibition through audience research.
- Evaluate the efficiency of these methods and their impact according to communication goals and educational objectives.

²⁹⁸ To date, *Darwin* has travelled throughout the US (to at least eight venues), to Canada and the UK as well as to Japan, Australia, New Zealand and Brazil.

- Gain insight into and a better understanding of the visitor experience in international travelling exhibitions and the effect of culture on communication and learning.
- Determine which communication methods prove to be more 'globally effective' for an international audience.

As museums creating international travelling exhibitions must attempt to effectively communicate messages and transfer knowledge to multiple audiences both within and across numerous cultures, the main research questions are:

- What happens to the effectiveness of educational theory and methods used in exhibitions when they are transferred from one culture to another?
- Do truly international communication strategies and methods for the museum exhibition exist?
- Aside from the obvious question of the translation of texts, do certain changes and adaptations need to be made to exhibit content in order to ensure that the chosen communication strategy stays effective across cultures?
- Are the adaptations required in a travelling exhibition's message content-based, communication/education-based or both?
- Is visitor meaning making in museums similar across cultures, thus allowing the international travelling exhibition to communicate effectively in any number of countries?
- Is an effective international travelling exhibition truly possible?

These questions can be narrowed down to the following 'causal puzzle':²⁹⁹

How do culture and context affect the exhibition medium, the communication of messages, the "reading" of the exhibition, visitor meaning-making and museum learning?

²⁹⁹ According to Jennifer Mason, a *causal puzzle* is a type of *intellectual research puzzle* that serves as a main research question focusing on "what influence *x* has on *y*, or what causes *x* or *y*" [...] "you will notice the significance of the words 'what, why and how' in formulating the questions." Mason, Jennifer. 2002. *Qualitative Researching*. 2nd Ed. London: Sage Publications, p18.

The desired outcomes of the research are:

- To obtain a better general understanding of the effectiveness (and non-effectiveness) of specific communicative methods in international travelling exhibitions.
- To determine any essential differences and similarities in visitor behaviour and audience reception in the travelling exhibition.
- To gain knowledge on the effect of culture, worldview and perspectives on informal adult evolution learning in the UK and Canadian contexts.
- To establish recommendations based on empirical research for truly international communication methods for institutions currently striving to transfer knowledge to multiple audiences on an international scale by fostering effective cross-cultural learning.
- To both encourage and contribute to a new focus in travelling exhibitions, putting visitor experience and cultural relevance at the forefront of effective communication practices.

3.3 Research Methodology

“Social research is a process in which people combine a set of principles, outlooks, and ideas (i.e., methodology) with a collection of specific practices, techniques, and strategies (i.e., a method of inquiry) to produce knowledge.”³⁰⁰ In determining research methodology, it is therefore necessary to analyse and understand the specific research questions to be answered, the relative ontological perspective, concept of reality or “worldview” and the specific epistemological position or concept of knowledge to be applied.³⁰¹ Thus, of equal bearing are: the identification of research motives and aims and the establishment of the appropriate

³⁰⁰ Neuman, Lawrence W. 2004. *Basics of Social Research. Qualitative and Quantitative Approaches*. Lasser, Jeff (ed). Boston: Pearson Education Inc., p2.

³⁰¹ Mason, Jennifer. 2002. *Qualitative Researching*. 2nd Ed. London: Sage Publications, p13-23.

philosophical and epistemological positions. The goal is to ensure that the research process and objectives are effectively linked to pertinent theory.

3.3.1 *Ontology: The Realism-Idealism Dichotomy*

“Philosophical perspectives are worldviews that define the nature of the world, the individual’s place in it and the possible relationships to that world and its parts.”³⁰² George Hein sums up the differences in ontological views of the nature of knowledge as conflicting philosophies where knowledge is perceived as either existing “within” or “without” the individual. The theory of “realism”, often quoted from Plato, states that the “real” world exists, no matter the views of humans. Our ideas or thoughts are mere imitations of the real, external world. Thus knowledge exists outside of our minds, within the real world. The theory of “idealism” takes on an opposing view stating that knowledge exists only within our own minds, including the “laws of nature”. Philosophically, realists believe that knowledge exists independently of the learner; idealists uphold the opposite view that knowledge exists in the mind and is constructed by the learner.³⁰³ The persisting realist-idealist dichotomy, rooted in the writings of the ancient Greek philosophers Plato and Aristotle, stems from debates of the “body/mind” or “body/matter” relationship which includes issues of the “subjective/objective”.

³⁰² Schuh, Kathy L. and Barab, Sasha A. 2007. ‘Philosophical perspectives’. In Spector, J.M., Merrill, M. D., van Merriënboer, J. and Driscoll, M. P. (eds). *Handbook of research on educational communications and technology*. New York: Lawrence Earlbaum Associates, p68.

³⁰³ Hein, George E. 1998. *Learning in the Museum*. New York: Routledge, p16-18.

Thus, ontological positions provide opposing views on the nature of reality and the relationship of the human mind to the world, including where truth and knowledge are 'situated', which implies variable methods for acquiring truth and knowledge. Positivism is "the view which considers scientific method the only path to truth" and is "opposed to any form of metaphysics".³⁰⁴ Thus, positivist epistemology maintains that knowledge and truth can only be obtained through science and the scientific method, through the investigation of the natural world, a reality that inevitably exists independently of human mind and thought. Reality is therefore perceived as objective.

Positivism may appear essential to science and scientific research; however, it eliminates the human aspect of knowledge as well as the possibility for diverging perspectives on truth and reality. The positivist perspective negates the importance of the social sciences focusing on human behaviour rather than human consciousness as behaviour is "verifiable" through observation and therefore objective.³⁰⁵ Yet "human beings do not just *behave*. They *act*, and their actions occur with an understanding of their significance in a wider social context. Human actions are endowed with meaning, and it may appear that they cannot be properly understood unless that meaning is grasped."³⁰⁶

³⁰⁴ Trigg, Roger. 2001. *Understanding Social Science*. 2nd Ed. Oxford: Blackwell Publishers, p258.

³⁰⁵ Ibid, pp44-45.

³⁰⁶ Ibid, p47.

An objectivist ontological view upholds the belief that nature and reality exist separately and independently from the human mind whereas a subjectivist ontology perceives reality as existing in and through the human mind, maintaining that reality exists through the projection of human consciousness. Subjectivists purport, therefore, that multiple realities are possible. These conflicting perspectives of reality serve to illustrate the existing discord and divide between specific fields of study, such as the natural and social sciences, as methodology and method of inquiry vary according to ontological perceptions of where knowledge exists (in the natural world or in human minds), dictating specifically adapted methods for obtaining and analysing data.

The distinction between two radically opposing philosophical viewpoints - idealism and realism – has had great importance in museum evaluation and research as over time the focus in the field has shifted from exhibition evaluation toward visitor studies.³⁰⁷ In the late 1990's, Roger Miles and George Hein became involved in debate based on their opposing realist versus anti-realist views, positions or “explanations of science”.³⁰⁸ Roger Miles performed substantial research at the NHM London based on a positivist, objectivist approach which included the view that effective learning in the science museum entails “a successful transfer of

³⁰⁷ Hooper-Greenhill, Eilean. 2006. 'Studying Visitors'. In Macdonald, Sharon (ed). *A Companion to Museum Studies*. Companions in Cultural Studies. Malden, USA; Oxford, UK; Victoria, Canada: Blackwell Publishing Ltd, p365-368.

³⁰⁸ Ibid, p372.

messages”.³⁰⁹ Although Miles undeniably contributed valuable knowledge of effective exhibit design methods (see Pp 193) for facilitating the communication of scientific concepts through the exhibition medium³¹⁰, his implementation of “learning models from behaviourist psychology and sociological models from positivist American mass communication theory [...] was not entirely successful”.³¹¹ Essentially, within Miles’ approach the exhibition was perceived as an “all powerful” communicative medium based on the assumption “that the visitors were open to manipulation through its effects”.³¹² As researching meaning-making process requires the recognition of individual “interpretive strategies and repertoires,”³¹³ it was therefore concluded that within the natural science museum, “more attention needed to be paid to the visitors.”³¹⁴

³⁰⁹ Hooper-Greenhill, Eilean. 1995. ‘Museums and Communication: An introductory essay’. In Hooper-Greenhill, Eilean. (ed). *Museum, Media, Message*. 2nd Ed. London: Routledge, p5.

³¹⁰ Miles, Roger S. et al. 1982. *The Design of Educational Exhibits*. 2nd Ed. London: Unwin Hyman Ltd.

³¹¹ Hooper-Greenhill, Eilean. 1995. ‘Museums and Communication: An introductory essay’. In Hooper-Greenhill, Eilean. (ed). *Museum, Media, Message*. 2nd Ed. London: Routledge, p4-5.

³¹² Ibid, p5.

³¹³ Hooper-Greenhill, Eilean. 2006. ‘Studying Visitors’. In Macdonald, Sharon (ed). *A Companion to Museum Studies*. Companions in Cultural Studies. Malden, USA; Oxford, UK; Victoria, Canada: Blackwell Publishing Ltd, p373.

³¹⁴ Hooper-Greenhill, Eilean. 1995. ‘Museums and Communication: An introductory essay’. In Hooper-Greenhill, Eilean. (ed). *Museum, Media, Message*. 2nd Ed. London: Routledge, p5.

3.3.2 *The Ontological Perspective of the Thesis: Postmodernism*

Perhaps the most fundamental step in any social research project is the establishment of the specific understanding of both the social world and social phenomenon implied or inherent in the proposed research questions. The aim is to identify the ontological perspective relevant to research objectives and to thus determine the appropriate research methodology and method of inquiry. The thesis research project consists of an evaluation of planned visitor outcomes in informal science learning; the aim is to better understand the multiple perspectives and points of view of various audiences in relation to the theory of evolution. It is vital to situate the research within the field of social science, hence embracing a subjectivist ontological view as well as the “anti-realist” position that “views knowledge as that which is constructed by the knower, relative rather than absolute, intertwined with values, and provisional.”³¹⁵ The subjectivist position of social science, that reality exists both in and through the human mind, is essential to the research questions, methodology and method of inquiry. This thesis attempts to understand and relate all findings to the specific social, cultural and historical contexts within which communication and interpretation is taking place and has therefore consciously chosen to forgo positivism, adopting a postmodernist perspective.

Beginning as a “reaction to the Enlightenment conception of reality”, postmodernism positions itself as being “opposed to the idea of foundations

³¹⁵ Hooper-Greenhill, Eilean. 2006. ‘Studying Visitors’. In Macdonald, Sharon (ed). *A Companion to Museum Studies*. Companions in Cultural Studies. Malden, USA; Oxford, UK; Victoria, Canada: Blackwell Publishing Ltd, p372.

for human knowledge, or of an independent reality”.³¹⁶ In other words, the postmodernist perspective is in opposition with objectivism and thus rejects the concept of universality and the existence of an ultimate or absolute truth. The concept of relativism is introduced supporting the idea that “there is a relative aspect to all truth”, or taken to the extreme as with absolute relativism, “all truth or knowledge is subjective, therefore all truths are equal”.³¹⁷ Postmodernism, therefore, supports the idealistic, subjective philosophical standpoint where truth and reality are perceived as existing within individual or personal frameworks in the human mind and is “known through personal experience”³¹⁸; postmodernism supports social sciences method and methodology as access to truth and facts is achieved through the research and analysis of individual perspectives. The theory of social constructionism is also relevant as it serves to extend or broaden the framework from the individual to society as it implies the existence of a social reality: a “humanly constructed environment, formed by beliefs and expectations, and contrasted with physical reality”³¹⁹.

Articulating the postmodernist ontological perspective, French philosopher Jean-François Lyotard “announced the demise of the great paradigm of scientific rationality and the return of multiple wisdoms, cultures, [and] a

³¹⁶ Trigg, Roger. 2001. *Understanding Social Science*. 2nd Ed. Oxford: Blackwell Publishers, p258.

³¹⁷ Hoffman, Louis. 2005-2008. *Postmodernism Dictionary*. www.postmodernpsychology.com/Postmodernism_Dictionary.html (accessed 23.12.2011).

³¹⁸ Ibid.

³¹⁹ Trigg, Roger. 2001. *Understanding Social Science*. 2nd Ed. Oxford: Blackwell Publishers, p259.

relativism of knowledges”³²⁰ thus advocating a pluralistic view that embraces complex diversity and renders the idea of meta-narratives obsolete. In support of the claim that “multiple realities” exist, ideologically, postmodernism opposes positivism by rejecting the concept of absolute truth, essentially embracing the idea of reality as dependant on an individual or society’s perspective.

The postmodernist proposes that arguments about what is really real are futile. There is no means of transcending cultural traditions to make such an assay. Furthermore, in the present global conditions – in which cultures increasingly collide and social movements can be organized with dispatch – taking stands on what is ultimately real (or true or moral) is increasingly perilous.³²¹

Advocating the concept of multiple, co-existing cultural and cognitive paradigms, Lyotard explains the fundamental concept of relativism: “the genuine relativist would always say [...] that notions such as those of “the world” are already theoretical. They can only be understood in the context of someone holding beliefs. “Reality” has no meaning apart from what is believed real by some group.”³²² This point is essential in a study of visitor responses to an exhibition on evolution within various cultures; consequently, also crucial to this research, is a firm conviction in “non-judgemental” evaluation, where all visitor realities are considered “valid”,

³²⁰ Kuper, Adam and Kuper, Jessica (eds.). 1996. *The Social Science Encyclopedia*. 2nd Ed. London and New York: Routledge, p652.

³²¹ Gergen, Kenneth J. 2001. ‘Psychological Science in a Postmodern Context’. *American Psychologist*. American Psychological Association. October, Vol 56, Inc., p806.

³²² Trigg, Roger. 2001. *Understanding Social Science*. 2nd Ed. Oxford: Blackwell Publishers, p24.

including perceptions that cannot be scientifically substantiated or “justified”. Opposition to the theory of evolution is generally considered to be culturally-based or defined: thus, the thesis intention is to avoid ethnocentrism and cultural value-judgements in analysis by considering all points of view as culturally relevant and hence “valid”. Furthermore, throughout the research, at all times an awareness of cultural influences in communication and interpretation, as well as cultural preconceptions and biases: whether those of the researcher, of the exhibition producers or the audience.

As discussed in Chapter 2: Culture, Worldview and Evolution, science significantly contributes to worldview. Within the subjectivist ontological perspective, the individual can be either perceived as actively incorporating science (i.e. scientific theories and facts) within his/her cultural framework or worldview, or rejecting specific scientific claims based on the conflicting-worlds model. The role of the researcher is not to challenge personal perspectives but to better understand how culture, habits of the mind and points of view contribute to the acceptance or rejection of the theory of evolution and to explore the panoply of “beliefs” that either conflict with or support acceptance of evolution. For it is within the balance or conflict of individually and culturally held beliefs combined with scientific theory within the individual mind that evolution is either accepted or rejected. Within science, this conflict is non-existent.

3.3.3 *The Epistemological Position on Communication and Learning: Semiotics, Socio-cultural Theory, Constructivism and Transformative Learning Theory*

Ontologically, postmodernism applies best to this research project as the focus is on understandings, perceptions and interpretations of an exhibition (as a constant) which will be “tested on” different audiences or evaluated within various cultures (as the variable). Hence, social constructivism is relevant, the main idea being that “our whole picture of the world, and indeed “the world” itself, is a product of social construction.”³²³ As the social world individuals live in dictates both individual experience and individual interpretation, the researcher’s role is to better understand and analyse these experiences and interpretations within their specific socio-cultural contexts. The epistemological position that best supports the thesis research is a combination of several main theories of communication and knowledge: semiotic theory, socio-cultural theory, and constructivism (notably transformative learning theory).

Within this study, the museum exhibition is considered as a communication media, and thus analyses the effects of culture and society on communication and interpretation based on the theory of semiotics. As it is through the exhibition medium that museums “produce and communicate knowledge,”³²⁴ it is necessary within the framework of the research to not only focus on the visitor and the visitor experience in

³²³ Trigg, Roger. 2001. *Understanding Social Science*. 2nd Ed. Oxford: Blackwell Publishers, p249.

³²⁴ Hooper-Greenhill, Eilean. 2000. *Museums and the Interpretation of Visual Culture*. London: Routledge, p4.

museum learning, but also on the exhibition itself as a “cultural product”, including intended and unintended messages, the meanings which are “conveyed” and culturally-based sign systems. Semiotic theory is relevant as it delineates the perception and understanding of the communication process, defining how culture influences both the “sender” and “receiver” of messages, thus directly affecting both the information communicated (implying and including cultural references and inferences) as well as the interpretation of information in meaning-making processes (taking into consideration cultural frames of reference and identities as they relate to assumptions, perceptions and meaning).

The research methodology also draws on Lev Semanovich Vygotsky’s socio-cultural approach to learning which is based on the theory that individual learning is dependent on social context. Vygotsky’s work emphasizes the significant influence of society on learning experiences as individual learning is built upon previous learning; Vygotsky understands previous learning to include both previous individual knowledge and learning as well as the knowledge and learning of the society within which the individual lives.”³²⁵ His approach highlights the collective aspects of learning within a social context. He also identifies two “agents of learning”: “mediation” which he sees as “intermediaries” between the learner and the learning material and; “psychological tools [which] are those symbolic systems specific for a given culture that when internalized by individual

³²⁵ Falk, John H., Dierking, Lynn D. 2000. *Learning from Museums: Visitor Experiences and the Making of Meaning*. Walnut Creek, California: AltaMira Press, p43.

learners become their inner cognitive tools.”³²⁶ There appears to be an obvious connection (or over-lap) between the socio-cultural theory of learning and semiotic theory, thus both semiotic and socio-cultural theory apply when considering museum learning within variable social and cultural contexts.

In further support of the socio-cultural approach to learning, the key concepts of J.H. Falk and L.D. Dierking’s “Contextual Model of Learning” are applied in the analysis of individual learning experiences. Falk and Dierking focus on learning as a “contextually driven effort to make meaning in order to survive and prosper within the world”³²⁷ which they define as “the process/product of the interactions between an individual’s personal, sociocultural, and physical contexts.”³²⁸ Within the Contextual Model of Learning, although not originally featured, culture plays a role as a key factor in free-choice learning, not only in relation to the cultural background of the visitor (including the beliefs of a specific society), but also in forming the visitors’ views and understanding of learning itself, visitors’ familiarity with the museum institution in general and the role of

³²⁶Kozulin, Alex, Gindis, Boris, Ageyey, Vladimir S. and Miller, Suzanne M. (eds). 2003. *Vygotsky's Educational Theory in Cultural Context. Learning in Doing: Social, Cognitive and Computational Perspectives*. Cambridge: Cambridge University Press, p3.

³²⁷ Falk, John H., Dierking, Lynn D. 2000. *Learning from Museums: Visitor Experiences and the Making of Meaning*. Walnut Creek, California: AltaMira Press, p136.

³²⁸ Ibid, p136.

the museum in learning within society.³²⁹ Barbara Rogoff, an educator implementing Vygotsky's work in the study of the effect of culture in learning processes, explains: based on the "contextual approach", human development is a cultural process where individuals learn and develop both as an integral part of their society and culture as well as "in light of" their specific cultural context; furthermore, culture is dynamic and therefore continues to develop and change.³³⁰

Constructivism is central to the research methodology, consisting of the epistemological stance on where knowledge "lays" or is situated, as well as how knowledge is acquired and built upon. Constructivist learning theory is based on the view that knowledge exists within the learner and that individuals learn "actively", constructing new knowledge based on previous knowledge and experience. This epistemological perspective is at the core of the research due to the very nature of this study; researching the effect of culture and context on visitor reception in travelling exhibitions implies that visitors bring their personal and sociocultural knowledge, experiences and perspectives with them into the museum, thus significantly effecting meaning-making processes.

The research focuses on communication, learning, experience and interpretation through a constructivist lens. Research tools are based on constructivist learning theory, including transformative learning theory as a

³²⁹ Institute for Learning Innovation. 2006. 'Contextual Model of Learning'. www.ilinet.org/contextualmodel.htm (accessed 01.02.08).

³³⁰ Rogoff, Barbara. 2003. *The Cultural Nature of Human Development*. New York: Oxford University Press, p3-4.

subset of constructivism. From this epistemological stance, both previous knowledge and new knowledge or understandings gained through active interpretation and meaning-making processes are considered. As transformational theory takes into account cultural frames of reference, points of view and habits of the mind, the implementation of transformative learning theory allows research to not only focus on **what** visitors are learning, but also to analyse **how** visitor perceptions or knowledge influence learning. Consequently analysis involves considering whether previous knowledge remains the same, has been reinforced, enhanced or modified through a process of auto-evaluation and critical reflection based on transformative learning theory. The thesis does not only assess the assimilation of knowledge, where visitors' frames of reference remain the same, but also evaluates perspective transformation, which Jack Mezirow defines as learning that serves to change visitors' beliefs, assumptions and opinions ("meaning schemes") through "critical reflection".³³¹

The audience research analyses visitors' critical awareness of personal perceptions, encouraging reflection on individuals' assumptions and expectations in relation to those of others (whether within their own culture or within different cultures), including those of the exhibit curators (as interpreted through the exhibit content) and the host institution. Therefore it examines both similarities and differences in visitor understandings, experiences and learning, while searching for any obvious discrepancies with planned visitor outcomes. Once again, the aim is to better understand

³³¹ Mezirow, Jack. 1991. *Transformative Dimensions of Adult Learning*. Knox, Alan B. (ed). San Francisco: Jossey -Bass Inc., p196 – 226.

the influence of culture on communication and learning as it specifically applies to the communication and interpretation of messages in internationally travelling exhibits.

The epistemological stance is applied to the research in order to analyse and comprehend visitor experiences and interpretations within their specific social, cultural and historical contexts by taking into account the cross-cultural nature of the exhibit project and therefore embracing the idea that certain beliefs, perspectives, cultural frameworks and/or worldviews conflict with evolution and recognising that individuals have the power to actively choose (through critical reflection) to accept or reject scientific theory, ultimately upholding or refuting the claims or facts of science. The aim is to better understand visitor perspectives on evolution and the effect of culture on communication and learning in an international travelling exhibition in natural science within a process of life-long, transformative learning.

3.4 Research Method of Inquiry

The aim of this section is to describe the research method of inquiry and to demonstrate the connection between the theoretical implications of the research (i.e. research methodology) and the methods of data generation implemented in the study (research method of inquiry).

3.4.1 Methodological and Contextual Implications for Research Method of Inquiry

The objective of the audience research is to obtain data relative to evolution learning in various cultures within the context of the International “year of Darwin”. Darwin: The Evolution Revolution was produced conjointly with clear communicational and educational objectives. Furthermore, headed by the AMNH, exhibit content was both verified and validated by partner host institutions, and as such, was produced with a primary focus on the objectives of all participating museums, incorporating their target audiences.

The approach to the study deliberately combines the curatorial and educational fields of museum practice in order to determine effective communication and education methods within the field of international travelling exhibitions. This is based on the belief that taking into account culture and worldview in methods of communication and “teaching” in didactic travelling exhibitions, especially when promoting informal evolution education on an international scale, will lead to an improvement of overall visitor experience and an increased opportunity for learning. The aim is to promote and increase curatorial and educational combined processes within exhibition production as well as to advocate effective collaborative front-end “cultural” research in international travelling exhibits in order to reinforce learning and improve cross-cultural visitor experiences.

Implementing personal professional experience curating exhibitions, the research process was initiated by gathering data about the exhibition as a

communication medium, identifying major themes and sub-themes as well as specific content meant to inform and instruct. Thus, exhibit content was analysed from the curatorial point of view, determining 'obvious' communication and education objectives. This research was performed before interviewing museum professionals at participating institutions, serving to confirm whether planned objectives were evident in exhibit content.

As the exhibition production process allowed for an evaluation of content according to specific knowledge of partner institutions' audiences, both culture-specific and site-specific modifications were able to be planned in advance, before exhibit production. Thus the contribution of partner institutions in this process and the subsequent planned adaptations are also taken into account. It is important to mention that front-end studies at partner host institutions were not performed within the exhibition production process and the American Museum of Natural History took "project lead" in the generation of exhibit content. Therefore, the thesis intends to demonstrate that the possible augmentation of cross-cultural visitor experiences warrants the financial investment of an international front-end study across cultures for international travelling exhibits.

Taking into consideration the international travelling schedule of the exhibit, during the analysis of exhibit content, evidence of culture-bound points of view was investigated and particular perspectives and/or positions as well as culture-specific contextualisation were identified. As the exhibit theme is Darwin (the man and the scientist) and the theory of

evolution by natural selection, this process included an analysis of the view of Darwin presented, the specific perspective of evolutionary biology conveyed through exhibit texts and displays and the position taken regarding the “science versus religion” debate. Overall, the objective was to situate the points of view communicated and to identify (before the visitor survey) any possible culture-based or perspective-based reactions that may directly arise from content.

After analysing exhibit content, objectives and positions, the goal was to establish the planned learning and communication objectives with curatorial, educational and managerial museum staff directly working on the project within host institutions: host institution staff members who were involved in the content production process and/or in the implementation of the exhibit in their venue were therefore interviewed. The aim is to measure learning effectiveness according to planned communication strategies, educational objectives and planned visitor outcomes; however, un-planned visitor outcomes are also considered.

The context of travelling exhibitions involves particular challenges for audience research as both content and presentation modifications are consistently and inevitably made at each separate host venue; the added difficulty is ensuring and justifying scientific grounds for comparison. In order to directly address this issue, during the initial content analysis (at the ROM where a complete version of the original exhibit was

presented),³³² an ‘exhibition core’ was defined consisting of the exhibit sections containing the main exhibit messages and key educational content based on communication and learning objectives. This process also served to establish a “content hierarchy” as specific criteria or requirements for inclusion of host venues in the study, determining the boundaries of accepted content adaptation by pinpointing the limit at which exhibit adaptations or omissions significantly change the exhibit messages conveyed, hence considerably modifying learning objectives and thus anticipated visitor reception. This limit served as a basis for accepting or rejecting participation in the study based on the contingent of scientific grounds for comparison. Vital to this decision was obtaining unanimous confirmation of participating museum staff (via staff interviews) of the possible fulfilment of all learning and communication objectives through the ‘exhibition core’ alone.

Finally, the methodological approach, which includes a postmodernist ontological perspective and a constructivist approach to learning with particular focus on transformative learning theory, necessitated the implementation of an effective research tool for the method of inquiry. As research tools directly aimed at evaluating transformative learning in

³³² The ROM essentially maintained the original AMNH ‘turn-key’ exhibit content. It is therefore significant that while cultural differences between American and Canadian audiences were raised regarding ‘the science versus religion debate’, ROM staff members did not discuss cultural similarities in interviews. It is therefore assumed that content included in the ROM presentation was considered both appropriate and relevant for Canadian audiences. However, the simple fact that the ROM had significantly more gallery space than required for optimal display of *Darwin* may also have contributed to the decision to maintain the original AMNH ‘turn-key’ exhibit content.

informal or free-choice learning environments are currently a 'work in progress', the creation of new adapted evaluation tools directly based on transformative learning theory was required.

Implementing methods for evaluating transformative learning within the field of formal learning environments, a process of self-evaluation was devised where visitors are encouraged to critically reflect on their personal frames of reference, points of view and habits of the mind, within a wider context which includes other viewpoints (as well as possible opposing views), in order to provide an opportunity for both objective and subjective reframing. This approach is particularly relevant when addressing adult evolution learning through a single communicative medium across cultures (an international travelling exhibit) as it encourages self-awareness, addresses issues of conflicting views or belief systems and ultimately aims to integrate worldview questions.

3.4.2 Scope and Limitations of Research

The focal point of the study is a cross-cultural evaluation of visitor reception and learning in a travelling exhibition centring on local adult audiences (age 18 and up) in two exhibit venues: at the Canadian partner institution, the Royal Ontario Museum in Toronto and the UK partner venue, the Natural History Museum in London. As well as a deliberate aim to limit research variables, focusing the visitor study specifically on the relevance of 'international' exhibit discourses for local audiences serves to establish connexions with research in the fields of marketing communication and sociology on issues related to globalization in which a

tension between global and local tendencies has been identified, defined by Roland Robertson as the “universalism-particularism issue”.³³³ The “global/local imperative is one of the key themes in [current] marketing communication.”³³⁴ Essentially, Robertson’s research “reframes globalism not as an abstract universalism, but in terms of a ‘glocal’ dialectic between the global and the local”.³³⁵ Robertson defines the co-existence of universalism and particularism tendencies as ‘glocalization’ which is therefore distinct from globalisation.³³⁶ Within the academic field, he considers postmodernism - the ontological position of this thesis - to be “the most intellectually tangible manifestation” of ‘glocalization’.³³⁷ Furthermore, although cultural institutions communicate on an international level (through travelling exhibits as well as Internet sites) as well as on national, regional and local levels, the thesis purposefully bases the analysis of visitor reception on local relevance in order to be aligned with the “New Museology” movement. Within new museology, local

³³³ Robertson, Roland. 1992. *Globalization: Social Theory and Global Culture*. London: Sage, p97 and 102.

³³⁴ Chiang, Shiao-Yun and Mi, Hanfu. 2009. ‘Glocalization through Global Brand Transposition’. In Leung, Ho Hon, Hendley, Matthew, Compton, Robert W. and Haley, Brian D. (eds). *Imagining Globalization: Language, Identities and Boundaries*. New York: Palgrave Macmillan, p47.

³³⁵ Holton, Robert. 2012. ‘Some Comments on Cosmopolitanism and Europe’. In Robertson, Roland and Krossa, Anne Sophie (eds). *European Cosmopolitanism in Question*. Basingstoke, UK: Palgrave Macmillan, p35.

³³⁶ Robertson, Roland. 1995. ‘Glocalization: Time-Space and Homogeneity-Heterogeneity’. In Featherstone, Mike, Lash, Scott and Robertson, Roland (eds). *Global Modernities*. London: Sage: p26.

³³⁷ Ibid, p32.

audiences must find significant relevance in exhibit content and messages in order for exhibitions to be perceived as pertinent to their own lives. In the field of cross-cultural communication, and in relation to meaning-making processes in the museum, the concept of 'glocalization' is significant as local meanings may not coincide with 'original meanings' or intended messages due to "interpretation on the basis of local resonances".³³⁸ Therefore, the evaluation focuses on perceptions of 'local cultural relevance' and subsequent visitor learning and experience, essentially the greatest communicational and educational challenge for international travelling exhibits. Consequently, international relevance is defined in the study as pertaining to (and directly proportional to) the perceived level of local relevance. This is based on the assumption that by explicitly enhancing cultural relevancy of exhibition discourses, local and international pertinence – or 'glocal' relevance - is achieved and maintained. As worldviews, perspectives, frames of reference and thus visitor interpretations may vary both within and across cultures, international relevance of travelling exhibitions is achieved by maintaining resonance and significance by providing effective communication and learning experiences locally, on an international scale. Thus, visitor surveys participants were intentionally limited to include only members of the local public. For the purpose of this study, local audience was defined as those living within a specific geographical confine of

³³⁸ Friedman, Jonathan. 1995. 'Global System, Globalization and the Parameters of Modernity'. In Featherstone, Mike, Lash, Scott and Robertson, Roland (eds). *Global Modernities*. London: Sage: p78.

participating museums allowing for a maximum travel time of one hour to the exhibit venue. Additionally, survey respondents were further limited to include those living within the identified geographical confines ideally for one year. As both Toronto and London are major city centres with a major influx of recent immigration, the objective was to focus on audiences with adequate knowledge of local culture who can be considered sufficiently integrated in the local community. Thus, tourist audiences and very recent immigrants are excluded from the research.

3.4.3 Key Secondary Data Sources in Museum Audience Research

As a great wealth of secondary data sources is available in museum audience research, new exploratory research is not required. However, analysing the impact of culture on learning and communication in travelling exhibitions, hence evaluating cross-cultural effectiveness of international travelling exhibits, can be considered a new approach to audience research. Although the topic of research represents a new area of focus, key sources on which to base the method of inquiry and guide the construction of research tools were identified.

A key concept this thesis implements, the “expert visitor” or “visitor-as-critic”, originates from audience research³³⁹ of an innovative travelling exhibition experiment *Difference: Three Museums, Three Perspectives* (originally entitled *La difference: Trois musées, trois regards*) produced by and displayed in the three participating museums: the Ethnographic

³³⁹ Audience research performed by the Centre for Study and Research on Exhibitions and Museums, CEREM, at the University of Jean-Monnet in Saint-Étienne, France.

Museum in Neuchâtel, Switzerland (1995), the Dauphinois Museum in Grenoble, France (1996) and the Museum of Civilisation in Quebec, Canada (1997). Signing a non-disclosure agreement, the directors of each museums created exhibit content of equal size on the ethnological theme of “difference” implementing their individual museographical styles, curatorial approaches and available collections. The travelling exhibition consisted essentially of a “side-by-side” presentation of three (cultural) perspectives or exhibit narratives on the established theme of ‘difference’.

Audience research was performed by the Centre for Study and Research on Exhibitions and Museums (CEREM) at the University of Jean-Monnet in Saint-Étienne, France, which also culminated in the publication of a PhD thesis.³⁴⁰ The aim was to evaluate visitors’ capacity to critically assess exhibition discourses and presentations as the ‘expert visitor’ or ‘visitor-as-critic’, defined as: “a person capable of analysing – and evaluating – the different ways in which the same procedures for mounting an exhibition are reused in different forms in all exhibitions”³⁴¹. The visitor study was carried out in 1996 at the Dauphinois Museum in Grenoble³⁴² focusing on 39³⁴³ first-time visitors³⁴⁴. The research protocol included the use of

³⁴⁰ Candito, Nathalie. 2001. *Expérience de visite et registres de la réception : L'exposition La différence et ses publics*. January. University of Avignon, Department of Information Science and Communication: PhD thesis.

³⁴¹ Davallon, Jean, Gottesdiener, Hanna and Poli, Marie-Sylvie. 2000. ‘The “expert visitor” concept’. *Museum International*. Vol 52, Issue 4, Oct.-Dec. Paris: UNESCO, p64.

³⁴² Ibid, p60.

³⁴³ Ibid, p61.

³⁴⁴ Ibid, p60.

Polaroid photographs taken by visitors of 10 objects (or texts) that had made a “particular impression” on them during their visit which was followed by post-visit interviews.³⁴⁵

As visitors surveyed demonstrated the ability to ‘spontaneously compare’ individual partner institutions’ exhibits with each other, the research confirmed visitors’ ‘expert capacity’.³⁴⁶ Furthermore, research participants were shown to have reflected on the social, historical and cultural contexts of exhibition discourses: “they considered the experiment to be an intelligent, effective means of portraying ways of thinking in French-speaking countries that have neither the same history nor the same contemporary socio-cultural situation”.³⁴⁷

This thesis research therefore incorporates the concept of ‘visitor-as-critic’ that relies on visitors’ capacity to critically reflect on both the conceptual pertinence and cultural relevance of exhibition discourses. However, a distinct methodological difference should be noted: research participants in this study were intentionally not informed during the survey process of the collaborative nature or travelling aspect of the exhibition in order to evaluate whether cultural cues or references were present in the exhibit, were noticed, posed any ‘issues’ or affected visitor interpretation in any way (this information was provided at the end of the survey). Visitors

³⁴⁵ Davallon, Jean, Gottesdiener, Hanna and Poli, Marie-Sylvie. 2000. ‘The “expert visitor” concept’. *Museum International*. Vol 52, Issue 4, Oct.-Dec. Paris: UNESCO, p61.

³⁴⁶ Ibid, p61.

³⁴⁷ Ibid, p62.

therefore analysed their exhibition experiences based solely on knowledge acquired from the exhibit itself as well as any previous reading or information they had access to through the media.

Another key secondary data source in museum audience research addressing the cultural aspects of learning is Sharon Macdonald's research of 'cultural imaginings. Using cultural studies as her base, Macdonald analysed the effect of cultural and social conceptions on the reading of exhibitions. Her analysis of visitor interpretation of the 1989 exhibit *Food for Thought* at the Science Museum, London³⁴⁸ demonstrated that cultural "attributes" come into the museum with the visitor, playing a role in visitor perceptions and interpretation. Macdonald's cultural conceptions include: emotional or visceral attraction or repulsion to specific representations; specific classifications of information or ways of organising "sense-data" (mental images of objects); and the generation of "personal stories" or the intentional triggering of group activities in response to exhibitions.³⁴⁹ She explains:

³⁴⁸ Macdonald, Sharon. 1992. 'Cultural imagining among museum visitors: a case study'. *Museum Management and Curatorship*. Vol. 11, Issue 4. was the first publication of her findings.

³⁴⁹ Macdonald, Sharon. 1999. 'Cultural Imagining Among Museum Visitors'. In Hooper-Greenhill, Eilean (ed). *The Educational Role of the Museum*. 2nd Ed. London: Routledge, p270.

A good deal of the response to an exhibition may well be individually variable, but within this there will be certain recurring, though not necessarily universal, patterns. These patterns – cultural imaginings – are imaginative in that they involve creative interaction between visitors and the exhibition; and they are cultural in that these interactions are influenced by all kinds of expectations and ideas about the nature of museum visiting, science [in this particular case], and so forth.³⁵⁰

Macdonald describes three ways museum visitors' readings of *Food for Thought* were affected by 'cultural imaginings'. Firstly, the overall reading of the exhibition theme varied and was not necessarily what the exhibition producers had planned. Furthermore, visitors could reconstruct the exhibition in terms of and supporting the specific theme they had identified. Secondly, visitors claimed the exhibition communicated messages exhibition producers had purposefully not included in the exhibit. As Macdonald states, by merely leaving out certain classifications and making a simple text statement, the exhibition producers were not able to 'fight' against "deeply-rooted notions". Interestingly, the message communicated through the three-dimensional portions of the exhibit seemingly had more impact on the reading of the exhibition than the textual elements, perhaps so much so that the message communicated was not quite as intended. Lastly, the exhibition producers wanted visitors to understand that science was a part of everyday life, pertaining to us all. This message did come across to certain visitors, but whether or not the exhibition managed to break certain preconceptions of science and technology remained unclear. Macdonald concludes, therefore, that

³⁵⁰ Macdonald, Sharon. 1999. 'Cultural Imagining Among Museum Visitors'. In Hooper-Greenhill, Eileen (ed). *The Educational Role of the Museum*. 2nd Ed. London: Routledge, p270.

cultural preconceptions and imaginings affect exhibition readings and the chosen media can bring about readings very different from those intended. If the aim is to break preconceptions or change views, these imaginings must be planned for and clearly addressed within the exhibition content.³⁵¹ Although the curator's role is to create exhibitions and displays with an "inner coherence", when this is not achieved, visitors will "construct their own coherence".³⁵² This study therefore incorporates Macdonald's research findings in its approach in the aim of analysing the effect of "cultural imaginings" on the reading of the exhibit *Darwin: The Evolution Revolution* as the exhibit team deliberately built-in a position statement on the science versus religion debate which includes the limits of accepted scientific practice in alignment with the AAAS "pillars of science"; the nature of science and the position of science regarding supernatural claims (i.e. the limits of scientific practice) are provided.

The final key secondary source the research draws upon for addressing the issue of significant counter-narratives in visitor experience in travelling exhibits on natural history and evolution is Monique Scott's research of the "black visitor experience" in exhibits on African origins in *Rethinking Evolution in the Museum*. Scott's objective was "to begin examining the experiences of culturally under-represented groups in museums" in an attempt to understand "how such groups construct counter-narratives and

³⁵¹ Macdonald, Sharon. 1999. 'Cultural Imagining Among Museum Visitors'. In Hooper-Greenhill, Eilean (ed). *The Educational Role of the Museum*. 2nd Ed. London: Routledge, p269 - 275.

³⁵² Hooper-Greenhill, Eilean. 2000. *Museums and the Interpretation of Visual Culture*. London: Routledge, p4.

“negotiated” responses against the interpretations produced by museum visitors at large.”³⁵³ She explains: “most natural history museums tell “consensus narratives” employing common symbols to which ideal visitors should relate. [...] visitors rarely conform to the normative assumptions made by museums; visitors’ varied and complex cultural identities thoroughly mediate their experiences.”³⁵⁴ Both culturally and institutionally-based, normative assumptions are particularly relevant in audience research of *Darwin* due to the presentation of the ‘science versus religion debate’ including perspectives of Creationism and Intelligent Design, significant counter-narratives to evolution.

3.4.4 Methodological Perspective: Qualitative and Quantitative Research Measures

The thesis study consists of both descriptive and explanatory research, as it analyses how audiences, both within and across cultures, respond to the same exhibit as well as why. Descriptive research is necessary to the research question as it “presents a picture of the specific details of a situation, social setting, or relationship [...] [and] focuses on “how?” and “who?” questions.”³⁵⁵ However, the aim is also to identify “the sources of social behaviours, beliefs, conditions, and events”³⁵⁶ and will tackle this

³⁵³ Scott, Monique. 2007. *Rethinking Evolution in the Museum: Envisioning African Origins*. Hooper-Greenhill, Eilean and Kaplan, Flora (eds). Museum Meanings Series. London and New York: Routledge, p114.

³⁵⁴ Ibid, p113-114.

³⁵⁵ Neuman, Lawrence W. 2004. *Basics of Social Research. Qualitative and Quantitative Approaches*. Lasser, Jeff (ed). Boston: Pearson Education Inc., p16.

³⁵⁶ Ibid, p16.

challenge by performing “explanatory research” as, building on descriptive research, “it documents causes, tests theories, and provides reasons.”³⁵⁷

As the goal of examining visitor meaning making and experience in the travelling exhibition is to better understand the underlying reasons for specific visitor behaviour, the ontological perspective, epistemological position and research focus are aligned with qualitative research strategies and objectives:

A qualitative researcher interprets data by giving them meaning, translating them, or making them understandable. However, the meaning he or she gives begins with the point of view of the people being studied. He or she interprets data by finding out how the people being studied see the world, how they define the situation, or what it means for them.³⁵⁸

The intention is to uncover existing patterns in “micro-data” in order to make “generalisations” and recommendations as a set of guidelines for truly international communication methods. In-depth knowledge and understanding of individual visitor experiences is required in order to “fully” grasp the implications of context and culture on learning and communication in an internationally travelling exhibition.

A mixed method approach was selected for the research, thus implementing qualitative and quantitative research methods both in the design of the research tools and data analysis. This method is considered

³⁵⁷ Neuman, Lawrence W. 2004. *Basics of Social Research. Qualitative and Quantitative Approaches*. Lasser, Jeff (ed). Boston: Pearson Education Inc., p16.

³⁵⁸ Neuman, Lawrence W. 2003. *Social Research Methods: Qualitative and Quantitative Approaches*. 5th Ed. Boston: Pearson, Allyn and Bacon, p148.

beneficial as obtaining and combining soft and hard data will provide a more detailed, holistic “picture” of the research setting:

All social researchers systematically collect and analyse empirical data and carefully examine the patterns in them to understand and explain social life. One of the differences between the two styles [quantitative and qualitative] comes from the nature of the data. Soft data, in the form of impressions, words, sentences, photos, symbols, and so forth, dictate different research strategies and data collection techniques than hard data, in the form of numbers.³⁵⁹

The research employs mixed methodology with a “single approach” design, implementing primarily an inductive qualitative strategy that incorporates quantitative strategies. The study is therefore positioned as descriptive and qualitative, integrating both a holistic and contextual approach in data collection and analysis: qualitative data collected served to provide in-depth information on visitor points of view, beliefs, knowledge and actions (or behaviour) while quantitative data collected served to provide measurable indicators of knowledge levels, learning, and communicational success in the form of statistics and scales.³⁶⁰

³⁵⁹ Neuman, Lawrence W. 2003. *Social Research Methods: Qualitative and Quantitative Approaches*. 5th Ed. Boston: Pearson, Allyn and Bacon, p139.

³⁶⁰ Measurable indicators of learning obtained through the questionnaires consisted of prior knowledge and post-visit knowledge levels. As the evaluation of knowledge consisted of a visitor self-assessment, post-visit interviews integrated questions encouraging visitors to provide explanations of acquired knowledge and understandings. Responses were then thematically categorized. Further measurable indicators were obtained through observation data: visitor dwell times in exhibit sections as well as for the entire visit were quantified, exhibit texts visitors read and exhibit components they engaged with (or did not) were also noted. As not all data generated is presented in the thesis, these findings - particularly misconceptions that remained after visiting the exhibit such as employment of the phrase ‘survival of the fittest’ when describing natural selection and visitors’ perceptions of evolution as linear progression - will figure in future publications.

Furthermore, implementing an inductive interpretive approach to qualitative data analysis served to condense large amounts of data and to summarise findings into concise conclusions.

Triangulation of method is applied in order to provide an opportunity for cross-validation.

Most researchers develop an expertise in one style, but the methods or styles have different, complementary strengths. Since there is only partial overlap, a study using both is fuller and more comprehensive. Mixing the styles can occur several ways. One way is to use the methods sequentially, first one then the other. Another way is to carry out the study using the two methods in parallel or both simultaneously.³⁶¹

Another way triangulation is applied in the research is through a “triangulation of theory [which] occurs when a researcher uses multiple theoretical perspectives in the planning stages of research, or when interpreting the data. For example, the researcher plans the study using the concepts and assumptions of both conflict theory and exchange theory, or looks at the data coming from each theoretical perspective.”³⁶²

As elucidated earlier, the epistemological position combines three theories of knowledge and communication: semiotics (communications theory), socio-cultural theory and constructivism (including transformative learning theory). These theories were implemented in the planning phase of the research, in the construction of research tools, as well as in the data analysis.

³⁶¹ Neuman, Lawrence W. 2003. *Social Research Methods: Qualitative and Quantitative Approaches*. 5th Ed. Boston: Pearson, Allyn and Bacon, p139.

³⁶² Ibid, pp138-139.

Finally, the research is both cross-sectional and longitudinal (although three variables exist in the study: audience, time and host institution), essentially consisting of several “snapshots” of visitor reception of the exhibition at a specific cultural institution at a fixed period of time.

However, the same exhibition has been evaluated at two host institutions and thus with multiple audiences. Considering the research as longitudinal, it falls under Lawrence W. Neuman’s category of “time-series” the same type of information is gathered during two or more time periods in aims of searching for patterns within the given data.³⁶³

3.5 Research Strategy: An Inductive Mode of Inquiry Based on Grounded Theory

The research tools designed for data collection implement the study’s ontological and epistemological positions as well as the methodological perspective. Separate questionnaires for semi-structured interviews of museum professionals and museum visitors (both for the visitor survey and the focus group interview). Visitor survey questionnaires were constructed applying a triangulation of methods in order to generate both qualitative and quantitative data and thus provide a more comprehensive picture of visitor learning and experiences through the production of both hard and soft data. A secondary aim was to establish a “rhythm” for interviews between close-ended questions and open-ended questions to encourage ease in visitor responses. Close-ended questions served to

³⁶³ Neuman, Lawrence W. 2003. *Social Research Methods: Qualitative and Quantitative Approaches*. 5th Ed. Boston: Pearson, Allyn and Bacon, p17.

produce quantitative data while open-ended questions solicited explanatory or additional information from the respondent in their own words (qualitative data).

Implementing an inductive approach based on grounded theory, research tools have been created successively integrating previous research findings in subsequent tools, both explicitly and intentionally. Thus, data from interviews with museum professionals served to establish the basis for audience research inquiry and data from visitor surveys and observation was incorporated in the group interviews. All research was performed by the researcher alone, providing a clear overview of data content and direct contact with all participants, face-to-face. Furthermore, as the research tools were specifically designed by the researcher for the purpose of the study, a pilot test of each tool was performed at every step or phase of fieldwork. Thus, based on grounded theory, a “data-feeding” process between research phases was employed and each phase of research has specific objectives.

3.5.1 Objectives for Interviews with Museum Professionals

The exhibition’s objectives were established according to host institutions. The purpose was to identify planned institutional goals as well as the specific educational and communicational objectives in order to clearly define the desired message and planned visitor outcomes. Combining data from the staff interviews and the researcher’s in-depth analysis of the exhibition, the educational goals to be assessed in the study, including the ‘prime message vectors’ to be tested, were directly agreed upon with

museum professionals at participating host institutions during the interview process. Interviews with staff members therefore served to validate the research method of inquiry.

Another objective of the interviews with museum professionals was to identify site-specific adaptations to content and presentation, providing a basis for an analysis of any affects to the exhibition discourse and visitor experience as well as relative communicational and educational objectives. Interviews therefore served to elucidate the official institutional position on evolution learning and any possible divergence between original intended messages and modified messages, addressing underlying reasons for adaptations. Museum staff members from host institutions were asked to identify any content or presentation issues that may pose “communication problems” for the public (identification of possible non-effective portions) as well as any possible cultural issues with content.

3.5.2 Objectives for Visitor Study

A visitor information questionnaire was devised in order to establish survey participation criteria (local adult audiences) and to collect visitor demographics of respondents. Survey participants therefore identified their age, place of residence, length of time in current place of residence, level of studies and profession. Additionally, participants indicated how often they visit the host institution and whether they are museum members.

The pre-visit interview questionnaire was designed with several goals: to determine pre-visit levels of knowledge and understanding of the exhibit

theme (the life of Darwin, the man and the scientist and the theory of evolution by natural selection); to obtain pre-visit views of Darwin, the current relevance of evolution by natural selection and the significance of the presentation of the exhibit within its context (institutional, cultural, and time-period) as well as visitor perceptions of the relationship between science and truth; and to begin reflection on worldview. Incorporating visitors' pre-visit knowledge aligns with constructivist view of active meaning-making and self-directed learning where new learning is "built upon" previous learning and obtaining visitors' pre-visit perspectives of the main exhibit themes - Darwin and evolution - serves to integrate the principles of transformative learning theory through the encouragement of critical reflection, self-awareness and self-empowerment within a constructivist paradigm. Explanations provided serve as contextualisation and are used as a basis for comparison with post-visit answers to the same questions.

After the pre-visit interview, visitor observation - the tracking and timing of visitor actions and behaviour within the four main exhibit sections (the exhibit core consisting of the 'prime message vectors') - was performed in order to contextualise visitor responses. Visitors' dwell times, levels of engagement, behaviour and interaction with the exhibit provided valuable insight into personal interests and motivations which were then correlated with data from the analysis of learning. Thus, visitor observation served to establish overall trends in behaviour and related to underlying reasons for actions: personal interest/motivation or design/presentation issues.

Additionally, as *Darwin* is both large and relatively content-heavy,

particular attention was given to obvious changes in behaviour (possibly signifying museum fatigue), breaks and exit-points (the particular point where the visitor ends engagement) as well as visitor exit strategies. Thus, the research includes an analysis of communication and learning, content and design as well as exhibit shortcomings and successes. During the observation process, the researcher avoided directly engaging with visitors in the aim of minimising any possible influence on visitor understandings, learning and perceptions and so as to not disturb the flow of visit.

After visitor observation of survey participants, post-visit interviews were performed. Questionnaires were devised with multiple objectives:

- To utilise observed visitor behaviour and engagement within the four key sections of the exhibit (defined as the prime message vectors) as a basis for asking questions on underlying reasons for behaviour
- To determine post-visit levels of knowledge and understanding of the life of Darwin, the man and the scientist as well as the theory of evolution by natural selection.
- To obtain post-visit views of Darwin, the current relevance of evolution by natural selection and the significance of the presentation of the exhibit within its context (institutional, cultural, temporal)
- To attain respondents' views on the exhibit message and fulfilment of visitor motivations
- To further engage in critical reflection on worldview and obtain visitor perceptions of the relationship between science and truth post-visit
- To determine whether visitors perceived the exhibition as an "in-house" exhibition or a travelling exhibition made by several partners (as explained in the exhibit).

Both in pre-visit and exit surveys, taking into consideration constructivist learning theory, transformative learning theory and particularly the definition of perspective transformation, participants were asked to identify

whether their knowledge of the main themes of the exhibit (directly related to the communicational and educational objectives of the prime message vectors) has remained the same, been reinforced, enhanced or changed in any way and to explain their response. Visitors estimated their post-visit knowledge levels of the main themes of the exhibit on a scale from no knowledge to expert knowledge which were then compared with pre-visit knowledge levels hence providing a quantifiable estimation of perceived knowledge increases alongside qualitative data. Visitors provided post-visit perceptions of Darwin and the relevance of the theory of evolution (for comparison with pre-visit responses) in the aim of identifying when learning served to significantly modify understandings or shift perspectives.

Visitors were also asked to identify the stance of the host institution on evolution and the 'evolutionary debate' in relation to their personal views, opinions and understandings in order to determine visitors' understandings of the exhibition message. Respondents were asked whether they engaged in critical reflection on perspectives during their visit and whether they felt supported in their personal viewpoints, particularly relevant for those who possess "opposing views" on evolution, Darwin and/or science as they may interpret the exhibition's messages differently in accordance with their specific points of view, habits of the mind and cultural frameworks. Visitors were also asked to comment on the exhibit's use of the words "evidence" and "theory" as both were used repeatedly throughout the exhibit texts.

As the exhibit presentation includes a both an official position statement on the religion versus science debate and an historical recount of opposition to evolution throughout time, the visitor exit survey included questions on personal perceptions of the relationship of science to truth and worldview. The objective was to allow visitors to express their viewpoint on where truth resides, their perception of truth within science and whether sources of truth are singular or multiple and whether they believe universal or absolute truths exist. This portion of the interview purposefully empowers visitors to engage in a discussion (or explanation) of their personal view of reality and the different components which comprise their worldview (frames of reference, perspectives, habits of the mind, points of view, philosophy etc.) To further this conversation, visitors were asked an optional question: to identify their personal heritage and origins.

Lastly, visitors were asked to identify the exhibit producers (i.e. who created the exhibit), thus directly addressing the question of whether visitors perceive travelling exhibits as 'in-house' productions as the public perception of the provenance of messages may impact visitor meaning-

making, understandings and experience.³⁶⁴ As well, this portion of the interview served to determine if any cultural differences or culturally-specific content were noted by visitors in exhibit content.³⁶⁵

3.5.3 Objectives for Control Group

Visitor observation (tracking and timing) of non-participants was also performed within the four key sections of the exhibit (defined as the prime message vectors) in order to evaluate engagement and experience with the intention of establishing a completely “unbiased” reference group or control group, essentially generating data based on visitors who had no interaction with the researcher. The objective was to determine whether participation in the survey had any significant influence on visitor behaviour and dwell times. The behaviour of the control group was also integrated in the overall analysis of visitor paths and engagement, hence providing further quantitative data.

³⁶⁴ While the pre-visit interviews were relatively short, the post-visit interviews were generally quite lengthy (at times interviews exceeded 30 minutes). For the very few visitors who did appear to be pressed for time, the balance between open-ended and closed-ended questions in the questionnaire appeared to reassure them as they were able to provide quick and brief answers to quantitative questions. On the other hand, the qualitative research questions, due to a combination of high topic interest and knowledge of certain interviewees, produced lengthy responses which often addressed more than one question. This somewhat complicated the process of data analysis. Finally, due to the significant popularity of *Darwin*, crowds in the exhibit generated considerable noise making the analysis of certain digitally recorded interviews difficult.

³⁶⁵ The issue of “cultural references” in travelling exhibit content was raised in my analysis of the travelling exhibition “Mouches” (Flies) produced by The Natural History Museum in Neuchâtel, Switzerland shown in 2007 in Paris at the National Natural History Museum. Certain portions of the exhibit were “culturally translated” such as a video of Swiss celebrities (well-known actors and journalists) reacting to the presence of a fly, which was replaced with a similar video with French celebrities.

3.6 Research Design or Protocol

The aim of this section is to describe the specific research methods or research protocol employed in the study and therefore includes questions and procedures relative to sampling (the selection and number of respondents), specific data collection methods (both qualitative and quantitative) and research tools. Fieldwork was divided into distinct phases performed identically at each participating host institution: phase 1 consisted of the researcher's analysis of the exhibition and face-to-face semi-structured interviews of museum staff members; phase 2 consisted of audience research of two separate visitor groups: visitor survey participants (face-to-face, structured pre-visit interviews, non-intrusive direct visitor observation and face-to-face, semi-structured post-visit interviews); and the control group (non-intrusive and direct visitor observation without interviews). For research protocol and tools please see Appendices 1 and 2 attached.

3.7 Conclusion: An Overview of Objectives of the Research Methodology and Method of Inquiry

The bulk of data for the thesis was collected through empirical research evaluating the international travelling exhibition *Darwin: The Evolution Revolution*. However, the focus and topic of research required substantial exploration of secondary data sources on ontology, epistemology, museum education, communication theory, cultural theory, evolution, science teaching and learning, worldview, audience research in museums and evaluation methods and techniques.

The overall objective of the research methodology was to devise a new inquiry mode and method for audience research in international travelling exhibitions that takes into consideration the cultural aspects of communication and learning incorporating the socio-cultural view of learning, constructivism and transformative learning theory. The study evaluates visitors' perspectives on science, truth and evolution taking into consideration culture, worldview, perspectives, frames of reference, habits of the mind and points of view with the objective of analysing visitor experiences of the exhibition and responses or reactions to content. A fundamental goal of the research was therefore to devise an effective evaluation tool for testing transformative learning in informal learning environments, to analyse whether transformative learning took place and to assess implications and outcomes. Finally, the thesis also intends to contribute to current research on the influence of culture and worldview in evolution learning with the goal of enlarging the spectrum of current focus mainly on the 'science versus religion debate' in order to include culture, religion, history, politics, ethics, philosophy and identity (both group and individual) in the aim of defining effective teaching and communication methods for the museum environment that encourage evolution learning based on a transformative learning approach.

Chapter Four: Programming Motives, Institutional Goals, Educational Objectives and Exhibit Adaptations

4.0 Introduction

Initially proposed and led by the AMNH throughout, *Darwin: The Evolution Revolution* was created through a collaborative process between five partner institutions which included assembling key members of staff from participating institutions in “collaborator’s meetings” (in New York) in order to discuss content, as well as specific institutional and educational goals and objectives. Dr. Niles Eldredge (1943 -), eminent evolutionary biologist and palaeontologist, co-discoverer of the theory of punctuated equilibrium with the late Stephen Jay Gould, prolific author and Curator at the American Museum of Natural History, developed the content for the exhibit and wrote the accompanying exhibition publication *Darwin: Discovering the Tree of Life*. The AMNH took curatorial lead in the project with partner institutions acting as consultants in the verification of content relevance and focus according to specific institutional educational missions and cultural constraints or “requirements” for their audiences.

Darwin: The Evolution Revolution was designed as a ‘turn-key’ travelling exhibition, supplied to host venues as a complete and functioning exhibit in exchange for a rental fee. In view of possible high demand for the exhibit and aiming at an increased return on investment, the AMNH produced two copies of the exhibit allowing for simultaneous travel and showings. As a ‘cultural product’, the *Darwin* exhibit is exceptional in content and pertinence as “the most comprehensive exhibition ever

mounted on the man whose revolutionary theory changed the world”³⁶⁶ and covering a massive 7’000 square feet³⁶⁷ (approximately 2’135 square meters), the exhibit features collections never before shown together (including Darwin’s personal research notebooks, manuscripts and tools) at a time leading up to and including the 2009 international celebration of ‘the year of Darwin’. Presenting the extensive research of AMNH curator Niles Eldredge, *Darwin* can also be considered ‘text-heavy’ as the exhibit texts represent approximately 40’000 words.³⁶⁸

Darwin: The Evolution Revolution, was premiered at the AMNH in New York from November 19, 2005 to May 29, 2006 and was subsequently shown at each partner institution, beginning with American partners, then the Canadian partner and culminating with a presentation in the UK partner venue. Fieldwork for the thesis was performed during the ROM showing from 4 June to 26 August 2008 and at the NHM in two time periods (due to the logistics for research accommodation) from January 8 to 18, 2009 and from March 6 to 17, 2009.

The aim of this chapter is to describe, analyse and compare participation motives and approaches, institutional and learning objectives, as well as

³⁶⁶ Royal Ontario Museum. ‘Darwin: The Evolution Revolution’. Official Website. Official Press Release. http://www.rom.on.ca/exhibitions/special/pdf/darwin_web.pdf (accessed 24.04.2012).

³⁶⁷ American Museum of Natural History. 2005. *Darwin Brochure*. <http://www.amnh.org/traveling/pdfs/Darwin%20Brochure.pdf> (accessed 24.04.2012).

³⁶⁸ Calamai, Peter. 2008. ‘Darwin Still Battling Creationists’. *Toronto Star*. May 15. www.thestar.com/printarticle/424961 (accessed 10.04.2012).

partner institution's evaluation of exhibit relevance and subsequent adaptation. The chapter will therefore commence with the analysis of the exhibit, performed by the researcher, focusing on: exhibit narrative, layout and path; exhibit type; educational approach; communication, interpretation, voice and dialogue; and the exhibit core or 'prime message vectors' identified. Established through the staff interviews, ROM and NHM programming motives, approach to collaboration, objectives and adaptations will be described and explained. However, as institutional and educational objectives at both Museums were both variable and profuse, an overview will be provided highlighting key objectives such as underlying goals driving exhibit adaptations.

4.1 The Original Exhibit Presentation, Type and Approach to Communication and Education

Darwin: The Evolution Revolution, commemorates Darwin's quintessential work through a display of both historical and scientific content; the exhibit's dual focus is Darwin's life-story and research (the theory of evolution by natural selection) although the final section of the exhibit core also serves to highlight the current significance of evolution through modern research. Thus, the main exhibition theme is Darwin's life and work and the focus is Darwin, the man and the scientist, a second main theme is the scientific process Darwin undertook and his revolutionary findings published in his seminal work *On the Origin of Species*. Exhibit subthemes include: Darwin's "fieldwork" voyage on the *HMS Beagle*, the theory of evolution by natural selection, and social reactions to the publication of his research

within the framework of Darwin's life story from young naturalist to accomplished scientist and from youth to family man. The exhibition takes a history and philosophy of science approach (HPS) to teaching about the theory of evolution, endeavouring to appeal to a wide audience.

4.1.1 Exhibit Narrative, Content, Layout and Path

The exhibition narrative or "storyline" of the AMNH "turn-key" travelling exhibit (intended for the five partner institutions and referred to in the thesis as the 'complete' or 'original' version) is chronologically defined according to a historical account of Darwin's life, hence delineating a sequential path: beginning with the commonly-held worldview and scientific knowledge before Darwin, followed by Darwin's youth, then his voyage on the *HMS Beagle* including his scientific research, observations and process, then the development of "his theory" which is succeeded by the subsequent publication of *On the Origin of Species* and social reactions to 'his theory' and finally culminates with the significance of the theory of evolution in modern scientific research and Darwin's legacy. The 'original version' of the *Darwin: The Evolution Revolution* was divided into the following exhibit sections: *Introduction*, *The World Before Darwin*, *Young Naturalist* (or Early Life), *A Trip Around the World* (or The Voyage of the *Beagle*), *The Idea Takes Shape* (or London), *A Life's Work* (or The Down House), *Evolution Today* and *Darwin's Legacy*.³⁶⁹ The exhibition layout is directional, leading the visitor from the exhibit's entrance to exit

³⁶⁹ American Museum of Natural History. 2005. *Education Resources*. Darwin: The Evolution Revolution. <http://www.amnh.org/education/resources/rfl/web/darwinguide/map.html> (accessed 24.04.2012).

(from the Introduction to Darwin's Legacy) in a fixed, controlled manner, as illustrated in the AMNH map of the exhibit below.

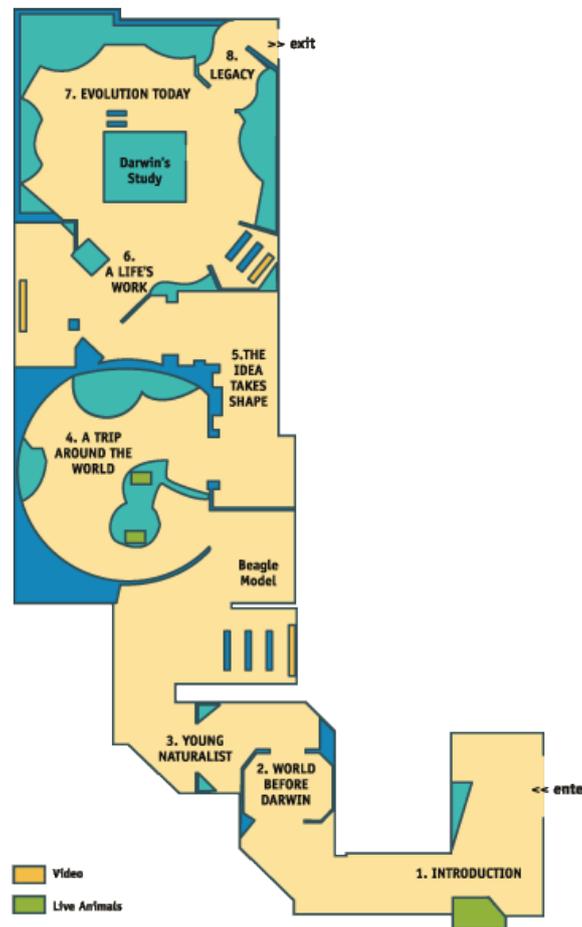


Figure 4.1: Floor plan of the AMNH presentation of Darwin: The Evolution Revolution.

Source: American Museum of Natural History. 2005. *Education Resources*. Darwin: The Evolution Revolution.

<http://www.amnh.org/education/resources/rfl/web/darwinguide/map.html> (accessed 24.04.2012).

4.1.2 Exhibit Type

Exhibitions offer a variety of strategic “encounters” with content and displays based on a continuum from a concept-based approach to an object-based approach. According to David Dean “exhibitions range from being either object-oriented at one extreme, to concept-oriented at the

other. That is, either objects or messages predominate.”³⁷⁰ Although numerous documents, specimens, live animals and videos are proposed, the textual content in *Darwin: The Evolution Revolution* - almost 39,000 words³⁷¹ - is substantial and thus significantly dominates in the content ratio of the exhibit. Additionally, explanatory panels are not the only textual content; the exhibit is filled with manuscripts, notebooks and letters as well as their accompanying exhibit labels. Thus, implementing Dean’s definition, *Darwin: The Evolution Revolution* is ‘concept-oriented’: the message predominates and the aim of communication is to transmit knowledge mainly through a combination of texts and didactic materials with objects serving to illustrate and support the message.³⁷²

Furthermore, the text-object balance coupled with the level of interpretation proposed can be used to define ‘exhibit type’. Dean situates the educational exhibit toward the concept-oriented end of the content scale where the display of information dominates as oppose to the display of objects with a balance of sixty percent text and forty percent objects.³⁷³

³⁷⁰ Dean, David. 2003. *Museum Exhibition: Theory and Practice*. London and New York: Routledge, p3.

³⁷¹ According to Peter Calamai, Freelance writer on scientific issues for the Toronto Star and Board Member at Youth Science Canada, “the explanatory panels crowding the Garfield Weston exhibition hall [in the Darwin exhibit at the ROM] contain – by official count – almost 39,000 words. At an average rate of two words per second, that’s more than five hours of reading.” Source Calamai, Peter. 2008. ‘Darwin Still Battling Creationists’. *Toronto Star*. May 15. www.thestar.com/printarticle/424961 (accessed 10.04.2012).

³⁷² Dean, David. 2003. *Museum Exhibition: Theory and Practice*. London and New York: Routledge, p4-5.

³⁷³ *Ibid*, p5.

Applying David Dean's 'Exhibit Content Scale'³⁷⁴, the balance of content in *Darwin: The Evolution Revolution* is representative of a concept-oriented and educational exhibit, fulfilling a communicational and didactic function and focusing on the transmission of knowledge (as oppose to proposing an "open experience" of objects displayed).

4.1.3 The Exhibit's Educational Approach

The *Darwin* exhibit takes a History and Philosophy of Science (HPS) and Nature of Science (NOS) approach to informal evolution education. Internationally, in the 1980's and 1990's, various government bodies for science education, ranging from the AAAS to the British National Curriculum Council (NCC)³⁷⁵, began integrating the HPS approach in their policies for science curriculum, recognising the educational benefits which include a "humanisation" of science³⁷⁶ and a better understanding of the significance of scientific findings within cultural, social and historical frameworks. The HPS approach to current formal science teaching methods serves to:

³⁷⁴ Dean, David. 2003. *Museum Exhibition: Theory and Practice*. London and New York: Routledge, p4.

³⁷⁵ Matthews, Michael R. 1994. *Science Teaching: The Role of History and Philosophy of Science*. Howard, V. A. and Scheffler, Israel (eds). Harvard Graduate School of Education. London and New York: Routledge, p5.

³⁷⁶ Ibid, p7.

connect topics in particular scientific disciplines, to connect the disciplines of science with each other, to connect the sciences generally with mathematics, philosophy, literature, psychology, history, technology, commerce and theology, and finally to display the interconnections of science and culture – the arts, ethics, religion, politics – more broadly.³⁷⁷

Integrating content on Darwin's 'life and times', his research method, the analysis of his data, the scientific significance of the theory of evolution and the social and religious reactions to the publication of 'his theory', the *Darwin* exhibit clearly implements this approach. Notable benefits are to encourage learning of "theory and evidence, and Darwin's life, times and the religious, literary and philosophical controversies his theory occasioned" which is based on an understanding of "how data relies upon theory, how evidence relates to the support or falsification of hypotheses, how real cases relate to ideal cases in science, and a host of other matters which all involve philosophical or methodological concerns".³⁷⁸

Through a focus on Darwin's life-story which unfolds alongside the 'tale' of the development of his revolutionary theory and pioneering scientific method, another fundamental element of the HPS educational approach is implemented in the *Darwin* exhibit: the humanisation of science. By relating the 'story' of the father of evolution to 'his theory', science becomes both approachable and personalised.

³⁷⁷ Matthews, Michael R. 1994. *Science Teaching: The Role of History and Philosophy of Science*. Howard, V. A. and Scheffler, Israel (eds). Harvard Graduate School of Education. London and New York: Routledge, p xv.

³⁷⁸ Ibid, p4.

The nature of science (NOS) holds a prominent position within HPS by helping learners to understand “what science is, how it works, the epistemological and ontological foundations of science, how scientists function as a social group and how society influences and reacts to scientific endeavours.”³⁷⁹ Specific NOS exhibit content is included in *Darwin* serving to define the relationship of evidence or facts to theory as well as describing society’s reactions to the theory of evolution by natural selection.³⁸⁰ Also significant, the exhibit supplies vital information on Darwin’s scientific method, displaying Darwin’s fieldwork as data collected around the world while travelling on the *HMS Beagle*, his analysis of data and his formulation of evidence to support ‘his theory’.

Finally, the educational approach implemented also serves to align the AMNH exhibit with specific science teaching methods and curriculum standards proposed by international and US national science associations such as the National Academy of Sciences (NAS) and the AAAS.

4.1.4 Communication, Interpretation, Voice and Dialogue

The communicational approach of the exhibit appears to follow the transmission model that “sees communication as a process of imparting information and sending messages, transmitting ideas across space from

³⁷⁹ Clough, Michael P and Olson, Joanne. 2008. ‘Teaching and assessing the nature of science: An introduction’. *Science and Education*. Vol 17. No. 2-3. February, p143.

³⁸⁰ The NOS approach to science learning is evident in the video *What is a Theory* and exhibit texts such as *The World Reacts* and *Social Reactions to Darwin* in the exhibition.

a knowledgeable information source to a passive receiver.”³⁸¹ However, contrary to the transmission approach, the exhibit includes recognition of multiple perspectives and attitudes to evolution within the general public (as oppose to within science) and possible visitor reactions are taken into consideration in both the message and content, albeit in a limited fashion. The only counter-narratives sincerely addressed in the exhibit content are those of creationism and Intelligent Design. Other religious viewpoints are not explored (such as opposition to evolution within the Muslim religion) and other counter-narratives based on the difficult history of evolution and its application in society and politics are not clearly addressed.³⁸² Although alternate views in opposition to evolution are explained (i.e. the religious view), the exhibit firmly states that the supernatural worldview does not, and cannot, provide a scientific explanation to replace the theory of evolution by natural selection and is therefore not a valid position within science; although scientists are said to have religious worldviews, according to NOMA (the position of the exhibit) and the AAAS pillars of

³⁸¹ Hooper-Greenhill, Eilean. 1999. ‘Museum Learners as Active Postmodernists: Contextualising constructivism’. In Hooper-Greenhill, Eilean (ed). *The Educational Role of the Museum*. 2nd Ed. London: Routledge, p69.

³⁸² It is noteworthy that of the 60 survey participants from both research sites only one visitor – at the NHM - explicitly indicated being of Muslim faith. This visitor’s motivation for coming to *Darwin* was questions he had about how to negotiate the implications of the theory of evolution with his belief in Divine creation. The significant absence of audience members of Muslim faith from the survey samples raises the question of the actual percentage of ROM and NHM visitors from local Muslim communities in general. Without further research, it is difficult to determine whether this local audience segment is habitually not represented at these museums or whether the *Darwin* exhibit simply did not attract these communities.

science, religion is not an accepted integrated part of the scientific method.

Thus, even though visitors are incited to actively reflect on scientific and historical content which includes social (and religious) reactions to evolution throughout history, the exhibit cannot be said to follow Hooper-Greenhill's cultural view of communication where "communication is understood as a process of sharing, participation and association"³⁸³ Within the cultural view, meaning is not "imposed" and the opportunity for multiple meanings is provided where counter-narratives may even be validated as legitimate.³⁸⁴ Visitors to the exhibit are not intentionally provided an experience open to multiple interpretations as the focus is science which is based on realism. Refuting evolution is explained within the perspective of Western religion (Christianity) and the position of NOMA is supplied which does provide a possible solution for reconciliation between science and religion: the 'separate worlds' model. Nevertheless, the exhibit's approach to communication and learning can be defined as traditional, authoritative and unidirectional.

Furthermore, visitor participatory strategies are not included in the exhibit as, according to Nina Simon, this approach in museum institutions implies a creative sharing of authority and the possibility of dialogue:

³⁸³ Hooper-Greenhill, Eilean. 1999. 'Museum Learners as Active Postmodernists: Contextualising constructivism'. In Hooper-Greenhill, Eilean (ed). *The Educational Role of the Museum*. 2nd Ed. London: Routledge, p69.

³⁸⁴ Ibid, p70.

Rather than delivering the same content to everyone, a participatory institution collects and shares diverse, personalized, and changing content co-produced with visitors. It invites visitors to respond and add to cultural artefacts, scientific evidence, and historical records on display. It showcases diverse creations and opinions of non-experts. People use the institution as meeting grounds for dialogue around the content presented.³⁸⁵

The main voice expressed in the exhibit is the voice of science, realism and reason. A single position, the position of evolutionary biology is proposed, perhaps justified in the context of the exhibit (within natural history museums), and understanding the clear objective of transmitting scientific knowledge to exhibit viewers. Although the religious worldview's "struggle" with the acceptance of evolution is presented, it is not "open for debate" based on the nature of science that limits the scope of scientific inquiry to observable phenomenon (which therefore excludes religion from the practice of science). Thus the religious counter-narrative is merely voiced in the exhibit as part of the long-standing social controversy surrounding evolution.

4.1.5 The Exhibit's Prime Message Vectors (or Exhibit Core)

As disparities in the presentation and content of internationally travelling exhibits appear inevitable, the "adaptive nature" of travelling exhibits can be perceived as a hindrance to the establishment of scientific grounds for comparison when performing comparative audience research. As discussed in Chapter Three, the research methodology consisted of

³⁸⁵ Simon, Nina. 2010. *The Participatory Museum*. San Francisco: Museum, Creative Commons Attribution, piii.

defining an exhibit core comprised of the prime message vectors of the travelling exhibit through which all communication and learning objectives can be fulfilled, fundamentally establishing an exhibit content hierarchy defined in relation to variable levels of relevance.

Four exhibit sections – defined as the exhibit core – served as the exhibit's 'prime message vectors', thus absolutely necessary for maintaining the original exhibit message, the presentation of which therefore constituted inclusion criteria for the ROM and the NHM: *A Trip Around the World*; *The Idea Takes Shape*; *A Life's Work*; and *Evolution Today*.

The main theme of exhibit section *A Trip Around the World* is Darwin's fieldwork or voyage on the *HMS Beagle*. The educational and communicational focus of this section is therefore Darwin's research methodology, his scientific method of inquiry (fieldwork observations), his research questions and initial analysis during his five-year voyage around the world on the *HMS Beagle*.



Figure 4.2: Exhibit Section 'A Trip Around the World' in *Darwin: The Evolution Revolution*. Photo by AMNH Photography Studio, AMNH Exhibitions

Source: American Museum of Natural History. 2005. *Darwin Brochure*.

<http://www.amnh.org/traveling/pdfs/Darwin%20Brochure.pdf> (accessed 24.04.2012).

The exhibit section *The Idea Takes Shape* focuses on the theme of Darwin's analysis and writing-up of his research with supplementary educational and communicational emphasis on the formulation of his theory, Darwin's key scientific evidence and his realisation of the implications of his research for all animal species (including humans).



Figure 4.3: Exhibit Section ‘The Idea Takes Shape’ in *Darwin: The Evolution Revolution*. Photo by AMNH Photography Studio, AMNH Exhibitions.

Source: American Museum of Natural History. 2005. *Darwin Brochure*.

<http://www.amnh.org/traveling/pdfs/Darwin%20Brochure.pdf> (accessed 24.04.2012).

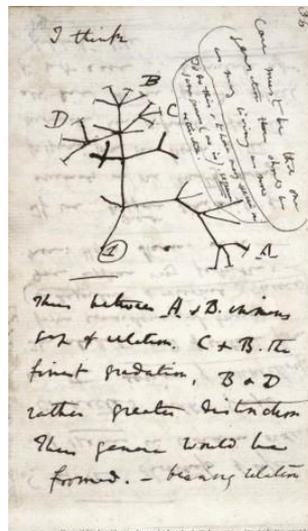


Figure 4.4: ‘The Family Tree of Life’ in Darwin’s Notebook B (1837-1838), the first he dedicated to “transmutation”, which was displayed in *Darwin*.

Source: ‘The Complete Work of Charles Darwin Online’. (accessed 25.04.2012)

http://darwin-online.org.uk/EditorialIntroductions/vanWyhe_notebooks.html

The main theme of the exhibit section *A Life's Work* is the publication of Darwin's research and hence includes attribution issues, reactions and controversies. The educational and communicational focus of exhibit content in this section is: the publication of *On The Origin of Species*, reactions to evolution by natural selection (including the implications for man) over the last 150 years, and Darwin's personal issues such as his reticence to publish, his suffering of personal tragedy, his religious scepticism and subsequent loss of faith.



Figure 4.5: The Reconstruction of Darwin's study at Down in *Darwin: The Evolution Revolution*. Photo by AMNH Photography Studio, AMNH Exhibitions.

Source: American Museum of Natural History. 2005. *Darwin Brochure*.

<http://www.amnh.org/traveling/pdfs/Darwin%20Brochure.pdf> (accessed 24.04.2012).

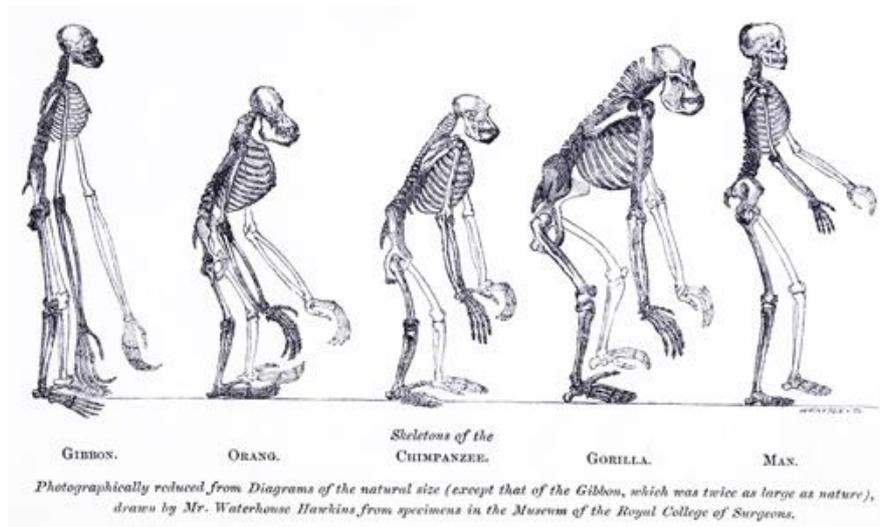


Figure 4.6: The frontispiece to Huxley's 1863 *Evidence as to Man's Place in Nature* published eight years before Darwin's *The Descent of Man* (1871). This illustration serves to compare the skeletons of apes to humans and was presented in the *Darwin* exhibit on the panel 'The Highest and Most Interesting Problem' in Section 'A Life's Work'.

Source: http://en.wikipedia.org/wiki/Thomas_Henry_Huxley (accessed 27.04.2012).

This section also includes an official 'position statement' on evolution on a text panel entitled *Social Reactions to Darwin: Long-standing*

Controversies, implementing both bold and capital letters:

DARWIN'S THEORY OF EVOLUTION BY NATURAL SELECTION IS THE ONLY SCIENTIFIC EXPLANATION FOR THE SPECTACULAR DIVERSITY OF LIFE ON EARTH.

INDEED THE CURRENT CONTROVERSY IS STRONGLY ROOTED IN THE OBJECTIONS FIRST EXPRESSED 150 YEARS AGO.

CREATIONISM, INCLUDING INTELLIGENT DESIGN, DOES NOT OFFER A SCIENTIFIC ALTERNATIVE TO THE THEORY OF EVOLUTION.

FOR 150 YEARS SINCE THE PUBLICATION OF DARWIN'S *Origin of Species*, THE THEORY OF EVOLUTION BY NATURAL SELECTION HAS NOT BEEN SERIOUSLY CHALLENGED BY ANY OTHER SCIENTIFIC EXPLANATION.³⁸⁶

Finally, the main theme of the final section of the exhibit core, *Evolution Today*, is modern knowledge and understanding of evolution by natural selection, including evidence in contemporary science, as well as the use, implications, significance and impact of Darwin's research on modern biology and society.



Figure 4.7: Display of Horse Evolution in Section 'Evolution Today' in *Darwin: The Evolution Revolution*. Photo by AMNH Photography Studio, AMNH Exhibitions.
Source: American Museum of Natural History. 2005. *Darwin Brochure*.
<http://www.amnh.org/traveling/pdfs/Darwin%20Brochure.pdf> (accessed 24.04.2012).

The educational and communicational focus of exhibit content in this section is therefore Darwin's contribution to evolutionary biology and the extension of his knowledge through modern science, evolution and natural selection today, the implications of evolution by natural selection for all

³⁸⁶ AMNH. 2005. *Darwin: The Evolution Revolution*. Exhibition Text 'Social Reactions to Darwin: Long-standing Controversies' from Section 'A Life's Work'.

forms of living species (including humans) and the significance of the theory of evolution by natural selection in current research and modern medicine.

4.2 The ROM's Programming Motives, Objectives and Exhibit Adaptations

Programming motives, objectives and exhibit adaptations were identified in the semi-structured interviews with ROM staff members directly implicated in the *Darwin* project: Christine Lockett, Senior Director of Exhibit Planning and Community Programs, Department of World Cultures and Natural History; Julian Kingston, Director of the Department of Education and Public Programs; Chris Darling, Senior Curator in the Department of Natural History; and Jason French, Project Manager in Exhibit Planning.

4.2.1 The ROM's Key Programming Motives and Objectives

The ROM based the decision to participate in and program *Darwin: The Evolution Revolution* on various institutional and educational objectives the exhibit was meant to fulfil. Furthermore, the ROM devised a business plan including attendance and revenue goals as well as target audience.

The *Darwin* exhibit was perceived by ROM staff members as: a viable solution to scheduling issues during Renaissance ROM, capable of building the Museum's corporate image through strategic partnerships, educationally relevant and fulfilling the ROM's mission and new corporate strategy. *Darwin* was also considered capable of meeting the goals of the ROM's business plan, thus having the potential to achieve financial

objectives as well as effectively attract the ROM's target audience with minimal adaptation. Furthermore, presented during a peak period of public interest in Darwin and the theory of evolution, the exhibit theme was considered both historically and currently relevant.

The AMNH's proposal to partner and host *Darwin: The Evolution Revolution* came during *Renaissance ROM*, a massive renovation project at the ROM that served not only to redesign the museum's presentation areas and open new exhibition wings, but also aimed to significantly reposition the Museum's corporate and public image.³⁸⁷ As the ROM remained open to the public throughout the 'rejuvenation project', a new corporate strategy focusing on the "creation of major original exhibitions with international partners"³⁸⁸ was implemented under Director and CEO William Thorsell³⁸⁹ aiming to build and reinforce the Museum's international image through influential partnerships with [other] world-leading institutions (such as the partnership with the AMNH on the *Darwin* exhibit). Furthermore, the goal of the ROM's new education and programming strategy was "to host and produce programs of intellectual

³⁸⁷ The main objectives for *Renaissance ROM*, a nine-year project costing 270 million Canadian dollars,³⁸⁷ were: to "raise base annual attendance from 750'000 to between 1.3 and 1.6 million visitors"; to increase funds generated and to restore financial support for all of the ROM's functions and programming³⁸⁷; and to expand available public space within the Museum by an additional 80'000 square feet [7'432 m²] and renovate 75% of public space in pre-existing historical buildings. Source ROM. 'FAQs'. Official Website. <http://www.rom.on.ca/about/faqs/index.php> (accessed 20.09.2012).

³⁸⁸ ROM. 'News Realeases'. Official Website. <http://www.rom.on.ca/news/releases/public.php?mediakey=nrp2y9dzkp> (accessed 20.09.2012).

³⁸⁹ Ibid.

depth and social relevance on both sides of its mandate, including unique ROM exhibitions and works of collaborative nature”³⁹⁰ and to “emphasize its role in engaging the public on issues of environmental and social change”.³⁹¹ *Darwin: The Evolution Revolution* was therefore programmed based on strategic intent to reinforce the ROM’s international importance, to build the ROM’s corporate image and to strengthen the institution’s public relevance.

Aligned with the ROM’s corporate strategy, the ROM had the following institutional objectives for Darwin:

- To communicate the collaborative nature of the exhibit project.³⁹²
- To enhance or reinforce the position of the ROM as a world-leading institution alongside other internationally renowned natural history museums (such as the Darwin exhibit project partners).³⁹³
- To communicate the official position of the ROM in the evolutionary debate: the ROM very clearly supports the theory of evolution and natural selection.³⁹⁴
- To reinforce the public’s view of the essential role of museums in shaping public discourse about ideas of great significance³⁹⁵ (such as the theory of evolution and the evolutionary debate).

³⁹⁰ ROM. ‘About Us’. Official Website. <http://www.rom.on.ca/about/index.php> (accessed 20.09.2012).

³⁹¹ ROM. ‘News Realeases’. Official Website. <http://www.rom.on.ca/news/releases/public.php?mediakey=nrp2y9dzkp> (accessed 20.09.2012).

³⁹² Lockett, Christine. 2008. Senior Director. Exhibit Planning and Community Programs. Department of World Cultures and Natural History. Royal Ontario Museum. Interview by Afshan Heuer. June 4.

³⁹³ Ibid.

³⁹⁴ Ibid.

³⁹⁵ Ibid.

- To highlight the ROM's collections and essential research function.³⁹⁶

ROM staff members agreed the AMNH *Darwin* exhibit had the potential to fulfil the Museum's mission, the primary focus of exhibition and educational programming,³⁹⁷ hence AMNH partnership and programming of the exhibit was supported.³⁹⁸ In alignment with the Museum's vision to "inspire wonder and build understanding of human cultures and the natural world",³⁹⁹ the ROM's mission statement is ambitious:

The ROM will be a world leader in communicating its research and collections to increase understanding of the interdependent domains of cultural and natural diversity, their relationships, significance, preservation and conservation.⁴⁰⁰

Participation in a collaborative project with the AMNH provided the opportunity to collaborate with a number of "first-class institutions"⁴⁰¹ and hence "be positioned among leading institutions."⁴⁰² Furthermore, the ROM had not presented a major natural history exhibition for quite some time⁴⁰³ and due to time constraints during *Renaissance ROM*, curators

³⁹⁶ French, Jason. 2008. Project Manager. Exhibit Planning. Royal Ontario Museum. Interview by Afshan Heuer. June 6.

³⁹⁷ Darling, Chris. 2008. Senior Curator. Department of Natural History. Royal Ontario Museum. Interview by Afshan Heuer. August 26.

³⁹⁸ Christine Lockett.

³⁹⁹ Royal Ontario Museum. 'About Us/Reports and Policies'. Official Website. <http://www.rom.on.ca/about/reports.php> (accessed 20.09.2012).

⁴⁰⁰ Royal Ontario Museum. 2011 'FAQs'. Official Website. February 21. <http://www.rom.on.ca/about/faqs/faqsgen.php#Q1> (accessed 20.09.2012).

⁴⁰¹ Julian Kingston.

⁴⁰² Christine Lockett.

⁴⁰³ Ibid.

were not able to produce an in-house temporary exhibition project; hosting the travelling exhibition was the best solution.⁴⁰⁴

The proposed exhibit theme, Darwin's life and work (the theory of evolution), fulfilled the ROM's internal Exhibit Policy: "the ROM will implement a thought-provoking and diverse exhibit program that reflects both the natural history of Ontario, Canada, and the world, and the history of humankind."⁴⁰⁵ The exhibit was selected for its "credible seriousness of scientific intent [...] curatorial depth and quality."⁴⁰⁶ Furthermore, Darwin's work is "central to everything that the Museum does in natural history".⁴⁰⁷

The content of Darwin: The Evolution Revolution was considered educationally relevant, fulfilling the Museums' goal to promote the understanding of natural history as a scientific field of research and "to increase understanding of the interdependent domains of cultural and natural diversity, their relationships, significance, preservation and conservation".⁴⁰⁸ As stated in the Museum's Educational Policy: "at the heart of this commitment is a belief in the role of museums as centres for

⁴⁰⁴ Christine Lockett.

⁴⁰⁵ Royal Ontario Museum. 'About Us/Reports and Policies'. Official Website. <http://www.rom.on.ca/about/reports.php> (accessed 20.09.2012).

⁴⁰⁶ Christine Lockett.

⁴⁰⁷ Chris Darling. Also confirmed by William Thorsell Museum Director and CEO Royal Ontario Museum. 'News Realeases'. Official Website. <http://www.rom.on.ca/news/releases/public.php?mediakey=nrp2y9dzkp> (accessed 20.09.2012).

⁴⁰⁸ Royal Ontario Museum. 2011 'FAQs'. Official Website. February 21. <http://www.rom.on.ca/about/faqs/faqsgen.php#Q1> (accessed 20.09.2012).

life-long learning.”⁴⁰⁹ Thus, the Darwin exhibit was meant to fulfil the Museum’s educational goals by encouraging life-long learning.

Julian Kingston, Director of Education, explains that the exhibit’s theme, content and scientific approach was perceived as fulfilling the Museum’s objectives “on a number of levels”: “it’s a Natural History sort of biographical show [and] the content fits very well with our own collections and research program.”⁴¹⁰ Jason French adds that the exhibition presented the opportunity “to highlight or to feature some of the ROM’s collections if they are supplemented within our own exhibition, as well as our research from our curatorial departments.”⁴¹¹

The timing of the exhibit, during a period of international focus on Darwin, also meant that programming occurred when “there was a lot of buzz about [...] [and] a resurgence of interest in Darwin”,⁴¹² hence providing a good opportunity for a balance between “public interest in Darwin and

⁴⁰⁹ Royal Ontario Museum. ‘About Us/Reports and Policies’. Official Website. <http://www.rom.on.ca/about/reports.php> (accessed 20.09.2012).

⁴¹⁰ Julian Kingston.

⁴¹¹ Jason French.

⁴¹² Chris Darling.

relevance”⁴¹³. The Museum’s Senior Curator believed it was the perfect time to “take a firm stance on the issue [of evolution]”⁴¹⁴.

Adult visitors were considered the exhibit’s main constituent of the planned target audience. The ROM staff members identified various learning objectives for the adult visitor segment. For evolution and science learning, the objectives were: to effectively explain evolution, natural selection⁴¹⁵ and the scientific definition of “theory”;⁴¹⁶ to highlight the state of current thinking in evolutionary theory;⁴¹⁷ and to reinforce the importance of rationalism⁴¹⁸ as well as audience perceptions of the relevance of the theory of evolution today,⁴¹⁹ an extremely well-supported and substantiated scientific theory⁴²⁰ and the only logical explanation for the diversity we see in the living world.⁴²¹ Goals for learning related to

⁴¹³ Christine Lockett.

⁴¹⁴ The timing of the exhibit was an essential part of the institutional objectives, as Chris Darling explained; the exhibition came at a very important time when several important centennials took place: the 150th anniversary of the publication of the Origin and the 200th anniversary of Darwin’s birth. There were also several court cases concerning Darwin and evolution at that time [in the US]. Darling stated, “So this was at about the right time when there was a lot of buzz about Darwin. [...] there was a resurgence of interest in Darwin”. [...] I guess there was just a lot of buzz about Darwin so they wanted to sort of take a firm stand on the particular issue.”

⁴¹⁵ Chris Darling.

⁴¹⁶ Julian Kingston.

⁴¹⁷ Ibid.

⁴¹⁸ Chris Darling.

⁴¹⁹ Jason French.

⁴²⁰ Julian Kingston and Chris Darling.

⁴²¹ Chris Darling.

Darwin were: to raise awareness of Darwin, his life and work⁴²² and the importance of his contribution to science⁴²³ as well as to “humanize” evolution [through an HPS approach], rendering the scientific theory more “personal” and “accessible”.⁴²⁴ Finally, the ROM aimed to communicate its stance in support of evolution.⁴²⁵

Finally, *Darwin* was meant to fulfil objectives of the ROM’s business plan (an internal, confidential document) which stipulated specific targets for “admissions revenue”,⁴²⁶ anticipated to be substantial due to expected high public interest and the relevance of the exhibit’s content.⁴²⁷

Furthermore, objectives regarding target audience were identified as a crucial factor: the AMNH exhibit was considered as targeting adult audiences as well as families with children age twelve and up;⁴²⁸ hence in order to align with the institutional objective to regain the portion of the Museum’s target “family audience” lost due to the temporary closure of galleries with a “family appeal” during the renovation,⁴²⁹ supplementation of a child-focused area was necessary⁴³⁰ in order to broaden the reach of

⁴²² Julian Kingston.

⁴²³ Chris Darling.

⁴²⁴ Christine Lockett.

⁴²⁵ Julian Kingston and Chris Darling.

⁴²⁶ Julian Kingston.

⁴²⁷ Christine Lockett.

⁴²⁸ Julian Kingston.

⁴²⁹ Jason French.

⁴³⁰ Christine Lockett.

the exhibit and increase visitor attraction,⁴³¹ essentially adapting *Darwin* to suit all ages and knowledge levels.⁴³²

4.2.2 The ROM's Approach to Partnership and Audience-based Adaptation

The ROM's approach to the international partnership was one of confidence in the AMNH and in the competence of the exhibit's curator, Niles Eldredge, who maintained "curatorial lead" and headed the content production process with ROM staff providing advice and feedback on institutional concerns and requirements during the "collaborative production phase", focusing on the relevance of exhibit discourses for the Canadian audience (in order to limit cultural adaptations necessary) and validating AMNH-produced content, hence allowing the exhibit to be essentially maintained as a 'turn-key' exhibit (with relatively little modification). According to the staff interviews and in alignment with programming motives identified, the ROM's 'relinquishing' of curatorial leadership did not appear to cause any tension.

As previously mentioned, *Darwin* is an extensive exhibit: according to the AMNH's Darwin Brochure, the exhibit requires a gallery of 7'000 square feet⁴³³ (650m²) for optimal presentation. As the Garfield Weston Hall is "a 17'000 square foot temporary exhibition gallery"⁴³⁴ (1'580m²), the ROM

⁴³¹ Julian Kingston.

⁴³² Christine Lockett.

⁴³³ American Museum of Natural History. 2005. *Darwin Brochure*. <http://www.amnh.org/traveling/pdfs/Darwin%20Brochure.pdf> (accessed 24.04.2012).

⁴³⁴ Jason French.

had an extra surface space of 10'000 square feet (930 m2) that required exhibit optimisation for the presentation of *Darwin*.⁴³⁵ The main ROM adaptations were the creation of a *Young Naturalist* children's activity area⁴³⁶ and the addition of a display presenting a Canadian link in Darwin's life story.⁴³⁷ The ROM maintained the AMNH sequence of exhibit sections (i.e. storyline) and modification of original content was minimal. The ROM presentation of *Darwin* is henceforth defined as an "extension" of the AMHN version due to an increase in exhibition content and perhaps expected visit duration.

Although the ROM had validated content according to their understanding of the Canadian cultural context and Canadian visitor expectations,⁴³⁸ certain site-specific modifications were deemed necessary in order to effectively address target audiences as well as to "culturally adapt" the exhibit to the ROM's Canadian context.

⁴³⁵ Jason French stated that the ROM was "working with a really much larger space and having to fill much larger volumes than traditional galleries or traditional exhibition halls so we have to adapt." French, Jason. 2008. Project Manager. Exhibit Planning. Royal Ontario Museum. Interview by Afshan Heuer. June 6.

⁴³⁶ Julian Kingston.

⁴³⁷ Chris Darling.

⁴³⁸ Christine Lockett.

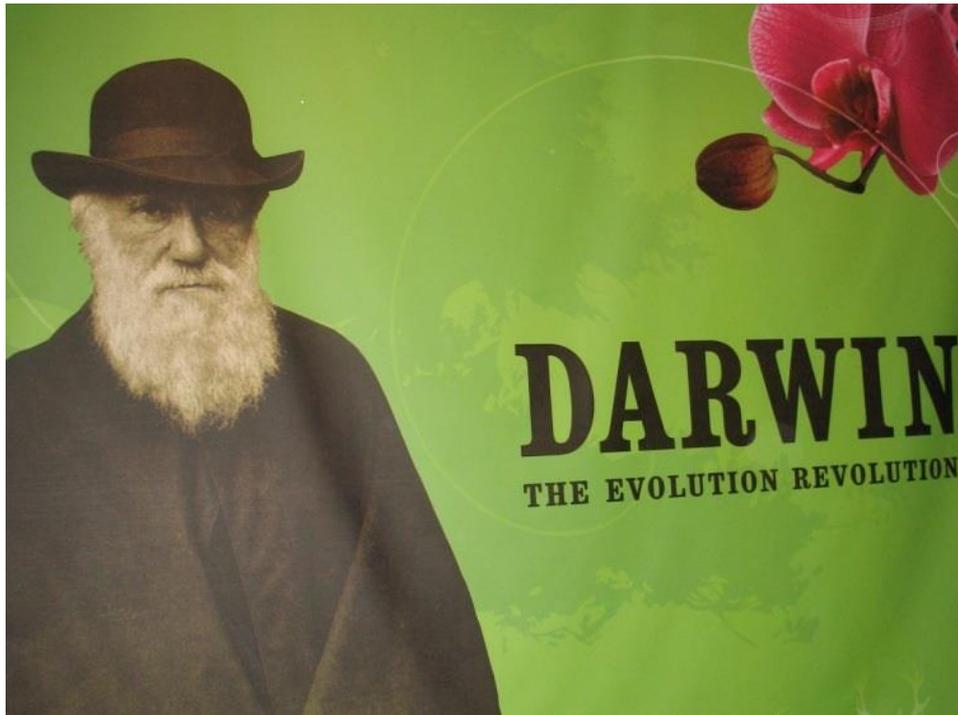


Figure 4.8: Exhibit Entrance of *Darwin: The Evolution Revolution* at the ROM.

Source: American Museum of Natural History. Photo by Afshan Heuer.

ROM staff members interviewed were asked to reflect on whether there were any possible cultural issues with the presentation of *Darwin* in Toronto that could hinder the fulfilment of the exhibition's educational or communicational objectives. Staff then explained if and how these issues were taken into account or planned for.

Christine Lockett's main concern, voiced during the collaborators' meetings in New York, was a cultural divergence between the US and Canada in attitudes to evolution, acceptance of the theory and adherence to Intelligent Design:

Yes, I think the issue I alluded to as to how much Intelligent Design is adhered to between different countries. I think in Canada we are so diverse and so tolerant and in general don't bring religion into public life as much as in the United States. I think that's a definite difference between Canada and the [United] States. Culturally I think Canada is more ready to embrace the idea of a museum having an exhibition on evolution.⁴³⁹

Julian Kingston highlighted worldview as a main possible cultural issue:

Well the key one is it really just comes down to worldview. Right? And basically the Museum and the exhibit take a scientific worldview, evolution and the history of life on earth. If this is not your world view then you've already got a fundamental disconnect between your belief system or your worldview and what we're putting forth in this exhibit. So that's the main one.⁴⁴⁰

As the exhibit takes the position of NOMA and explains there are many scientists who are Christian and who still work on evolution as they have "reconciled personal and scientific beliefs"⁴⁴¹ the ROM staff members were satisfied with the AMNH presentation of worldview and/or religious issues

⁴³⁹ Christine Lockett.

⁴⁴⁰ Julian Kingston.

⁴⁴¹ Ibid.

and did not expect any strong reactions to the exhibit.⁴⁴² However, aware there was potential for “public protest” to the exhibit, especially regarding the exhibit’s presentation of the ‘science versus religion debate’, rather than addressing the issues directly in the exhibit content, the ROM prepared an “institutional position” for responding.⁴⁴³

4.2.3 ROM Cultural Adaptations: Targeting the Local ‘Canadian Audience’

Cultural adaptations specifically devised for local audiences essentially consisted of contextualisation with the University of Toronto: a link was drawn between Darwin and UofT and current local evolutionary research was presented. Under the direction of Chris Darling, a display case was added in the section *A Life’s Work* entitled *Darwin’s Bulldog: a lost opportunity for the University of Toronto*, explaining Thomas Henry Huxley, a staunch supporter of Darwin’s work and loyal friend, had applied

⁴⁴² As previously mentioned, a small “anti-racism rally”, organised by Reverend Charles McVety, was held outside the ROM entrance during the Museum’s presentation of the *Darwin* exhibit. However, no public anti-evolution demonstrations were held at the NHM. This difference is surprising considering the similarity of results of Angus and Reid 2012 Public Opinion Polls in the two geographical regions of focus (as stated in Chapter Six, Table 6.3 Attitudes on Human Evolution and Divine Creation in Geographical Areas of Research Focus: 60% of the general population in both Ontario, Canada and London, England agreed with the statement “human beings evolved from less advanced life forms over millions of years”. Furthermore, 24% of respondents in Ontario, Canada 23% in London, England agreed with the statement “God created human beings in their present form within the last 10,000 years”.) More research is therefore required in order to determine whether the “US exception” which demonstrates significantly negative American attitudes to evolution (described in Chapter Six section 6.1) exerts influence on Canadian public manifestations of objections to the theory of evolution, especially in Toronto which is geographically located in close proximity to the Canadian/American border.

⁴⁴³ Christine Lockett.

for professorship as Chair of Natural History at the University of Toronto (his application was presented). Although Darwin wrote a letter of reference to the University (also on display), the position went to a Canadian counterpart, William Hincks. Darling felt this element was significant to Darwin's life-story as:

He [Huxley] wouldn't have been Darwin's bulldog if he had got the job [...] at the University of Toronto. This was about nine years before the publication of the Origin [of Species]. He would have been here in the colonies, struggling to get a Department of Biology organized here rather than at home in England when Darwin needed him to serve as his champion.⁴⁴⁴

Although an interesting and culturally relevant "twist" in the storyline, the adaptation is minimal and does not impact the exhibition narrative.

Another site-specific adaptation was an audio-visual component featuring Canadian scientists discussing the significance of the theory of evolution in current scientific research. The objective of the video was to address research performed in the Department of Botany at the University of Toronto and to make cross-reference to the ROM.⁴⁴⁵ Although intended to reinforce public understanding of the current relevance of the theory of evolution in modern research, to make direct reference to the Canadian research context as well as to highlight the ROM's fundamental research function, the video's extremely poor sound quality (coupled with issues of competing sound within the exhibit which will be discussed below), the dialogue was inaudible for audience members. Furthermore, the video

⁴⁴⁴ Chris Darling.

⁴⁴⁵ Christine Lockett.

was presented without explanatory texts. Thus, although the intended scientific, cultural and institutional contextualisation was significant, this portion had no effect on visitor experience, nor any consequence on exhibit discourse.

4.2.4 ROM Adaptations Targeting Family Audiences

The promotion of experiential or “guided discovery learning”⁴⁴⁶ is a fundamental aspect of the ROM’s overall offer: thus child-focused activity areas are a significant component of the Museum’s public appeal, influencing family visitor expectations. The exhibit’s “primarily adult appeal”⁴⁴⁷ did not effectively satisfy the ROM’s institutional objectives to restore family public appeal⁴⁴⁸ and was hence supplemented with the *Young Naturalist* children’s activity area, a 2’000 square foot [185 m²] family-oriented, interactive space⁴⁴⁹ created under the direction of Julian Kingston. Thus, in order to provide a “value-added experience”⁴⁵⁰ for families at the end of their visit (i.e. after the exhibit’s final section and the Darwin shop), a “hands-on” discovery gallery was designed to aid children’s understanding of Darwin’s scientific research process; the gallery was divided into three activity areas: *getting there* simulates

⁴⁴⁶ Royal Ontario Museum. ‘School visits/Experiential Education at the ROM (Lab/Exhibit Combo Lesson)’. Official Website. http://www.rom.on.ca/schools/book/?_qf_Main_BrowseActivities_display=true&sa=34956&pg_mode=ext (accessed 17.09.2012).

⁴⁴⁷ Christine Lockett.

⁴⁴⁸ Jason French.

⁴⁴⁹ Julian Kingston.

⁴⁵⁰ Ibid.

Darwin's travels on the *HMS Beagle*, *fieldwork* imitates Darwin's exploration of foreign plant and animal life and the *analysis* portion emulates Darwin's examination of natural specimens after his return to England. As this portion is physically located 'outside' the exhibit, it was considered to have no effect on visitor experience, nor any consequence on exhibit discourse.

4.3 The NHM's Programming Motives, Objectives and Exhibit Adaptations

The NHM chose to participate in and program *Darwin: The Evolution Revolution* based on various institutional and educational objectives which were identified in the semi-structured interviews with NHM staff members directly implicated in the planning and execution of the *Darwin* project: Dr. Robert Bloomfield, Head of Innovation and Special Projects; Grant Reid, Project Director; Alexandra Gaffikin, Interpretation Developer; and Lorraine Cornish, Senior Conservator. Programming motives were based on objectives regarding: institutional position, educational pertinence and target audiences as well as potential public interest, timing and relevance. Furthermore, the exhibit's focus on Darwin's life and scientific research was deemed highly relevant within the context of the UK-wide Darwin200 celebrations.⁴⁵¹

⁴⁵¹ Reid, Grant. 2009. Project Director. Natural History Museum. Interview by Afshan Heuer on January 8. All four NHM staff members interviewed highlighted the significance of the timing of the exhibit in relation to the Bicentenary and Darwin200 celebrations programme.

4.3.1 The NHM's Key Programming Motives and Objectives

The NHM based the decision to participate in and program the *Darwin* exhibit on various institutional and educational objectives as well as financial targets the exhibit was meant to fulfil. However, context and timing considerably significantly influenced the NHM's partnership and programming decision as the exhibit, retitled *Darwin: Big idea, big exhibition*, was hosted in the London venue at the most significant time both nationally and internationally: during the 'global' celebration "year of Darwin" marking the 150th anniversary of the publication of "On the Origin of Species", as well as for "Darwin Day" commemorating the 200th anniversary of his birth on February 12th 2009. The NHM was the primary site of the UK-wide "Darwin200" initiative as well as the focal point of worldwide Darwin celebrations in 2009.⁴⁵² The NHM therefore benefited from the most relevant scheduling period of the five partner institutions of the collaborative travelling exhibition project; the international focus on Darwin during this period presented "an ideal opportunity to engage the public about evolution".⁴⁵³ Additionally, this strategic programming decision ensured peak public interest - locally, nationally and internationally - as well as significant media attention as the exhibit served as media hub or "headquarters" during the Darwin celebrations supplying a perfect location for filming as well as for conferences and 'talks'.⁴⁵⁴

⁴⁵² Bloomfield, Dr. Robert. 2009. Head of Innovation and Special Projects. Natural History Museum. Interview by Afshan Heuer. January 13.

⁴⁵³ Cornish, Lorraine. 2009. Senior Conservator. Natural History Museum. Interview by Afshan Heuer. January 14.

⁴⁵⁴ Grant Reid.

The AMNH's partnership and hosting proposal took place during the NHM's major building and renovation project: *Darwin Centre 2*. Presented from November 2008 to April 2009, *Darwin* was scheduled just before the opening of "the state-of-the-art Darwin Centre [which] cost £78 million and took around 25 months and 280 people to build".⁴⁵⁵ The project also consisted of "re-housing" 40 million specimens from the botanic and entomology collections.⁴⁵⁶ The major staffing constraints during Phase Two of the Darwin Centre project meant the NHM was not engaged in a process of developing in-house temporary exhibits around the time of the showing of the *Darwin* exhibit.⁴⁵⁷ Participation was therefore both feasible and beneficial for the NHM, essentially ensuring the presentation of a "world class exhibition"⁴⁵⁸ on Darwin at a peak time of international and national focus while supplying a viable solution to portended scheduling and staff availability issues during the NHM's multi-million British pound building project.

As the NHM's Department of Innovation and Special Projects is dedicated to creating "novel areas of engagement on science communications" through the establishment of partnerships and collaborative projects, internationally collaborative projects such as the AMNH *Darwin* exhibit are

⁴⁵⁵ NHM. 'Darwin Centre Architecture'. Official Website. <http://www.nhm.ac.uk/visit-us/history-architecture/architecture-darwin-centre/index.html> (accessed 24.10.2012).

⁴⁵⁶ Grant Reid.

⁴⁵⁷ Ibid.

⁴⁵⁸ Lorraine Cornish.

a focus of the NHM's continuing strategy to demonstrate the international dimension and relevance of its work, hence providing significant political benefit for the Museum.⁴⁵⁹ A notable strategic advantage of participation and collaboration was also that due to "consolidation restraints" and the limited amount of original material available, the AMNH travelling exhibit was likely to be the "only exhibition which would really bring a lot of original [Darwin] material together" during the period of international Darwin celebrations;⁴⁶⁰ therefore, the NHM's tactical goal was to "consolidate forces around one project rather than trying to produce competing ones".⁴⁶¹ Furthermore, added-values of hosting *Darwin* were the public display "very visible fine work" and the "benefit of an international effort in terms of visibility".⁴⁶²

NHM staff members identified various institutional objectives for the presentation of *Darwin: Big idea, big exhibition*:

- To effectively demonstrate the international dimension of the NHM's work through strategic partnerships for "cultural engagement abroad".⁴⁶³
- To reinforce or enhance the NHM's position as a leader in scientific research.⁴⁶⁴

⁴⁵⁹ Dr. Robert Bloomfield.

⁴⁶⁰ Ibid.

⁴⁶¹ Ibid.

⁴⁶² Ibid.

⁴⁶³ Ibid.

⁴⁶⁴ Ibid.

- To significantly contribute to the “Darwin year” or Darwin200 bicentennial celebrations in 2009 (with a high quality exhibition)⁴⁶⁵ as well as the launch of the new Darwin Centre.⁴⁶⁶
- To give public access to a large amount of original Darwin material in one place for the first time in the UK.⁴⁶⁷
- To highlight the NHM’s collections,⁴⁶⁸ including NHM “Darwin holdings”,⁴⁶⁹ as well as the Institution’s research function⁴⁷⁰ and “expertise”.⁴⁷¹
- To reinforce public understanding of the importance of historical evidence in current scientific practice in the field of biology, including research at the NHM of London.⁴⁷²
- To effectively and accurately communicate the official position of the NHM on evolution (as well as on the debate of science or evolution teaching in the classroom): the NHM very clearly supports the theory of evolution and natural selection as the very basis of all biological scientific research within the Organisation as well as in the field of biology in general.⁴⁷³
- “To validate confidence in evolutionary biology”.⁴⁷⁴
- To adequately culturally adapt the AMNH exhibit for the UK audience⁴⁷⁵ (within the project’s budget constraints).⁴⁷⁶

⁴⁶⁵ Dr. Robert Bloomfield, Grant Reid, Lorraine Cornish and Gaffikin, Alexandra. 2009. Interpretation Developer. Natural History Museum. Interview by Afshan Heuer on January 8.

⁴⁶⁶ Grant Reid.

⁴⁶⁷ Dr. Robert Bloomfield and Grant Reid.

⁴⁶⁸ Grant Reid.

⁴⁶⁹ Lorraine Cornish.

⁴⁷⁰ Dr. Robert Bloomfield and Grant Reid.

⁴⁷¹ Lorraine Cornish.

⁴⁷² Dr. Robert Bloomfield and Lorraine Cornish.

⁴⁷³ Alexandra Gaffikin and Lorraine Cornish.

⁴⁷⁴ Dr. Robert Bloomfield and Grant Reid.

⁴⁷⁵ Dr. Robert Bloomfield.

⁴⁷⁶ Grant Reid.

NHM staff members interviewed agreed the AMNH *Darwin* exhibit had the potential to fulfil the Museum's mission, public engagement policy and business plan objectives as well as communicate the Museum's position on evolution. The NHM's vision, as a scientific research institution where over 300 scientists perform research both at the Museum and around the globe on "such topics as biodiversity, evolution and the ecosystem",⁴⁷⁷ is "to advance our knowledge of the natural world, inspiring better care of our planet".⁴⁷⁸ The Organisation's scientific mission is to "explore the diversity of the natural world and the processes that generate this diversity" and to "use the knowledge gained to promote responsible interaction with the natural world".⁴⁷⁹ The Museum's mission is "to maintain and develop [our] collections, and use them to promote the discovery, understanding, responsible use and enjoyment of the natural world."⁴⁸⁰

As both scientific and curatorial researchers work directly on questions related to evolution, the NHM provides the following official statement:

⁴⁷⁷ NHM. 'About Us'. Official Website. <http://www.nhm.ac.uk/about-us/index.html> (accessed 24.10.2012).

⁴⁷⁸ Ibid.

⁴⁷⁹ NHM. 'Research and Curation'. Official Website. <http://www.nhm.ac.uk/research-curation/index.html> (accessed 24.10.2012).

⁴⁸⁰ NHM. 'About Us'. Official Website. <http://www.nhm.ac.uk/about-us/index.html> (accessed 24.10.2012).

The Natural History Museum is an organisation that relies on the objective use of scientific evidence to support its public position as a voice of authority on the natural world. As such, it is important that we take a position on the major issues of our times, especially those that relate to the natural world and human examination of our place within and our impact upon it.⁴⁸¹

As evolution is fundamental to scientific research in biology and natural history, the Museum clearly defines its position on the theory of evolution:

The study of the diversity of life on earth is at the very heart of the Natural History Museum. As a scientific organisation we are committed to the principles embodied in the scientific method, which tests ideas with empirical evidence. We consider the theory of evolution as the best current explanation for how the diversity of life around us came to be. Through the late nineteenth and twentieth centuries the theory of evolution by natural selection has been thoroughly challenged and tested across a range of scientific disciplines and it remains the only compelling, scientifically rigorous account of how life evolves on our planet for which a great deal of empirical evidence has been accumulated.⁴⁸²

The NHM's position statement on evolution includes the Museum's objectives for public engagement including their stance in relation to faith-based views and science teaching:

The Museum's policy for public engagement is to present the theory of evolution as the best explanation, which is supported by rigorous scientific examination, of the on-going generation of the diversity of life on earth.

We strongly endorse the teaching of the theory of evolution in UK schools as a core part of the science curriculum and we use the Museum's assets to support this. We agree that views such as creationism and intelligent design should not be taught as

⁴⁸¹ NHM. 2008. *Position Statement on Evolution*. Author Joe Baker, External Relations Manager. June.

⁴⁸² Ibid.

‘science’, as the Department for Schools Children and Families has recently stated.

While we assert that the theory of evolution frames how we understand the world, we do recognise that there are faith-based views on the development of life. The Natural History Museum encourages discussion and exchange of such views in our science and society programme.⁴⁸³

Darwin intends to fulfil the Museum’s educational mission: to create opportunities for increasing knowledge and understanding of “the diversity of the natural world and the processes that generate this diversity; the dynamic nature of the Earth’s systems [...]; the interdependence in the natural world, including human interactions with other species and the environment; the processes of scientific enquiry; and the importance and relevance of the Museum’s collections and science”.⁴⁸⁴ Furthermore, as the NHM must ensure that the theory of evolution is “reflected” in the galleries (i.e. exhibitions),⁴⁸⁵ the theme of the exhibit, Darwin’s life-story and his ‘discovery’ of the theory of evolution, was perceived as educationally relevant by “promoting learning on the natural world”⁴⁸⁶ and “validating confidence in evolutionary biology”,⁴⁸⁷ hence meeting NHM content requirements.⁴⁸⁸

⁴⁸³ NHM. 2008. *Position Statement on Evolution*. Author Joe Baker, External Relations Manager. June

⁴⁸⁴ NHM. 2009. *Visitor Outcomes*. Author Emma Pegram, Education Department. March.

⁴⁸⁵ Lorraine Cornish.

⁴⁸⁶ Dr. Robert Bloomfield.

⁴⁸⁷ Ibid.

⁴⁸⁸ Ibid.

A key objective was to “make a public statement of the NHM’s official position on evolution”,⁴⁸⁹ the position on evolution communicated within the *Darwin* exhibit required adaptation (according to staff interviewed) in order to accurately reflect the NHM’s official views on evolution and science teaching. Notably, although the ‘science versus religion debate’ is presented, the exhibition itself is not regarded as a ‘forum for debate’: contentious issues are meant to be discussed within the specific conferences, events or talks programmed at the Museum⁴⁹⁰ (such as the “Talk about evolution” series held from April to July 2009).

The presentation of *Darwin* was intended to reinforce the Museum’s educational mission by encouraging learning of the natural world, validating confidence in evolutionary biology as well as effectively communicating the NHM’s official position on evolution and related science teaching.⁴⁹¹ Furthermore, the NHM wanted to ensure that “a good representation of Darwin [was] exhibited for the year”⁴⁹² of international and UK celebrations.

Specific learning objectives for *Darwin: Big idea, big exhibition* were identified in the staff interviews, however, as all exhibitions at the NHM must also adhere to Museum’s Education Department’s general objectives for visitor outcomes (and as advised by Gaffikin), outcomes directly related to Darwin, science and evolution learning were incorporated.

⁴⁸⁹ Lorraine Cornish.

⁴⁹⁰ Dr. Robert Bloomfield, Alexandra Gaffikin and Lorraine Cornish.

⁴⁹¹ Alexandra Gaffikin.

⁴⁹² Dr. Robert Bloomfield.

For evolution and science learning, the objectives were: to encourage public interest in the theory of evolution;⁴⁹³ to increase understanding of the “processes of science”⁴⁹⁴ and of “scientific enquiry”;⁴⁹⁵ to “enhance knowledge and understanding of the dynamic nature of the Earth’s processes”,⁴⁹⁶ “the diversity of the natural world and the processes that generate this diversity”;⁴⁹⁷ and to “validate confidence in evolutionary biology”.⁴⁹⁸ The NHM also had numerous learning objectives regarding the significance of Darwin’s scientific contribution and relevance of the theory of evolution: to reinforce understanding of the significance of Darwin’s research (i.e. theories) for science and the importance of the publication of “On the Origin of Species”;⁴⁹⁹ to “endorse the robustness” of Darwin’s “method”, “evidence” and scientific “deductions”;⁵⁰⁰ to highlight and raise awareness of Darwin’s “achievement as an individual, as a great mind and a great influence of his age”;⁵⁰¹ and to enhance or reinforce audience perceptions of the current relevance of Darwin’s research.⁵⁰² The NHM

⁴⁹³ Dr. Robert Bloomfield.

⁴⁹⁴ Alexandra Gaffikin.

⁴⁹⁵ NHM. 2009. *Visitor Outcomes*. Author Emma Pegram, Education Department. March.

⁴⁹⁶ Ibid.

⁴⁹⁷ Ibid.

⁴⁹⁸ Dr. Robert Bloomfield.

⁴⁹⁹ Alexandra Gaffikin.

⁵⁰⁰ Dr. Robert Bloomfield.

⁵⁰¹ Ibid.

⁵⁰² Ibid.

aimed to communicate its stance in support of evolution and hence encourage understanding that “evolution is the only scientific explanation” for the diversity of life on earth⁵⁰³ and there is “no scientific controversy” or scientific debate on the validity of the theory of evolution.⁵⁰⁴ Staff members also identified goals for learning related to Darwin and evolution [from an HPS approach]: to increase “knowledge and critical understanding of Darwin’s life and his theories”⁵⁰⁵ and hence “humanise” the theory of evolution, “making evolution relevant” through a more personal view.⁵⁰⁶ Finally, unlike the ROM, the NHM also had several institutionally-related learning objectives for the *Darwin* exhibit: to “enhance knowledge and understanding of the importance of the Museum’s collections and science”⁵⁰⁷ including the “historical and current links between Darwin and NHM science”⁵⁰⁸ and to raise awareness and understanding of the Natural History Museum’s relationship with Darwin.⁵⁰⁹

Lastly, *Darwin* was meant to reach goals of the NHM’s business plan which included objectives for visitor attendance, admissions revenue and

⁵⁰³ Alexandra Gaffikin.

⁵⁰⁴ Ibid.

⁵⁰⁵ Grant Reid. Objective also mentioned by Dr. Robert Bloomfield and Alexandra Gaffikin.

⁵⁰⁶ Lorraine Cornish.

⁵⁰⁷ NHM. 2009. *Visitor Outcomes*. Author Emma Pegram, Education Department. March.

⁵⁰⁸ NHM. 2008. *Business Plan, Darwin Exhibition November 2008 – April 2009*. Authors Mark Hepworth and Grant Reid, Commercial Department and Project Office. Approval Date August 5.

⁵⁰⁹ Grant Reid.

target audience. Targeting an adult “learned liberal audience” – “typified as middle-to-older-aged ‘culture vultures’ who are ABC1 biased [an upper to lower middle class demographic category], well educated, cultured, outward-looking, socially aware and strong-minded” - *Darwin: Big idea, big exhibition* was “expected to attract 100,000 visitors”.⁵¹⁰

The target age group of the ‘learned liberal’ audience is age 45 years and up.⁵¹¹ A secondary target audience, Key Stage 4 Schools, was identified, although the business plan clearly states that while the exhibit “includes attractions for younger audiences, it is more adult focussed”.⁵¹² As all staff members involved agreed *Darwin* was essentially an adult focussed exhibit, the NHM chose to maintain this focus in all exhibit adaptations; no specific adaptations were created for Key Stage 4 audiences. However, the original exhibit had already included specific content with youth and family audience appeal which was therefore displayed at both the ROM and the NHM.⁵¹³

⁵¹⁰ NHM. 2008. *Business Plan, Darwin Exhibition November 2008 – April 2009*. Authors Mark Hepworth and Grant Reid, Commercial Department and Project Office. Approval Date August 5.

⁵¹¹ Alexandra Gaffikin.

⁵¹² NHM. 2008. *Business Plan, Darwin Exhibition November 2008 – April 2009*. Authors Mark Hepworth and Grant Reid, Commercial Department and Project Office. Approval Date August 5.

⁵¹³ Taking in consideration diverging needs of specific target audiences and in order to ensure a wider “application” and “integration” of *Darwin: The Evolution Revolution* within a variety of host institutions, *Darwin* proposed a ‘multi-level visit’ which included specific content aimed at youth or family audiences. Visually attractive displays and interactive elements intended to limit reading requirement and enhance interactivity - such as live animals, the Galapagos ‘insular diorama’ displays, the reconstruction of Darwin’s study, various movies, computer-based quizzes (or games) and “touch” displays of models and specimens - were strategically placed throughout the exhibit from beginning to end.

The fulfilment of financial goals was perhaps a crucial objective for the *Darwin* exhibit as the main monetary incentive was to create “a quality [travelling] exhibition where costs are shared between several organisations”.⁵¹⁴ A commercial aim of the collaboration was therefore to test the financial benefits of a collaborative effort, consisting of shared financial costs, in comparison to the production of an in-house exhibit.⁵¹⁵ Furthermore, the Museum had a clear strategic intention to “maximise ticket sales” and hence “deliver a commercially neutral exhibition”, measuring its financial success according to “key performance indicators” which include “income targets” (from admissions, retail and publications sales), essentially aiming to achieve “a near break-even”.⁵¹⁶ Although the “minimum” financial objective was to recover cost and expense, the exhibition was still perceived (at least partially) as a “commercial venture” as “any extra funding” or monetary benefits generated through tickets sales could be reinvested in the further development of exhibit galleries and collections care.⁵¹⁷

4.3.2 The NHM’s Approach to Partnership and Vision for Adaptations due to Physical Constraints and Cultural Issues

The NHM’s approach to the international partnership, including the roles and implication of staff members, was significantly different from that of

⁵¹⁴ Dr. Robert Bloomfield.

⁵¹⁵ NHM. 2008. *Business Plan, Darwin Exhibition November 2008 – April 2009*. Authors Mark Hepworth and Grant Reid, Commercial Department and Project Office. Approval Date August 5.

⁵¹⁶ Ibid.

⁵¹⁷ Lorraine Cornish.

the ROM. As the large majority of pertinent specimens and historical documentation related to Darwin's life and work resides in London or British institutions including the NHM itself; it was therefore significant that the NHM was the project's unique "UK facilitator". The Museum's staff members were therefore proactively engaged in the project. Dr. Robert Bloomfield led the NHM's collaboration and was highly involved at an "early stage"; playing essentially a curatorial role, his responsibility was to ensure that "proper bounds" were established in the "partner ambitions" and that the "local goals" of the NHM were both aligned and respected within the framework of the internationally collaborative project.⁵¹⁸

Combining his scientific expertise (a PhD in Microbial Genetics) with his significant knowledge of audience engagement (as the NHM's former Head of Exhibitions and Education), Bloomfield felt he made a "substantial" contribution as he was "vociferous" in his suggestions for exhibit content during the approval phases.⁵¹⁹

Lorraine Cornish, Senior Conservator and NHM "liaison on exhibitions",⁵²⁰ in assuring proper travel and display conditions, played a substantial and crucial role in "helping to negotiate the contract, helping to select the objects to go on display, liaising with all of the Departments that were going to loan material, negotiating with the AMNH on the stay requirements and careering all of the material to every single [exhibit]

⁵¹⁸ Dr. Robert Bloomfield.

⁵¹⁹ Ibid.

⁵²⁰ Lorraine Cornish.

venue in North America”.⁵²¹ Cornish also performed this role for the AMNH’s “duplicate show made for Asian markets”.⁵²²

Grant Reid, responsible for directing both “in-house” and hired exhibitions, was mainly implicated within the developmental phase of “bringing the show in from Toronto”, having joined the NHM after the project’s initiation.⁵²³ Liaising between senior management and project teams, he devised the project’s business plan, contributed to the development and construction of NHM content as well as financial order, procurement, operations, evaluation etc.⁵²⁴ Alexandra Gaffikin’s role was “basically to adapt, change or evaluate the exhibition” for the NHM “venue” and “audience” therefore including a revision of both exhibit content and structure.⁵²⁵

At an early stage during the exhibition’s conception and development phases, Dr. Bloomfield, taking into consideration the cultural and institutional differences that set the London NHM apart from the project’s North American partners, felt that adaptations to the exhibit for the London venue would be inevitable.⁵²⁶ He therefore devised “adaptation guidelines”

⁵²¹ Lorraine Cornish.

⁵²² Ibid.

⁵²³ Grant Reid.

⁵²⁴ Ibid.

⁵²⁵ Alexandra Gaffikin.

⁵²⁶ Dr. Robert Bloomfield and Grant Reid.

for what he deemed necessary for the UK cultural context and in alignment with the significant physical constraints of the available gallery. A major concern and defining factor in the NHM adaptation plan was the lack of available space in the Waterhouse Gallery. While the ROM had considerably more space than required (an extra 930m²) and could considerably expand the exhibition, the NHM's Waterhouse Gallery (38) provided 250 square meters less than the AMNH space requirements for optimal presentation (650m²), therefore significantly constraining plans for presentation⁵²⁷. Bloomfield therefore studied the scope of the exhibit, identifying “four primary areas” to be included in the NHM presentation which are exactly identical to the ‘prime message vectors’ or exhibit core established in the thesis research methodology.

Aside from the obvious physical constraints that limited the possible size of the exhibit, NHM staff members had issues with specific AMNH content considered culturally un-adapted. Concerns regarding the exhibit's institutional and cultural relevance focused on three main areas: the inclusion of current relevance of evolution within modern science in the exhibit⁵²⁸ (which Bloomfield managed to have included in original AMNH content); the presentation of an accurate “public statement” of the NHM's position on evolution⁵²⁹ and appropriate cultural adaption of issues of

⁵²⁷ Dr. Robert Bloomfield and Grant Reid.

⁵²⁸ Dr. Robert Bloomfield.

⁵²⁹ Lorraine Cornish.

public controversy or debate surrounding evolution targeting local audiences.⁵³⁰

The AMNH exhibit's cultural relevance and contextualisation was a fundamental issue of concern for the NHM due to a divergence in American and UK cultural perspectives and expectations. Both Bloomfield and Gaffikin felt specific (finalised and validated) content was not appropriate (or adapted) for their Organisation as the perspective was clearly North American (or American). According to Bloomfield the key issue was the "exhibition was conceived primarily for four exhibitions in North America. And their cultural expectations of what would make a good Darwin exhibition were subtly different from perhaps what the Natural History Museum's would be."⁵³¹ One major "cultural issue" he highlighted was a high interest and "nostalgia" for history in North America which is not as strong in the UK (given the context): as the exhibit included "a lot of play on Victorian Heritage", for which there "is lesser interest" in the UK, these portions required removing.⁵³²

The second important issue identified was regarding "the sensitivity over how evolutionary biology is a cultural issue... and particularly obviously in the US, a quasi-religious question... against the background of sort of creationist thinking".⁵³³ The AMNH devised an "American response [...]"

⁵³⁰ Alexandra Gaffikin.

⁵³¹ Dr. Robert Bloomfield and Grant Reid.

⁵³² Ibid.

⁵³³ Ibid.

that wasn't a relevant response to the UK" which therefore needed to be revised.⁵³⁴

According to Bloomfield, the main constituencies involved in the 'science versus religion debate' as presented in the exhibit were from the American cultural perspective where the "specific Christian lobby" in the US contributes to a "strict science versus creationism debate"; this approach does not represent the debate within the UK context.⁵³⁵ Alexandra Gaffikin also described concerns of cultural relevance for UK audiences of the presentation of 'science versus religion debate' from an American perspective. She felt the AMNH's stance was "very one-sided from [the perspective of] Christianity" whereas the religious diversity of the NHM audiences would require a presentation of perspectives from other religions (including for instance Judaism and Islam).⁵³⁶ Thus, in order to maintain cultural relevance, the NHM adaptation would need to highlight that "within religious reactions or opposition, various perspectives exist,⁵³⁷ an issue also raised by Bloomfield.⁵³⁸ Dr. Bloomfield also expressed concern with the AMNH's position in the 'science versus religion debate' as communicated in original exhibit content. Significantly, while Julian Kingston at the ROM felt the AMNH exhibit took the position of NOMA,

⁵³⁴ Dr. Robert Bloomfield and Grant Reid.

⁵³⁵ Ibid.

⁵³⁶ Alexandra Gaffikin.

⁵³⁷ Ibid.

⁵³⁸ Dr. Robert Bloomfield Bloomfield stated that in London and the UK, there are many "other anti-science constituencies on the faith side" of the debate. Grant Reid agreed.

explaining many scientists are Christian and have therefore “reconciled personal and scientific beliefs”, Dr. Bloomfield felt the AMNH exhibit expressed the point of view that “science and faith can be perfectly compatible”.⁵³⁹ The NHM’s position on evolution and what constitutes scientific research needed to be more firm or “robust” (according to institutional goals and perspectives)⁵⁴⁰ by explicitly demarcating the epistemological difference between science and pseudoscience.

As the NHM does not generally discuss issues of faith within public programming and are not specialists in this area,⁵⁴¹ the Museum did reflect on whether ‘the debate’ should be addressed at all as the mere presentation tends to “give credence or gravitas to the religious issue”, possibly even somewhat validating religious counter-narratives to evolution.⁵⁴² Deciding to include the ‘debate’, the NHM’s approach was to highlight that “there is no scientific controversy on the theory of evolution”⁵⁴³ and “reinforce confidence in the evidence [for evolution]... and beyond that people can follow their own faith views... but not in contradiction with evidence.”⁵⁴⁴

⁵³⁹ Research findings from museum staff interviews therefore indicate that interpretations of the original exhibit’s stance as well as institutional relevance diverged amongst participating institutions.

⁵⁴⁰ Dr. Robert Bloomfield and Grant Reid.

⁵⁴¹ Ibid.

⁵⁴² Alexandra Gaffikin.

⁵⁴³ Ibid.

⁵⁴⁴ Dr. Robert Bloomfield and Grant Reid.

Overall, Bloomfield's advice for modifications were: to reorganise or "breakdown" the exhibit's strict "chronological structure"; to provide less contextual background to the historical discourse; to reposition remaining historical contextualisation content in a non-chronological manner; to include more original Darwin material and specimens (as well as substitute facsimiles with original documents); to "cut a lot of prevarication into the narratives"⁵⁴⁵ by modifying the beginning of the exhibit to immediately start with Darwin's work (beginning with the heart of the matter); to "reinforce the legacy" of Darwin's work by demonstrating the "range of literature which was consequential directly of his own words" (hence modifying the exhibit conclusion); and to modify and add to the exhibit's video content that addresses the science versus religion debate in order to ensure local cultural relevance.⁵⁴⁶

Once the adaptation plan entered the execution phase, Gaffikin's role was to both propose, devise and carry-out an NHM adaptation plan as far as interpretation is concerned, from "rearranging" the layout and omitting exhibit portions to adding new content including specimens and original documents with explanatory texts.⁵⁴⁷ Cornish ensured maintenance of

⁵⁴⁵ As explained by Dr. Robert Bloomfield, the AMNH original exhibit included sections presenting Darwin's youth and family heritage which was considered a digression from the main focus of the exhibit narrative: Darwin's voyage on the *HMS Beagle*, his 'discovery' of the theory of evolution and natural selection and the publication of *On the Origin of Species*. As presenting the Darwin and Wedgwood family lineages as well as Darwin's youth was perceived as unnecessary and extraneous, this information was removed at the NHM.

⁵⁴⁶ Dr. Robert Bloomfield.

⁵⁴⁷ Alexandra Gaffikin.

condition requirements for specimens as well as the newly selected specimens.⁵⁴⁸ Grant Reid collaborated with the Interpretation and Design team on the NHM interpretation plan and related budget and was in charge of marketing aspects.⁵⁴⁹

4.3.3 NHM Modification of the Exhibit Storyline, Layout and Narrative for Heightened Impact

Although limited space available in the NHM Waterhouse Gallery imposed exhibit modifications, the NHM's vision included a reworking of the chronological narrative and adaptation of storyline, while maintaining the exhibit core, with the overall objective of achieving a "heightened impact".⁵⁵⁰ The NHM presentation intentionally breaks with chronology,⁵⁵¹ omitting specific exhibit sections considered extraneous and/or culturally "irrelevant"⁵⁵² and reorganising the 'storyline'.

Removing the first sections, *Introduction*, *The World Before Darwin* and *Young Naturalist*, the NHM visitor experience began directly with the section *A Trip Around the World* or Darwin's voyage on the HMS Beagle. The exhibit opened with Darwin's mockingbirds - the NHM "crown jewels"⁵⁵³ – the key specimens Darwin collected during fieldwork. Getting

⁵⁴⁸ Dr. Robert Bloomfield, Grant Reid, Alexandra Gaffikin and Lorraine Cornish.

⁵⁴⁹ Dr. Robert Bloomfield and Grant Reid.

⁵⁵⁰ Alexandra Gaffikin.

⁵⁵¹ Dr. Robert Bloomfield and Grant Reid.

⁵⁵² Dr. Robert Bloomfield and Alexandra Gaffikin.

⁵⁵³ Alexandra Gaffikin.

“right to the point” from the outset,⁵⁵⁴ the storyline was constructed according to a discourse of the significance Darwin’s research and the relevance of the publication of *Origin* with a focus on original key artefacts. This section culminates with the audio-visual element *No Ordinary Man* retitled *The Life and Work of Charles Darwin*.

The next section presented was *The Idea Takes Shape* which was subsequently followed by the section *A Life’s Work* (as at the AMNH). However, this latter section breaks with chronology as *The World Before Darwin*, a section intended to be presented after the introduction (before Darwin’s youth), was inserted in the middle. The aim was to raise the impact of the publication of *On the Origin of Species* within the exhibition narrative through a side-by-side presentation of views “before and after Darwin”,⁵⁵⁵ highlighting both the influence and implications of Darwin’s publication on the commonly-held worldview in England at the time (i.e. the hierarchical view of nature, the understanding of the relationship between species and the unchanging, ‘young earth’ biblical view).

Then, re-joining with the original layout, the subsequent section presented was *Evolution Today* which includes two videos shown as a consecutive loop: the original AMNH movie *Natural Selection* as well as an ‘in-house’ NHM video *Evidence and Evolution*. Finally, the NHM removed the original exhibit conclusion, Darwin’s *Legacy*, replacing it with a ‘mock library’ display of various selected publications of *On the Origin of Species* in 29

⁵⁵⁴ Dr. Robert Bloomfield and Grant Reid.

⁵⁵⁵ Alexandra Gaffikin.

different languages. Following Bloomfield's direction, rather than ending the visit with the original presentation of orchids (Darwin's final preoccupation before his death), the NHM chose to highlight a selection of their significant holdings - the Kohler collection consisting of 475 editions of Darwin's *Origin* - intended to reinforce Darwin's legacy by demonstrating the "breadth" and "reach" of Darwin's influence around the world.⁵⁵⁶

Notably, exhibit content on the Darwin family, the Wedgewood family and Darwin's youth were removed as well as the terrarium display of live giant Galápagos tortoises (due to space and technical constraints). As the NHM maintained the exhibit core, all staff members interviewed agreed the original exhibit's core messages were maintained even after modifications to content and presentation were executed.

4.3.4 NHM Modification of Exhibit Components and Displays: Increasing Cultural Relevance and Heightening Prestige

Taking into consideration both target audience and institutional interests, the NHM planned numerous content adaptations. As numerous artefacts were added, removed and replaced, the following section presents an overview of key changes.

In order to highlight the NHM's significant Darwin holdings, a large amount of original artefacts were added (for the most part replacing facsimiles):

Darwin's Galápagos Mockingbirds from Floreana and San Cristóbal Islands in South America, including a main text panel, label and objects; a

⁵⁵⁶ Dr. Robert Bloomfield and Grant Reid.

series of *On the Origin of Species* editions from the Kohler book collection. Furthermore, due to the Museum's close relationship with Randal Keynes (Darwin's great-great-grandson) and facilitated access to other UK Darwin collections⁵⁵⁷ numerous original artefacts were added: the supplementation of original Darwin documents and materials (35 items in total) ranged from letters, Beagle notebooks and Captain's logbooks to Darwin's species specimens from his voyage and Etty's box of treasures, Darwin's daughter, which included her father's whiskers she had preciously kept.

A notable change in exhibit content, perhaps modifying the 'image' of Darwin presented, was the NHM's removal of Charles Darwin's copy of the New Testament in German signed "C. Darwin HMS Beagle" intended to be displayed along with his pistol with a text explaining the "items of choice" Darwin brought with him on his five-year voyage (with the exhibit text *But what to bring* in the section *A Trip Around the World*. According to Gaffikin, the replacement of Darwin's Bible by his geological hammer was made in order to highlight Darwin's studies in geology.⁵⁵⁸ However, this adaptation projects an image of Darwin the scientist, perhaps serving to somewhat 'downplay' Darwin's loss of faith and the 'science versus religion debate'.

⁵⁵⁷ The loaning of material from London and UK institutions was aided by the NHM's geographical location (as transport was minimal) as well as the relatively short period of the loan (when long-term loans for the travelling exhibit were not possible).

⁵⁵⁸ Alexandra Gaffikin.

The driving motivation behind the significant addition of UK Darwin holdings (including NHM collections) was that these artefacts were not included in the travelling exhibit throughout the North American tour due to conservation restrictions.⁵⁵⁹ According to Bloomfield, there is a heightened “prestige value” derived from the “collaboration of the specimen donors rather than the institutions which put it [the exhibit] together” coupled with the “uniqueness of the artefacts [i.e. original Darwin material] being in one place for the first time.”⁵⁶⁰

Finally, the NHM chose to remove an AMNH film on the ‘science versus religion debate’, considered to be presented from a purely American perspective,⁵⁶¹ which was replaced by the NHM video *Evidence and Evolution* (running time five minutes) featuring NHM scientists presenting the institution’s official position on the theory of evolution, science and religion and science teaching.

It should be noted that although NHM adaptations to exhibit components (i.e. artefacts and specimens) were substantial, only one text panel and accompanying display case – presenting Etty’s box – was added. All other text panels displayed were original AMNH content.

4.3.5 NHM Personalisation of Exhibit Marketing and Branding

Although the overall look and feel, colour coding and graphic management characteristic of the AMNH branding were maintained, the communication

⁵⁵⁹ Dr. Robert Bloomfield and Grant Reid.

⁵⁶⁰ Ibid.

⁵⁶¹ Dr. Robert Bloomfield and Grant Reid.

strategy, i.e. the marketing campaign and press images for the exhibition were modified in order to produce a site-specific, personalised branding (to a limited extent).⁵⁶² A “new identity” was therefore produced for the exhibit, consisting of the NHM title *Darwin: Big idea, big exhibition* and a new press image, an image of Charles Darwin intentionally without his black hat and cloak.⁵⁶³ Darwin is depicted holding his index finger to his lips (in a shush hand gesture), with the text “If you had an idea that was going to outrage society, would you keep it to yourself?” The new title, modified image and accompanying text were shown at the exhibition entrance, in media/press communications as well as on exhibition posters.

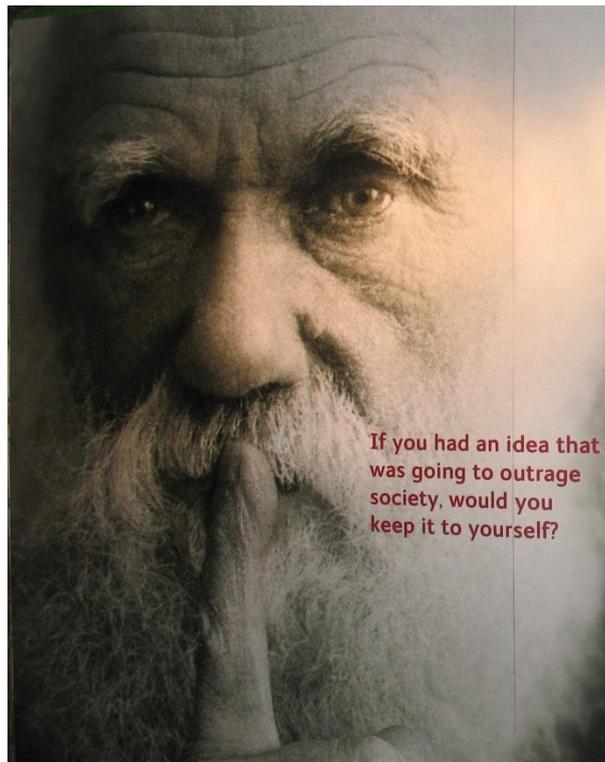


Figure 4.9: Exhibit Entrance of *Darwin: Big idea, big exhibition* at the NHM. This image was used in all media relations and on exhibit posters.

Source: American Museum of Natural History. Photo by Afshan Heuer.

⁵⁶² Grant Reid.

⁵⁶³ Alexandra Gaffikin.

In explaining this personalised branding, Bloomfield maintains that “most organisations want to show projects [...] as their own [...] wanting to show their own brand”⁵⁶⁴ however, Museums should also realise that “there are benefits of showing there’s an international collaboration”.⁵⁶⁵

4.4 Conclusion: A Comparison of Programming Motives, Approaches, Issues and Partnership Benefits

For both the ROM and the NHM, programming and partnership decisions for participation in the AMNH travelling exhibition project were shown to be based on various motivations: to fulfil institutional visions and missions; to build corporate image through international partnership and collaboration; to present a high quality, educationally relevant exhibit on Darwin and the theory of evolution during a period of peak public interest and focus; to meet financial objectives; to effectively target audiences; and to solve issues in staff availability for the development of a temporary exhibit during a major building and renovation project.

However, the ROM and the NHM were demonstrated to have approached partnership and collaboration in a different manner, fulfilling separate roles during the project. While the ROM’s approach was one of confidence in the AMNH and the designated curator, therefore providing advice and feedback on institutional concerns and requirements, the NHM played both a vociferous and active role in the development of the AMNH exhibit

⁵⁶⁴ Dr. Robert Bloomfield.

⁵⁶⁵ Ibid.

content and management of the travelling exhibit. On account of the NHM's significant implication and contribution to the *Darwin* project as well as undoubtedly due to the strength of the institution's international reputation, the NHM can be considered to have benefitted from a position of equal partnership with the AMNH which included curatorial freedom in adapting the exhibit for their venue.

While geographical proximity and cultural similarities allowed the ROM to implement *Darwin* as intended with only minor amendments and enhancements, geographical remoteness and cultural differences incited the NHM to engage in significant adaptation of *Darwin* due to the exhibit's historical approach, chronological presentation and North American perspective (especially of the 'science versus religion debate'), although accepting certain "compromises".⁵⁶⁶ The NHM's geographical removal from the North American partners also contributed to a more complex, virtual and often quite time consuming communication process⁵⁶⁷ marked by different "cultural approaches" to museum work in general.⁵⁶⁸

Installation and logistics, at both venues, was highly complex engendering numerous technical issues which may somewhat influence visitor experience. At the ROM, issues arose with the installation of an exhibit with a directional, linear layout and chronologically defined narrative in a gallery with a single entrance/exit point. The circular layout imposed

⁵⁶⁶ Dr. Robert Bloomfield and Grant Reid.

⁵⁶⁷ Lorraine Cornish.

⁵⁶⁸ Ibid.

contributed to visitor orientation issues in the exhibit's *Introduction* area, which essentially served as both a “transitional” and “distributional space”,⁵⁶⁹ meant to accommodate and orient both entering and exiting visitors and direct traffic to the ‘correct path’. Additionally, the placement of four audio-visual components within close proximity and installation methods employed by the ROM, problems of competing sound, sound overlap and ‘noise’ generation resulted and the ROM video’s audio track (presenting Toronto evolution researcher) was rendered completely inaudible.

The NHM somewhat underestimated the degree and magnitude of general public interest in *Darwin*, considered a “niche exhibition” without “blockbuster value”,⁵⁷⁰ due to significant crowding, timed ticketing was imposed in order to maintain visitor capacity constraints and crowding and bottlenecks in the exhibit were generated. Furthermore, the right-to-left orientation of certain components – especially the map of Darwin’s *Five-year Journey* – can be considered to have had negative impact on ease of visit and the effectiveness of displays.

Finally, due to a decision made at the collaborators’ meetings in New York during the project’s inception phase, the AMNH travelling exhibit did not include a lighting scheme; this inevitably implied that partners and host institutions were required to utilise available in-house lighting.⁵⁷¹ Although

⁵⁶⁹ Dean, David. 2003. *Museum Exhibition: Theory and Practice*. London and New York: Routledge p49.

⁵⁷⁰ Dr. Robert Bloomfield.

⁵⁷¹ Dr. Robert Bloomfield and Grant Reid.

intended to reduce the overall budget of the travelling exhibit by 15 to 20 percent, this decision also engendered certain compromises.⁵⁷² Thus, although the ROM was able to opt for a higher level of lighting due to lower risks and reduced conservation concerns (which also significantly modified the exhibit's atmosphere, 'look and feel'), the NHM's significant increase in original Darwin material and specimens required a strict control of light levels between 50 to 70 lux⁵⁷³ which had "huge implications for the presentation of texts"⁵⁷⁴ inevitably leading to visibility issues (especially for the visually impaired) due to the AMNH's treatment of "contrast and font size".⁵⁷⁵

In conclusion, although installation and logistics were complex and fairly involved, partner institutions significantly benefitted from the collaboration: participation in a travelling exhibition project of this size and nature served to inform them of internal physical constraints in the reception of large exhibits (such as the requirement of an adequate preparation area) as well as environmental conditions of specific exhibit galleries, hence contributing to the acquisition of both knowledge and experience which can be applied in future international collaborations.⁵⁷⁶

⁵⁷² Dr. Robert Bloomfield and Grant Reid.

⁵⁷³ Ibid.

⁵⁷⁴ Ibid.

⁵⁷⁵ Ibid.

⁵⁷⁶ Lorraine Cornish.

Chapter Five: Audience Research of Visitor Experience, Dwell Times and Learning as Acquisition of Knowledge

5.0 Introduction

The aim of this chapter is to describe, analyse and compare visitor experience and learning at the study's two fieldwork sites: the ROM and the NHM. The visitor experience evaluated relates to exhibit design and site-specific adaptation, with a focus on observation of visitor behaviour and dwell times. Profiles of survey participants are provided and general visit or behaviour trends established. These trends serve as a basis for further analysis and contextualisation of visitor learning.

In the analysis of exhibit type provided in Chapter Four (section 4.1.2), *Darwin* was defined as educational and 'concept-oriented' exhibit; according to Dean's definition, the exhibit's message therefore predominates and the aim of communication is to transmit knowledge, mainly through a combination of texts and didactic materials, with objects serving to illustrate and support the message.⁵⁷⁷ As discussed in Chapter One (Section 1.4), didactic exhibitions often implement a "transmission-absorption" approach to teaching: as the educational purpose is transmitting knowledge, learning is understood as an assimilation of facts⁵⁷⁸ and information 'gleaned' from exhibit content. The analysis of

⁵⁷⁷ Dean, David. 2003. *Museum Exhibition: Theory and Practice*. London and New York: Routledge, p4-5.

⁵⁷⁸ Black, Graham. 2005. *The Engaging Museum: Developing museums for visitor involvement*, London and New York: Routledge, p130.

knowledge acquisition in the *Darwin* exhibit aimed to evaluate learning from this perspective, however, in line with Hein's constructivism,⁵⁷⁹ prior knowledge levels were integrated as points of comparison. Thus, rather than perceiving learners as passive, visitors are understood as actively building new knowledge upon previous knowledge, within the constructivist paradigm. Furthermore, the analysis of learning consisted of a self-evaluation serving to determine visitor perceptions of impact of engagement on knowledge levels. The goal was to encourage active participation and critical reflection on learning and experience in a self-directed transformative learning process and hence evaluate the exhibit's impact on knowledge from the visitors' perspective.

5.1 Audience Research at the ROM: Demographics, Dwell Times and Knowledge Acquisition

Both before and after their visit of *Darwin*, visitors engaged in a self-evaluation of scientific and biographical knowledge, assessing the exhibit's impact. Through visitor observation, implementing tracking and timing techniques, dwell times were established for both survey participants and a control group in order to determine whether participation in the interview process significantly influenced behaviour as well as to provide additional quantitative data and statistics.

⁵⁷⁹ See Hein, George E. 1998. *Learning in the Museum*. New York: Routledge, p155-179.

5.1.1 Visitor Demographics of ROM Survey Participants

As the research targets adult visitors (18+) of the ROM's local audience, those willing to participate in the survey filled out a visitor demographics questionnaire (directly with the researcher) in order to determine whether they met the basic participation criteria as well as to provide information on their level of studies, profession and their familiarity with the ROM including fidelity and frequency of visits.

The definition of ROM local audience was based on the geographical limits of the Greater Toronto Area (GTA) and included those who had a maximum one hour travel time to the Museum. All survey respondents emanated from the ROM's local audience: 25 were from the GTA and 5 from outside the GTA however with driving time of less than one hour.

According to the City of Toronto's official website, Toronto has a population of 2.48 million people and is considered one of the most multi-cultural cities in the world with over 140 spoken languages; approximately 30% of Canada's recent immigration lives in Toronto and 48% of Torontonians were born outside of Canada.⁵⁸⁰ Taking into account considerable recent or new immigration to Toronto, in an attempt to ensure all survey participants were accustomed to the local cultural environment, integrated in the local community and could easily relate to exhibit content presented without major cultural barriers, respondents were also asked to identify the length of time they have been living in their

⁵⁸⁰ City of Toronto. 1998-2013. 'Toronto's Racial Diversity'. City of Toronto. http://www.toronto.ca/toronto_facts/diversity.htm (accessed 8.03.2011).

current place of residence. The majority of respondents had been residing in their current dwelling for a minimum of one year.⁵⁸¹ The gender distribution of interview respondents was well balanced: 16 females and 14 males. All adult age groups were represented in the survey sample:

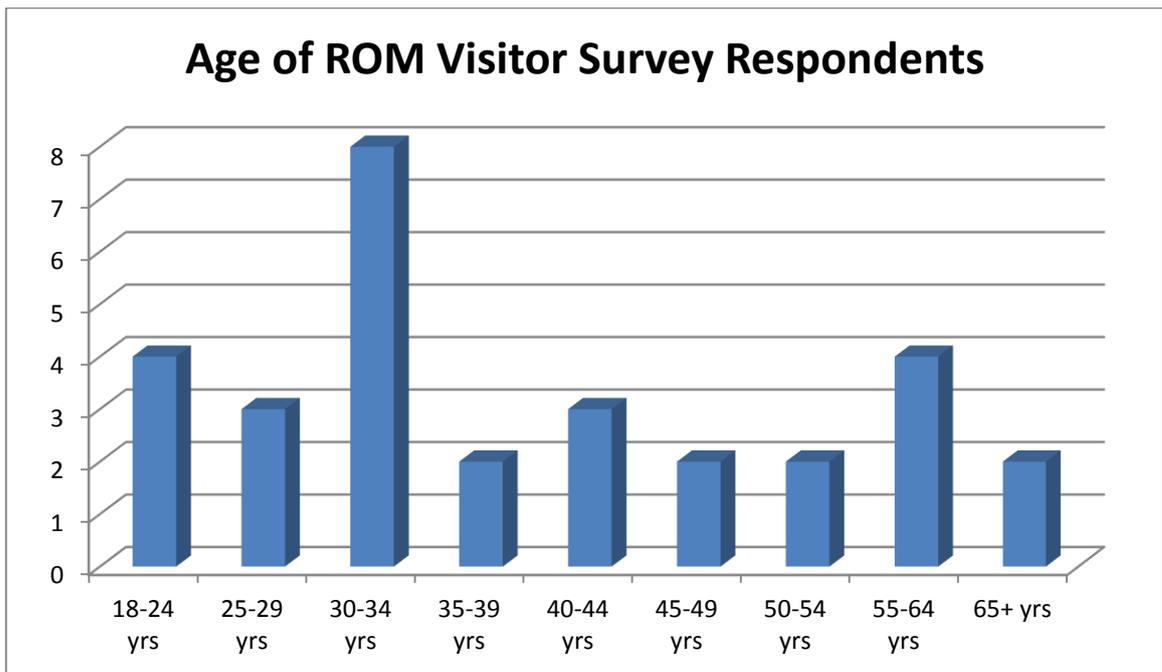


Table 5.1 Age of ROM Visitor Survey Respondents

As displayed in the chart below, 50% of visitors interviewed at the ROM were from a younger adult audience, 23.3% from a middle-aged adult audience and 26.7% from an older adult audience.

⁵⁸¹ Of the 30 visitors interviewed: 19 have been living in their current place of residence for over five years (16 visitors of which specified the exact amount of time giving an average of 17.5 years in their current place of residence); 10 visitors lived in their current place of residence for a period of 2-5 years (7 of which specified exact length giving an average period of 3 years); and one visitor interviewed has been in their current place of residence for under one year but had recently moved to Toronto from another location in Canada (British Columbia).

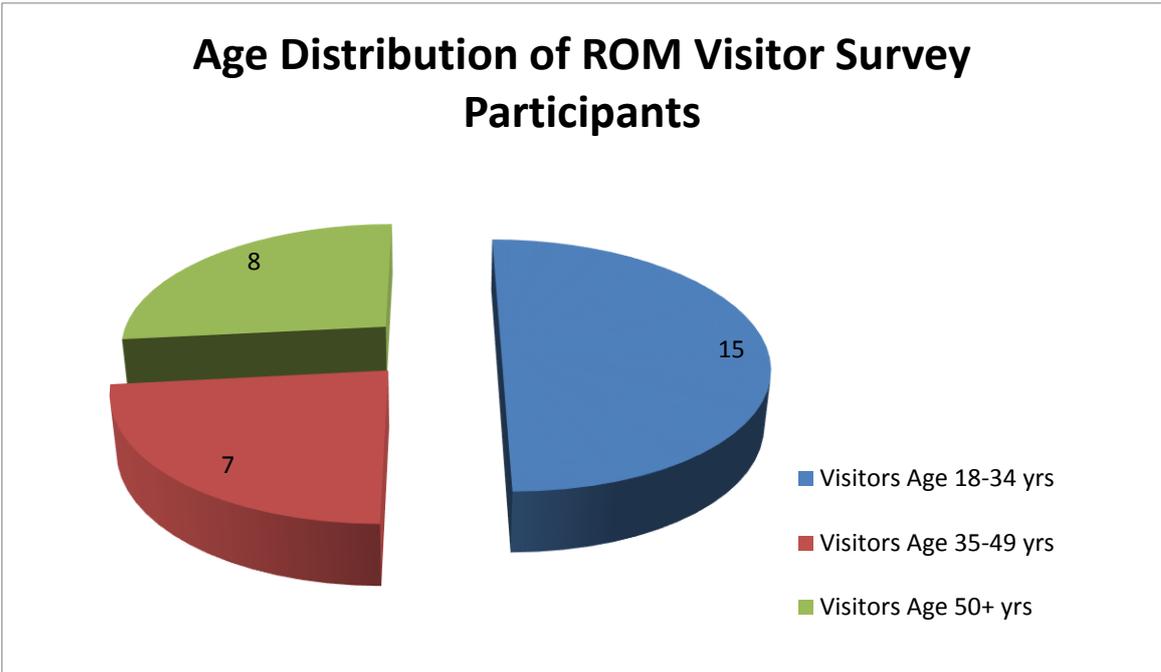


Table 5.2 Age Distribution of ROM Visitor Survey Respondents

As shown in the graph below, the educational level of respondents was quite high: 70% of those interviewed had a university degree (21 visitors), 33.3% of which had a graduate degree (6 visitors) or post-graduate diploma (4 visitors). Although some university degrees of respondents were science-related, others were not: degrees ranged from Bachelor of Arts, Architecture and Political Science to Geography, Biology, Medicine and Engineering.

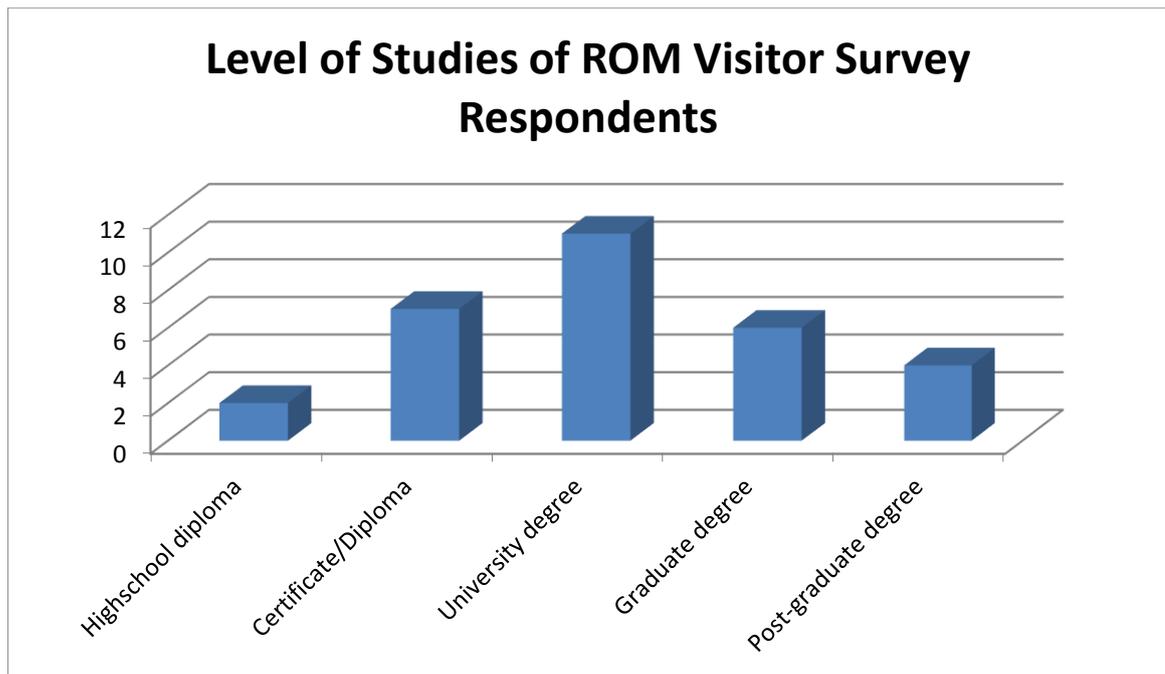


Table 5.3 Level of Studies ROM Visitor Survey Respondents

Survey respondents also specified their professions: 9 identified themselves as professionals; 3 as executives; 2 practiced academic careers; 6 were skilled workers; 1 was a trade worker; 4 were currently studying; 1 was retired; and 4 stated having other occupations (ranging from retail to library worker to filmmaker).

Frequency of visits to the ROM as described by the 30 respondents demonstrated: 19 habitually visit the ROM less than once a year; 8 stated visiting once to twice a year; 2 visitors usually visit three to five times a year; and 1 stated visiting the ROM more than 5 times a year. As 63.3% stated habitually visiting less than once a year, the majority of those interviewed were not frequent ROM visitors. Furthermore, one survey participant stated it was his first visit. Regarding ROM membership, only 4 of 30 survey respondents were ROM members. Although not a representative sample, visit frequency demonstrated that the *Darwin*

exhibit, a 'high visibility' or 'blockbuster' exhibit, tended to attract proportionally more first-time or occasional visitors to the ROM as oppose to 'loyal customers'.

5.1.2 Analysis of Visitor Experience and Dwell Times at the ROM: Key Findings from Tracking and Timing Data

Survey participants (as well as a control group) were observed, tracked and timed in four exhibit sections constituting the exhibit core. As the focus of the study is a travelling exhibit, the objective of the data analysis was to identify site-specific trends in visitor behaviour as well as to evaluate the potential influence of exhibit modifications on visitor experience through a comparison of data from the two fieldwork sites. Ultimately, engagement trends served as a basis for the comparative study of behaviour, experience and learning at participating venues.

At the ROM, average time in the exhibit core (including times spent in the video *No Ordinary Man* as well as the large screen movie *Natural Selection*) was relatively high: 50.45 minutes. Dwell times of the ROM control group (comprised evenly of 10 female and 10 male visitors) were essentially identical to those of visitor survey participants as they spent on average 49.5 minutes in the exhibit core. It was therefore concluded that participation in the visitor survey did not significantly impact dwell times. Furthermore, it cannot be stated that survey respondents comprised a 'higher interest group' as they engaged for the same length of time as 'non-participants'.

Although the research method did not initially intend to include dwell times in the entire exhibition, after performing approximately half of the ROM fieldwork, it was deduced that this information would be useful. Dwell times for the entire visit of 12 visitor survey participants and 11 from the control group were computed. The average dwell time in the entire exhibit for visitor survey participants was 54 minutes: 46 minutes within the exhibit core and 8 minutes outside of the exhibit core. The average dwell time in the entire exhibit for the control group was slightly higher, 62.2 minutes: 51.5 minutes in the exhibit core and 10.7 minutes outside the exhibit core. Visitor survey participants therefore spent approximately 15% of their visit times in the four sections outside of the exhibit core and control group members 17%. In order to better understand visitor engagement and interest as well as to determine the focus of learning, average dwell times spent in each section of the exhibit core were calculated.

According to research on general trends in visitor behaviour, driven by museum fatigue and exit-behaviour, engagement is habitually more focussed and perhaps longer in the beginning of exhibit visits (i.e. in early exhibit sections) and less focussed and shorter near the end (i.e. in later exhibit sections): due to museum or “exhibit fatigue”, defined as “mental and physical over-stimulation or over-exertion”⁵⁸², “most interest is concentrated at the beginning of an exhibition than at the end”.⁵⁸³

Furthermore, as visitors approach a visible exit, they are more drawn to

⁵⁸² Dean, David. 2003. *Museum Exhibition: Theory and Practice*. London and New York: Routledge, p52.

⁵⁸³ Ibid, p51.

leaving than engaging; hence “exhibits closest to exits are less viewed”.⁵⁸⁴

Finally, the “average maximum attention span for an adult audience is thirty minutes”.⁵⁸⁵

As anticipated, dwell times of visitor survey participants in the first section of the exhibit core, *A Trip Around the World*, were the highest, and the lowest in the final section of the core *Evolution Today*. However, ROM survey respondents did not consistently spend less time in successive exhibit sections.

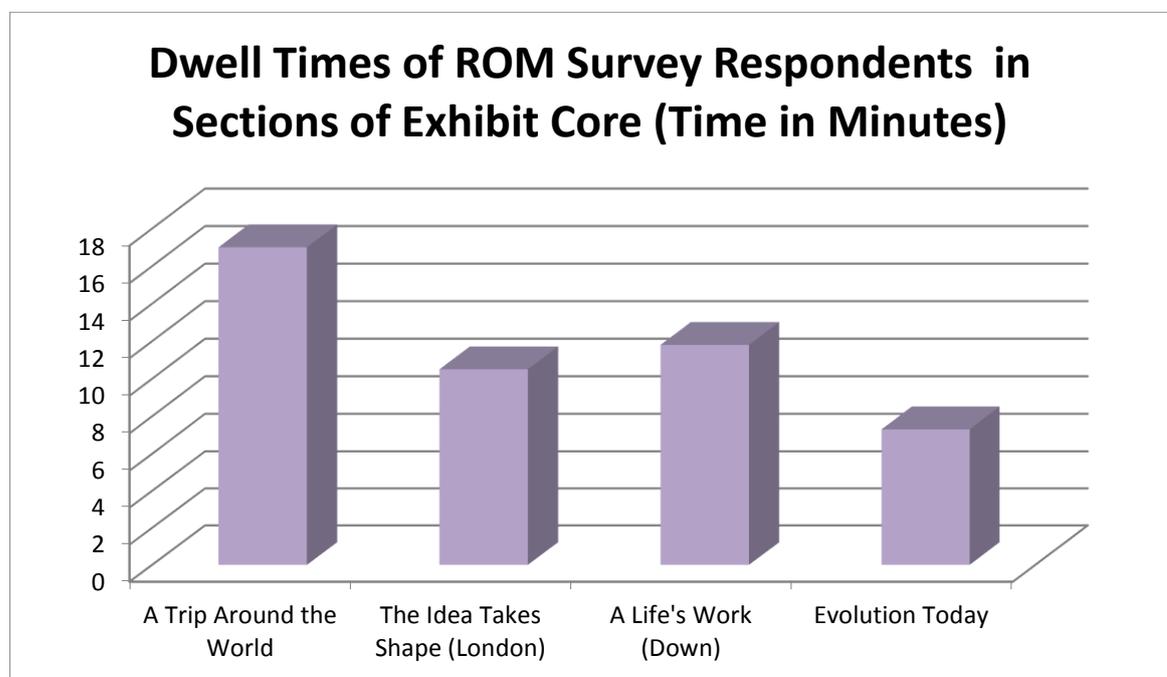


Table 5.4 Dwell Times of ROM Survey Respondents in Sections of the Exhibit Core (Time in Minutes) - Dwell times in the two main audio-visual components are excluded from data.

The average times in each section of the exhibit core demonstrated that visitors spent an average of: 17 minutes in *A Trip Around the World*

⁵⁸⁴ Dean, David. 2003. *Museum Exhibition: Theory and Practice*. London and New York: Routledge, p51.

⁵⁸⁵ Ibid, p52.

(excluding time viewing the video *No Ordinary Man*); 10.5 minutes in the subsequent exhibit section *The Idea Takes Shape*; 11.8 minutes in the following exhibit section *A Life's Work*; and 7.3 minutes in the final section *Evolution Today*. The atypical trend identified led to the conclusion that the content of *A Life's Work* was of particular interest to ROM visitors: sub-themes presented were the publication of Darwin's research, reactions to evolution by natural selection over the last 150 years (including the implications for man) and controversies (such as the 'science versus religion debate'). Darwin's personal issues also figure prominently in this section including his reticence to publish, his personal loss and growing religious scepticism.

Significantly, the two most popular exhibit sections, *A Trip Around the World* and *A Life's Work*, present Darwin's fieldwork and the publication of *Origin*, essentially providing an explanation of the "Year of Darwin" celebrations: his considerable scientific contribution. Although the focus of visitor experience, as displayed through dwell times in exhibit sections, may be explained by attraction to content and sub-themes presented, variation in 'holding power' of display methods and techniques of exhibit sections must also be taken into account. The most popular section, *A Trip Around the World*, was both different in form and presentation as well as in content from all other exhibit sections, consisting of "insular" displays with live animals and models. Live animal displays in museums are proven to have great "holding power" and are a popular attraction among visitors of

all ages.⁵⁸⁶ This section also incorporated diorama-type displays where taxidermy specimens and tactile models are presented on “insular” structures somewhat reconstructing the natural habitat in the Galapagos Islands; diorama displays have also been proven to fascinate visitors by their three-dimensional, “illusionary nature”.⁵⁸⁷ Thus, in comparison to other exhibit sections that appear more text-heavy and are filled with documents and taxidermy specimens, the attraction to live animals and more innovative, integrative display techniques was greater.

Finally, the least popular section of the exhibit core, *Evolution Today*, focuses on current relevance of evolution and modern science. Presenting essentially scientific content, this section significantly breaks away from the exhibit narrative mainly driven by Darwin’s life-story. Furthermore, as the “scientific crunch” so-to-speak was essentially presented at the end of an extensive exhibition of approximately 40’000 words,⁵⁸⁸ it is highly possible that museum fatigue contributed to low dwell times in this area. Visitor exit strategies of survey respondents at the ROM demonstrated that a vast majority of those observed (25 of 29 survey participants) left the exhibit directly from the last section of the exhibit core, skipping the exhibit’s conclusion. As technical sound issues were generated in the

⁵⁸⁶ A study on the holding power and visitor attraction to live animal displays in museums is available online on the Australian Museum’s official website. Hosking, Chris. 2010. ‘Why have live animals in a Museum?’ Australian Museum. September 13. <http://australianmuseum.net.au/Why-have-Live-Animals-in-a-Museum> (accessed 25.09.2012).

⁵⁸⁷ Bitgood, Stephen. 1996. “Les methods d’évaluation de l’efficacité des dioramas: compte rendu critique ». *Publics et Musées*. Vol 9, Issue 9, p37.

⁵⁸⁸ Chris Darling.

section *Evolution Today* due to the placement of four audio-visual components within close proximity resulting in a problem of competing sound, sound overlap and 'noise' generation, it is likely that sound disturbance in this area also significantly influenced visitors' exit strategies.

On account of comparative times spent engaging in sections of the exhibit core, the focus of learning experience of survey participants can be considered on a decreasing trend from: Darwin's research methodology, his scientific method of inquiry (fieldwork observations), his research questions and initial analysis during his five-year voyage around the world; to the publication of Darwin's research (including attribution issues, reactions and controversies) and Darwin's personal struggles and loss of faith; subsequently Darwin's analysis and writing-up of his research, the formulation of his theory and key scientific evidence; and finally Darwin's contribution to evolutionary biology and the extension of his knowledge through current research and modern medicine as well as understanding evolution and natural selection today and the implications for all forms of living species. It would therefore also appear that survey participants preferred the less scientific biographical exhibit sections to those presenting more scientific content.

Visitor observation showed that the majority of ROM survey respondents did not watch the two major movie components featured: 18 of the 29

visitors observed⁵⁸⁹ skipped the video *No Ordinary Man* (62%) and 22 of 29 skipped the large screen movie *Natural Selection* (76%). Furthermore, visitors who did engage with major audio-visual elements tended to not watch the entire video loop, spending on average 6.5 minutes in *No Ordinary Man* (video duration eight minutes) and 5.4 minutes in *Natural Selection* (video duration six minutes). The calculation of dwell times of all survey respondents in both audio-visual elements indicated respondents spent on average 3.8 minutes in a combined video loop of 14 minutes. As the majority of survey participants did not watch the two major audio-visual elements proposed, the average dwell time in the exhibit core of all survey participants excluding these elements was calculated: survey participants therefore engaged with mainly exhibit texts, documents and specimens in the exhibit core for 46.7 minutes.⁵⁹⁰

Considered effective learning tools, the general ‘aversion’ to the large audio-visual elements observed at the ROM is regrettable as video content serves to succinctly summarise two of the main exhibit sub-themes: *No Ordinary Man* presents an overview of the social and political

⁵⁸⁹ Although 30 visitors participated in the interview process, dwell times for survey respondents were calculated from the statistics of 29 visitors as one participant began a “backward visit”, became visibly upset and left, then returned for a “forward visit” for which observation data was not possible. However, this visitor came to the researcher at the end of her “forward visit” in order to participate in the post-visit interview: thus relative interview data from this visitor is included yet observation data is only available for half of her visit. It is interesting to note that when this visitor realized she was performing a “backward visit” she appeared to be arguing with her partner who decided to stay and visit the exhibit in its entirety continuing his “backward” path from conclusion to introduction, seemingly unbothered.

⁵⁹⁰ Average dwell time of the control group excluding time spent in the video components was exactly identical.

climate during Darwin's time and the implications and significance of Darwin's work; and *Natural Selection* provides a clear and relatively brief explanation of evolution, focusing on the steps of the process of natural selection – variation, inheritance, selection, time and adaption (V.I.S.T.A.) – and describes the phenomenon of co-dependency of adaptation between species.

The research attempted to determine whether the observed aversion to videos was related to design and experience. Firstly, as the ROM presented the two major audio-visual components in separate, designated 'movie theatre' areas, hence somewhat 'removed' from the visit path, visitors' aversion may possibly be caused by "shortest route preference"⁵⁹¹ as essentially, engaging in the videos implies visitors must somewhat deviate from the shortest path through exhibit space. Moreover, the video *Natural Selection* may have been avoided due to "exit-oriented behaviour" as located very near the visible end of the exhibit. While these factors inevitably contributed to visitors' aversion to the final video proposed, considering average dwell times were substantially high it is most likely the most important factor was accumulated museum fatigue.⁵⁹² Visitors' exit strategies further confirmed 'exhibit fatigue' and 'exit-orientated' behaviour in the final section of the exhibit core: the majority of survey participants (86%) exited *Darwin* directly from *Evolution Today*, skipping the final video

⁵⁹¹ Dean explains that "exhibits along the shortest route to the exit receive the largest amount of attention." In Dean, David. 2003. *Museum Exhibition: Theory and Practice*. London and New York: Routledge, p51.

⁵⁹² Dean, David. 2003. *Museum Exhibition: Theory and Practice*. London and New York: Routledge, p52.

component as well as exhibit's conclusion presenting Darwin's *Legacy*. In order to culturally and institutionally contextualise ROM visitors' general 'aversion' to large audio-visual elements, these findings will be compared with statistics from the NHM in an attempt to determine, if possible, whether the observed behaviour can be considered 'culture-specific' or was simply due to the significant size of the ROM presentation and layout.

5.1.3 Learning at the ROM: Acquisition of Knowledge and Learning within a Constructivist/Transformative Paradigm

The aim of this portion of the learning analysis is to compare pre-visit and post-visit responses, hence defining respondents' assimilation of information provided through a process of self-evaluation in order to determine perceptions of impact of engagement on knowledge levels. It is important to highlight the self-assessed nature of the evidence in the study of learning acquisition as the data generated is derived from participants' own evaluation of their knowledge levels of the main exhibit themes which may slightly diverge from 'actual' knowledge levels (if tested in the formal sense). According to David Boud, research serving to compare results of self-evaluation to grades (or 'actual knowledge') in a formal higher education setting demonstrated that generally "students in introductory courses and in earlier years of their programmes tend to slightly overrate themselves, whereas students in advanced courses and later years tended to slightly underrate themselves."⁵⁹³ It is therefore significant to highlight that the research findings in this portion of the thesis are not

⁵⁹³ Boud, David. 1995. *Enhancing Learning through Self Assessment*. Abingdon, Oxon, UK and New York, USA: Routledge Falmer, p50.

representative of ‘actual knowledge’ tested in the formal sense. Rather, visitors’ self-assessed knowledge levels serve to establish individual familiarity and comfort with the topic of focus (the theory of evolution and Darwin’s life) before visiting *Darwin* as well as to determine visitors’ perceptions of the impact of the exhibit experience on prior knowledge. Notably, the research methodology implemented took in consideration the possible divergence between individuals’ assessment of pre-visit knowledge and ‘actual knowledge’ in post-visit questionnaires by including a re-assessment of prior knowledge levels after the visit experience (hence allowing visitors to modify their self-evaluated prior knowledge levels after having engaged with exhibit content).⁵⁹⁴

While the possible discrepancy between self-assessed and ‘actual knowledge’ levels must be recognized, the “great educational value of self assessment”⁵⁹⁵ must also be acknowledged as “a necessary skill for lifelong learning”⁵⁹⁶: “it is important for all learners to develop the ability to be realistic judges of their own performance and to effectively monitor their own learning.”⁵⁹⁷ As significant within the analysis of transformative

⁵⁹⁴ Overall, only 2 of 60 survey participants modified their pre-visit knowledge levels: two visitors at the ROM had stated having little knowledge of Darwin the man and the scientist before visiting modified their response to average knowledge after their visit of *Darwin* as their visit experience had served to demonstrate they knew more about Darwin than they had previously believed. No visitors modified their responses on prior knowledge of the theory of evolution.

⁵⁹⁵ Boud, David. 1995. *Enhancing Learning through Self Assessment*. Abingdon, Oxon, UK and New York, USA: Routledge Falmer, p50.

⁵⁹⁶ Ibid, p13.

⁵⁹⁷ Ibid, p13.

learning, the process of self-evaluation “has the potential to engage and intrinsically motivate learners in reflective practice, autonomous self-sustained learning and critical thinking by developing capacity, influence and meta-cognition”⁵⁹⁸ as well as to “encourage students [learners] to reflect on their learning, to consolidate it and move beyond it.”⁵⁹⁹ The goal of implementing a self-assessment tool was therefore to encourage active participation and critical reflection on learning and experience. Furthermore, by maintaining the separation of knowledge and understanding of biographical/historical content and scientific content, the focus of visitors’ learning experiences was established.

Approaching the evaluation of learning from a social constructivist viewpoint, respondents estimated their pre-visit and post-visit knowledge and understanding of the life of Darwin as well as the theory of evolution on the following scale:

1 – No knowledge 2 – Little knowledge 3 – Average knowledge 4 – Strong knowledge 5 – Expert knowledge

After visiting the exhibit, visitors were given the opportunity to modify original pre-visit responses.

In general, ROM survey participants felt they had little pre-visit knowledge

⁵⁹⁸ Tait-McCutcheon, Sandi and Sherley, Brenda. 2006. ‘In the Hands of the Learner: The Impact of Self-Assessment on Teacher Education’. In Grootenboer, Peter, Zevenbergen, Robyn and Chinnappan, Mohan (eds). *Identities, Cultures and Learning Spaces*. Vol. 1. Proceedings of the 29th annual conference of the Mathematics Education Research Group of Australasia. Canberra: MERGA Inc., p353. <http://www.merga.net.au/documents/RP392006.pdf> (accessed 15.10.2013).

⁵⁹⁹ Boud, David. 1995. *Enhancing Learning through Self Assessment*. Abingdon, Oxon, UK and New York, USA: Routledge Falmer, p35.

of Darwin the man and the scientist - 15 of 30 or 50% of respondents - perhaps justifying the inclusion of contextualisation of Darwin's youth, upbringing, family and studies. Visitors' self-assessment of post-visit knowledge of biographical content established that 12 of 30 (or 40% of respondents) felt they possessed average knowledge of the life of Darwin, the man and the scientist after visiting the exhibit. The following graph provides a comparison of pre-visit to post-visit knowledge levels on biographical exhibit content at the ROM.

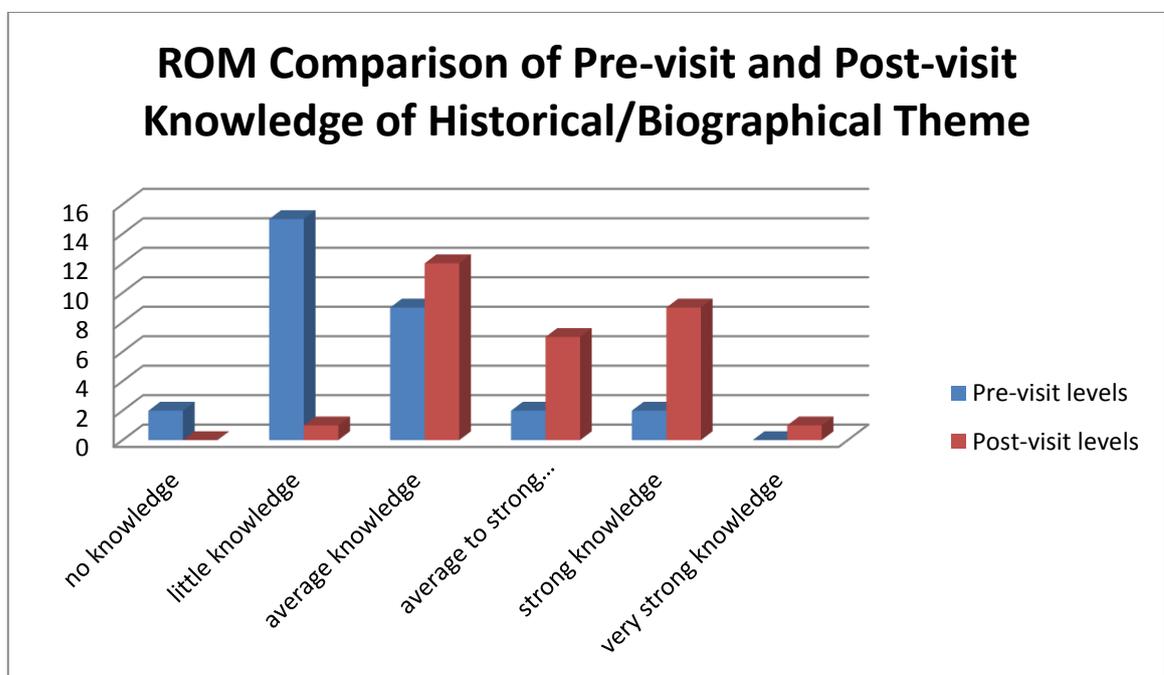


Table 5.5 ROM Comparison of Pre-visit and Post-visit Knowledge of Historical/Biographical Theme

The analysis of knowledge acquisition regarding the life of Darwin, the man and the scientist demonstrated that of the 30 respondents: 6 visitors felt their level of knowledge remained in the same category as when they came in whereas 24 visitors felt their knowledge level had been modified by visiting the exhibit.

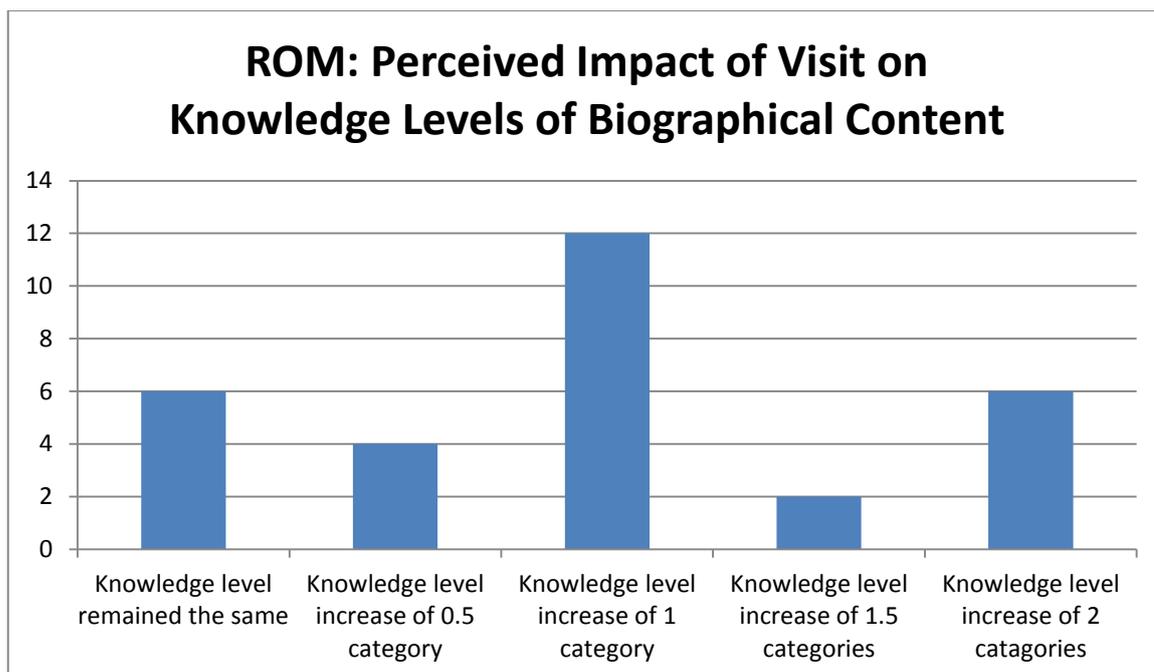


Table 5.6 Visitors' Perceived Impact of Visit on Knowledge Levels of Biographical Content at the ROM

In order to better understand the nature of learning experiences, the 'transformative learning scale' was implemented within a constructivist paradigm: survey participants evaluated whether their knowledge and understanding of the life of Darwin, the man and the scientist, had stayed the same, been reinforced, enhanced or changed. Results demonstrated a vast majority of ROM visitors interviewed, 28 of 30 respondents, felt their prior knowledge had been enhanced through the acquisition of new knowledge during their visit of *Darwin*.⁶⁰⁰ It can therefore be stated that the

⁶⁰⁰ Results of the implementation of a transformative learning paradigm for learning of Darwin, the man and the scientist at the ROM demonstrated: 1 of 30 participants (3.35%) felt his previous knowledge had been reinforced; 6 (20%) felt their knowledge had been both reinforced and enhanced; 19 (63.3%) felt that their knowledge had been enhanced; 3 visitors (10%) felt it had been both enhanced and changed; and 1 felt his knowledge of the life of Darwin, the man and the scientist had changed. None of the ROM respondents felt their post-visit knowledge was the same as when they entered the exhibit.

general nature of learning experiences on the exhibit's biographical/historical theme was an acquisition of new knowledge: ROM visitors' little pre-visit knowledge of Darwin the man and the scientist was therefore enhanced to average knowledge post-visit. The analysis of the construction of new or revised beliefs or meaning schemes is provided in Chapter Six: Culture, Worldview, Perspectives and Transformative Learning.

Implementing the same knowledge scale, respondents estimated pre-visit and post-visit levels of knowledge and understanding of the theory of evolution and natural selection. In general, before entering *Darwin*, ROM survey participants felt they had had average to strong knowledge of the theory of evolution as 46.6% of visitors interviewed felt they had average knowledge and a rather impressive 23.3% felt they had strong knowledge.

The assessment of visitors' post-visit knowledge levels of the theory of evolution and natural selection demonstrated: 40% felt they had average knowledge of the theory of evolution after the visit of the exhibit (as oppose to 46.6% average pre-visit knowledge) and 33.3% felt they now had strong knowledge (as oppose to 23.3% strong pre-visit knowledge). The following graph compares pre-visit to post-visit knowledge levels of evolution and natural selection.

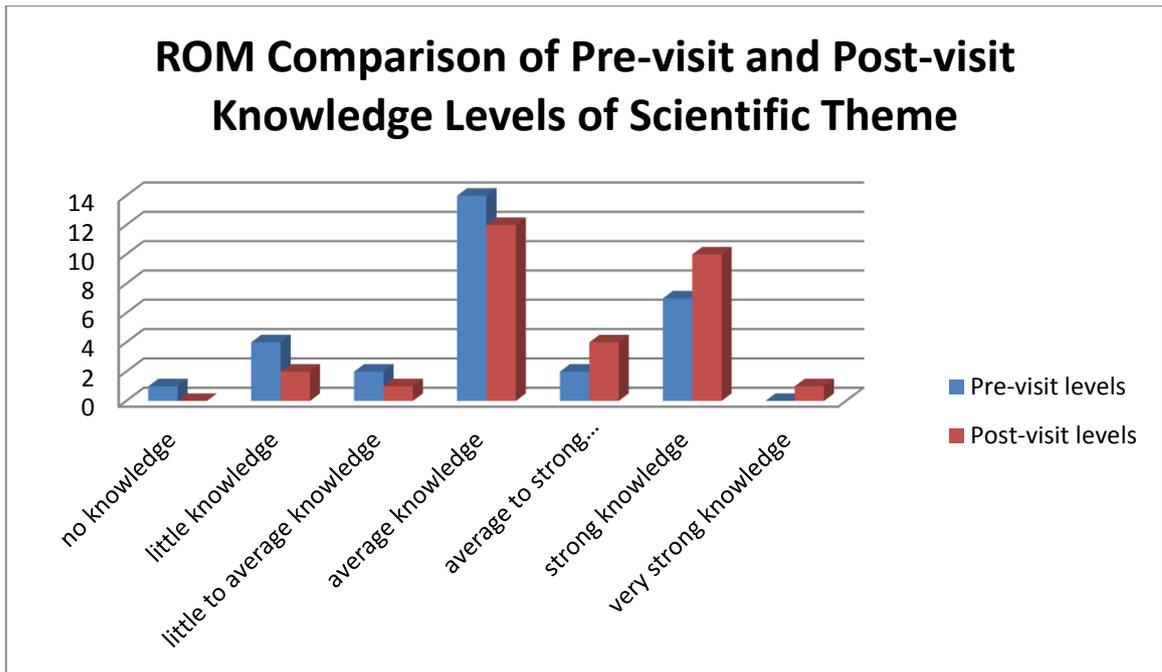


Table 5.7 ROM Comparison of Pre-visit and Post-visit Knowledge of Scientific Theme

The evaluation of the exhibit's impact on visitors' knowledge of the theory of evolution and natural selection found: 19 visitors (63.3%) felt their knowledge remained in the same category (level) as when they came in whereas 11 visitors felt their knowledge level had been modified by their visit.

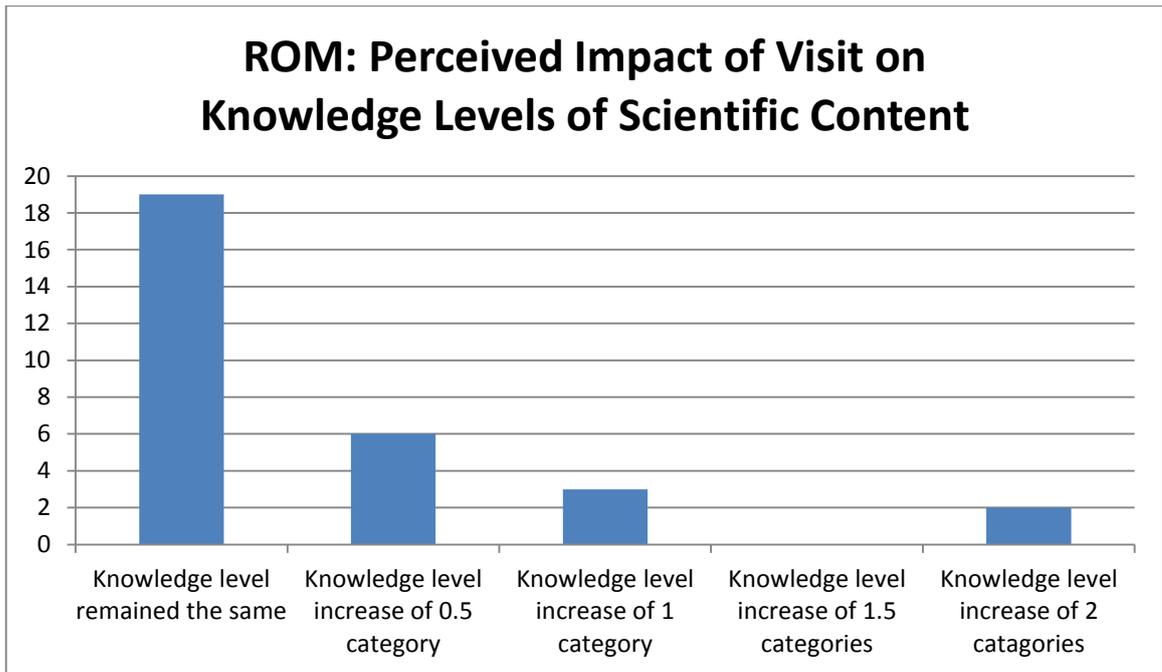


Table 5.8 Visitors' Perceived Impact of Visit on Knowledge Levels of Scientific Content at the ROM

Once again in order to better understand the nature of learning experiences, the 'transformative learning scale' was implemented within a constructivist paradigm: survey participants were asked to evaluate whether their knowledge and understanding of the theory of evolution had stayed the same, been reinforced, enhanced or changed. Results of the implementation of the 'transformative learning scale' demonstrated a majority of those interviewed, 19 of 30 respondents, felt their prior scientific knowledge had been reinforced through their visit of the

exhibit.⁶⁰¹ Based on visitors' average to strong pre-visit knowledge, the nature of learning experiences on the exhibit's scientific theme was generally a reinforcement of prior knowledge rather than enhancement through the acquisition of new knowledge.

Even though the majority of visitors perceived their knowledge level to still be in the same level post-visit, 80% of respondents interviewed (24 of 30 visitors) felt that the exhibition had a direct effect on what they knew (or are able to actively recall) about the theory of evolution and natural selection post-visit. The majority of ROM survey participants felt their learning of scientific content consisted of a reinforcement of previous knowledge, signifying that prior knowledge and understandings were strengthened through the educational experience.

Finally, it is significant that ROM visitors estimated their prior knowledge of the theory of evolution and natural selection between average and strong levels. While the research sample is limited to 30 participants, these findings indicate that the *Darwin* exhibit tended to attract visitors with significant prior knowledge of evolution. This brings into question the relevance of the

⁶⁰¹ Although within the analysis of increases in knowledge levels, the majority of visitors (63.3%) felt their level of knowledge level remained in the same category after visiting the exhibit (on a scale from no to expert knowledge), only 6 visitors (20%) said they felt their actual knowledge remained the same as when as when they came in. Results of the implementation of a transformative learning paradigm for learning of the theory of evolution at the ROM demonstrated: a majority of those interviewed, 16 of 30 visitors (53.3%), felt their previous scientific knowledge had been reinforced through their visit of the exhibit; 1 visitor (3.35%) felt his knowledge had remained the same but had also been reinforced; 2 visitors (6.7%) felt their knowledge had been both reinforced and enhanced; and 5 (16.66%) felt that their knowledge had been enhanced. None of the visitors felt their knowledge of the theory of evolution and natural selection had been changed by the exhibition.

ROM's learning objectives for evolution and science learning: to effectively explain evolution, natural selection⁶⁰² and the scientific definition of "theory";⁶⁰³ to highlight the state of current thinking in evolutionary theory;⁶⁰⁴ and to reinforce the importance of rationalism⁶⁰⁵ as well as audience perceptions of the relevance of the theory of evolution today,⁶⁰⁶ an extremely well-supported and substantiated scientific theory⁶⁰⁷ and the only logical explanation for the diversity we see in the living world.⁶⁰⁸ According to findings from the audience research on prior knowledge and learning, the actual necessity of the exhibit to substantiate the theory of evolution and to 'convince' audience members of the current relevance can therefore be considered unnecessary. As will be demonstrated in the analysis of pre-visit attitudes to science and religion and pre-visit understanding of the current relevance of evolution in the following chapter (See Tables 6.6 and 6.7), not all visitors interviewed fully accept evolution.⁶⁰⁹

⁶⁰² Chris Darling.

⁶⁰³ Julian Kingston.

⁶⁰⁴ Ibid.

⁶⁰⁵ Chris Darling.

⁶⁰⁶ Jason French.

⁶⁰⁷ Julian Kingston and Chris Darling.

⁶⁰⁸ Chris Darling.

⁶⁰⁹ The research findings on transformative learning in Chapter Six demonstrate that transformative learning did not necessarily occur for visitors who entered the exhibit unconvinced of the theory of evolution's substantiation. Thus, visitors' willingness to engage in subjective reframing, perhaps serving as a visit motivation, may be a requirement for perspective transformation.

5.1.4 Perceived Impact of Exhibit on Knowledge and Focus of Learning at the ROM

In order to better understand the perceived impact of the visit of *Darwin* on respondents' knowledge levels as well as for comparative purposes, knowledge increases were calculated, quantified and defined as 'knowledge level increments'.⁶¹⁰ For learning on the life of Darwin, the man and the scientist, visitors' evaluation of the exhibition's impact on knowledge levels demonstrated an 'overall knowledge level increment' of 29 and an 'average knowledge level increment' of 0.97 (i.e. visitors generally estimated an increase of approximately 1 category of knowledge). As an impressive 24 of 30 visitors (80%) felt their knowledge of Darwin, the man and the scientist was increased by visiting the exhibit, half of which rated their knowledge level a full category higher than pre-visit knowledge levels, and only 6 visitors (20%) felt their level of knowledge had remained at the same after visiting, it was therefore concluded that ROM visitors interviewed felt they had learned substantial information on the life of Darwin.

The analysis of the perceived impact of *Darwin* on respondents' knowledge of the theory of evolution and natural selection demonstrated that visitors had an overall 'knowledge level increment' of 10 for scientific content-related learning and an 'average knowledge level increment' of 0.35 (i.e. visitors generally estimated an increase of approximately less

⁶¹⁰ The following values have been attributed in order to define the "knowledge level increment": 0 for those who perceived their knowledge level to have remained the same, 0.5 for half a level of increase in knowledge, 1 for one level of knowledge increase, 1.5 for one-and-a-half levels of increase and 2 for two levels of increase in knowledge.

than half a category of knowledge). It is significant that 63.3% of survey participants declared their knowledge of the theory of evolution and natural selection remained in the same category after their visit.

As visitors estimated learning of the life of Darwin at a much higher rate than scientific learning, the considerable divergence in pre-visit knowledge levels and the similarity in post-visit results must be highlighted. Firstly, ROM participants felt they detained less prior knowledge of the life of Darwin (50% had little knowledge and 30% average knowledge) than of the theory of evolution and natural selection (46.7% average level of knowledge and 23% strong knowledge). Although there significant variance in pre-visit knowledge levels of the two main exhibit themes was demonstrated, estimated knowledge levels after visiting the exhibit were actually very similar in both domains: post-visit knowledge levels of the life of Darwin, the man and the scientist showed that 40% of respondents felt they had average knowledge after their visit and 30% had strong knowledge and on the subject of evolution and natural selection, 40% of visitors also estimated their post-visit knowledge level to be average and 33.3% felt they now had strong knowledge.

It is therefore a comparison of the calculated difference between pre-visit and post-visit levels of knowledge that is the most relevant for an analysis of learning in *Darwin*: 80% of visitors felt the exhibit had increased their knowledge level of the life of Darwin, the man and the scientist, 40% of which rated their knowledge level one category higher than pre-visit knowledge levels, whereas 63.3% declared their knowledge of the theory

of evolution and natural selection remained in the same category. The quantified “knowledge level increments” showed resounding differences: an overall increment of 29 was determined for biographical content-related learning and 10 for science-related learning. It was therefore concluded that visitors (i.e. visitor survey participants) focused their learning experiences on the exhibit’s historical/biographical content as oppose to scientific content. An analysis of the relationship between pre-visit knowledge, learning and dwell times, evaluating the effects of interest, prior knowledge and motivation on visitor engagement, will therefore follow in Section 5.3.

5.2 Audience Research at the NHM: Demographics, Dwell Times and Knowledge Acquisition

In London, semi-structured interviews of NHM visitors served to obtain demographics and evaluate knowledge acquisition. Through visitor observation, both general dwell times as well as time spent in exhibit sections were established.

5.2.1 Visitor Demographics of NHM Survey Participants

Visitors were randomly asked to participate in the survey as they approached the exhibit entrance and all willing respondents first filled out a visitor demographics survey in order to determine whether they met participation criteria (age, place of residence and travel time to the Museum) as well as to provide information on their level of studies, profession, their familiarity with the NHM and fidelity (frequency of visits).

The definition of NHM local audience was based on the geographical limits of London combined with a maximum required travel time to the Museum of one hour. Hence all participants were currently residing in London, the majority for great lengths of time: 16 respondents indicated living in their current place of residence for over five years, 13 of whom specified exact time in their current residence giving an average of 29 years.⁶¹¹ The gender distribution of respondents was equally balanced: 15 females and 15 male visitors were interviewed.

The age of respondents is significant as NHM staff members interviewed indicated the *Darwin* exhibit targeted an adult 'learned liberal' audience defined as age 45 years and up. Interview participants, however were mainly from either younger or older adult audiences, with a concentration on a younger adult audience: 60% of respondents were between the ages of 18 and 35 years and 30% were age 55 years and up.

⁶¹¹ Of the remaining 14 respondents: 5 have been in their current London residence for 2-5 years, 4 for 1-2 years and 5 for less than one year (however 1 visitor had relocated from another London location, 1 has been in England for a year but 7 months in London, 1 had returned to London since four months after having previously lived there, and 2 visitors had moved from elsewhere within the last six months).

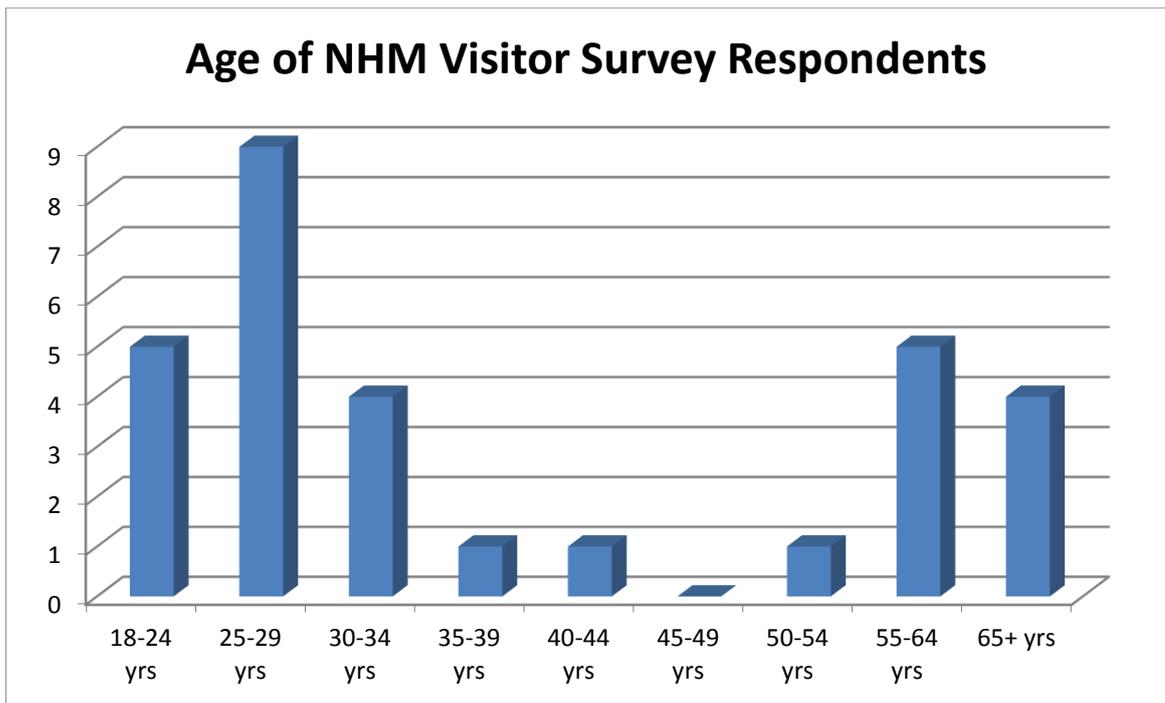


Table 5.9 Age of NHM Visitor Survey Respondents

Furthermore, the age distribution of survey respondents presents somewhat of a gap as only 10% of those interviewed (3 visitors) were between the ages of 35 to 54 years. Although the survey only consists of 30 audience members and therefore cannot be considered representative, it is pertinent that the majority of those interviewed were from a younger adult audience as oppose to an older, 'learned liberal' audience.

Survey respondents also specified their level of studies. Results are provided in the graph below.

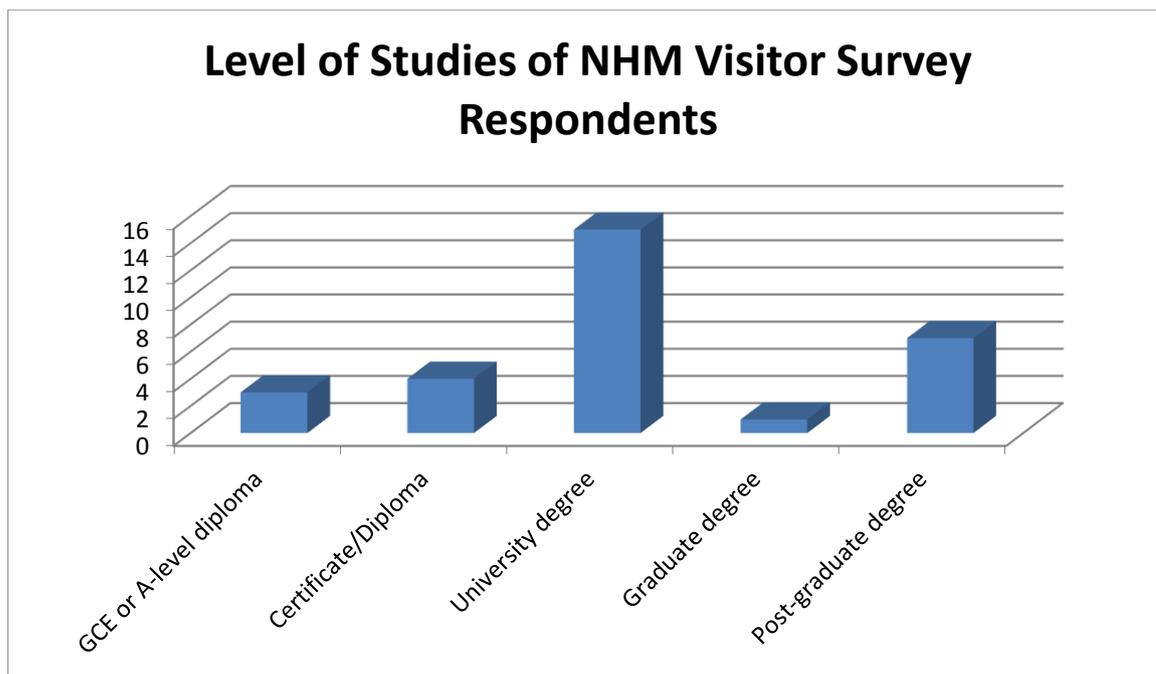


Table 5.10 Level of Studies NHM Visitor Survey Respondents

The educational level of respondents was once again demonstrated to be quite high as the majority (76.6%) had a university degree of which: 50% had a Bachelor's Degree, 3.3% a Master's Degree and 23.3% a Postgraduate Degree. Furthermore, a comparison of level of studies of the two main age groups interviewed established that older adult visitors (9 visitors aged 55+) had significantly lower education levels than the younger adult group (18 visitors aged 18 to 34 years).⁶¹² Furthermore, 14 of the 23 visitors detaining a university degree (ranging from Bachelor's to PhD level) had a science-related degree, perhaps therefore representative of a "niche" audience group of individuals particularly interested and

⁶¹² Within the older age group, age 55+: 1 visitor had a high school level education; 4 detained certificates; 2 had university degrees and 1 had a postgraduate degree. Within the younger adult segment (age 18 to 34): 2 visitors had high school level diplomas (but were studying for a Bachelor Degree), 11 had a university degree and 5 had a postgraduate degree.

knowledgeable in the field of science. Thus, taking into consideration the age and level of education of respondents, the NHM may be inclined to consider expanding their definition of the 'learned liberal audience' aged 45 and over to include younger, well-educated audience members.

The 30 survey respondents specified their professions: 3 were professionals, 4 were executives, 9 were skilled workers, 5 were currently studying, 3 were retired and 6 stated having other occupations (ranging from researcher to army officer and government official). The evaluation of frequency of NHM visits and membership demonstrated that the majority of visitors interviewed (16 of 30 individuals) habitually visited the NHM less than once a year although 9 stated visiting once to twice a year and 5 three to five times. Furthermore, no interview respondents were NHM members. As at the ROM, the evaluation of visit frequency and membership demonstrated that the *Darwin* exhibit, a 'high visibility' or 'blockbuster' exhibit, tended to attract proportionally more first-time or occasional visitors to the NHM as oppose to 'loyal customers'.

5.2.2 Analysis of Visitor Experience and Dwell Times at the NHM: Key Findings from Tracking and Timing Data

Once again, the research methodology of visitor observation implemented consisted of tracking and timing 30 survey respondents and 20 control group members (10 male and 10 female visitors) in the four core sections of the exhibit core. Thus, trends in visitor behaviour were identified and utilised in an in-depth analysis of visitor experience. Furthermore, the potential influence of site-specific modifications and culture on visitor experience was evaluated.

At the London venue, the average dwell time of visitor survey respondents in the exhibit core (including time spent in the three main audio-visual elements) was very high: 84.3 minutes or one hour and 24 minutes. Dwell times of the control group were slightly lower (seven minutes less): an average of 77.4 minutes including times spent in the major audio-visual elements was determined. It is therefore possible that either participation in the visitor survey incited visitors to spend more time in the exhibit core or that visitor survey respondents constituted a slightly 'higher interest' audience segment.

Dwell times for the entire exhibit were calculated at the NHM: visitor survey participants spent on average 87.3 minutes in Darwin, 84.3 minutes in the exhibit core and 2.9 minutes in the two sections 'outside' the core (*The World Before Darwin* and *Darwin's Legacy*). The control group members spent on average less time in the entire exhibit: 80 minutes in the entire exhibit with 77.4 minutes in the exhibit core and 2.25 minutes outside the exhibit core. It was determined that survey participants spent approximately 3% of their visit time outside of the exhibit core and the control group 2.8%. Time spent outside the exhibit's main sections was therefore very low.

The comparison of dwell times in sections of the exhibit core demonstrated, once again, engagement times in the first section of the exhibit core were highest and lowest in the last section as anticipated due to identified general trends in visitor behaviour. Also in concordance with findings at the ROM, NHM survey respondents did not consistently spend

less time in each subsequent exhibit section as had been expected due to museum fatigue and visitor exit-behaviour tendencies. The distribution of average dwell times in each section of the exhibit core demonstrated the same general trend of attraction as at the ROM: NHM visitors spent an average time of 34.8 minutes in *A Trip Around the World* (excluding time viewing the video *No Ordinary Man*); 13.9 minutes in the subsequent exhibit section *The Idea Takes Shape*; 15 minutes in the following exhibit section *A Life's Work*; and 9 minutes in the final section *Evolution Today*.⁶¹³

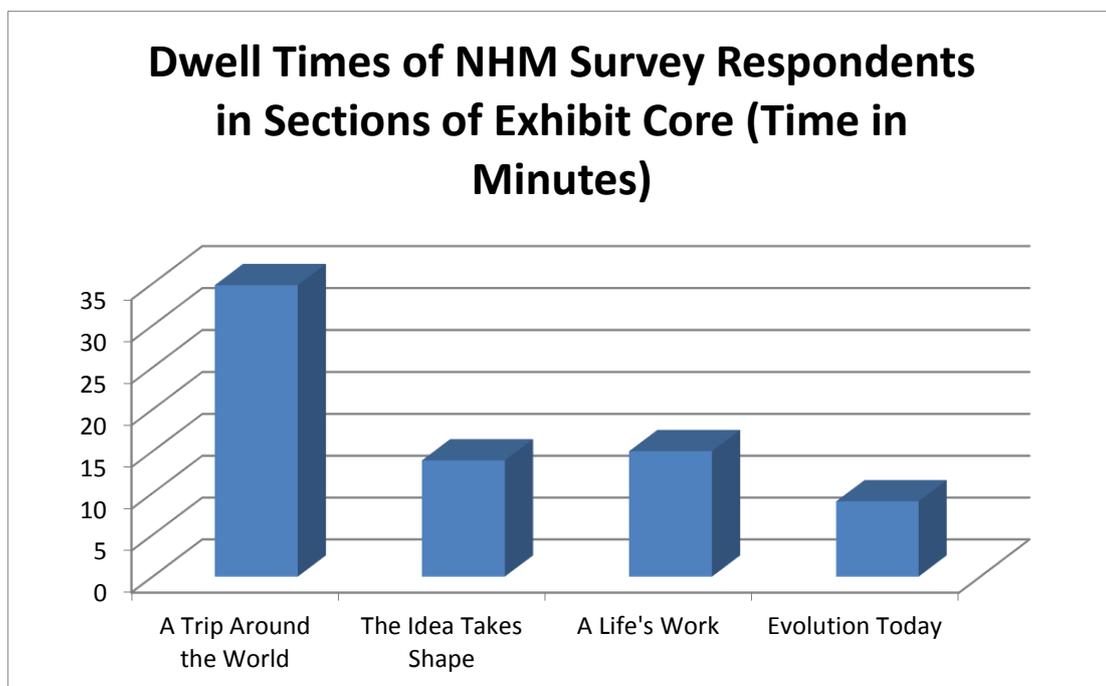


Table 5.11 Dwell Times of NHM Survey Respondents in Sections of the Exhibit Core (Time in Minutes) - Dwell times in the two main audio-visual components are excluded from data.

The section *A Life's Work* focus on the publication of Darwin's research, reactions to evolution by natural selection and controversies over the last

⁶¹³ Visit times within the main audio-visual elements are once again excluded from data.

150 years, as well as Darwin's reticence to publish, his personal tragedy and growing religious scepticism was therefore perhaps also of particular interest to NHM visitors.

The comparison of observation data from the NHM control group with that of visitor survey participants shows very little deviation in average dwell times: in *A Trip Around the World* the control group stayed 32.2 minutes (visitor survey participants stayed for an average of 34.8 minutes); the control group visited the section *The Idea Takes Shape* for an average of 12.45 minutes (visitor survey participants stayed for 13.9 minutes); average dwell time of the control group in *A Life's Work* was 14 minutes (visitor survey participants averaged 15 minutes); and finally control group visitors stayed on average 7.4 minutes in *Evolution Today* (whereas visitor survey participants stayed for an average of 9 minutes). It was therefore deduced that dwell times of survey respondents were not significantly impacted by inclusion in the survey process.

In opposition to findings at the ROM, NHM visitors observed did not display an aversion to the main audio-visual elements. A large majority of NHM respondents (27 of 30 visitors or 90%) watched the first movie feature *The Life and Work of Charles Darwin*, staying for an average of 9 minutes hence viewing the movie in its entirety (the loop duration time was 8 minutes). The overall average time spent in this movie, including the three visitors who skipped this audio-visual element, was 8.1 minutes. However the large 'combined' film element within the section *Evolution Today*, consisting of the six minute AMNH video *Natural Selection*

followed by the five minute NHM video, *Evidence and Evolution*, presenting “in-house” scientists’ views on evolution and natural selection serving to communicate the Museum’s official position on evolution (as the only scientific explanation for the diversity of life on earth), was markedly less popular. Only half of NHM survey participants (15 of 30) watched this main audio-visual element for an average of 7.1 minutes (of a combined loop time of 11 minutes). The overall average time spent in this movie, with all visitor survey respondents included, was 3.6 minutes. Dwell times were therefore calculated excluding time in the major video components demonstrated that average visit time in the exhibit core was reduced to 72.6 minutes (or one hour and 12.6 minutes).

A slight divergence in results was noted in the the comparison of video viewing of the control group: while only 10% of visitor survey respondents skipped the movie *The Life and Work of Charles Darwin*, 30% of the control group skipped this element. However, dwell times of the control group in audio-visual components were slightly lower: on average control group members spent 7 minutes in the video whereas survey respondents remained on average for 8.1 minutes. Regarding the AMNH/NHM combined audio-visual component (*Natural Selection and Evidence and Evolution*), data showed that 50% of both survey participants and the control group skipped this main movie element. Dwell times however varied slightly: those tracked and timed during for the visitor survey watched the movie for an overall average time of 3.6 minutes while those in the control group watched for 4.25 minutes. Finally, when time in the

major “movie elements” was excluded from data, the control group spent 66.1 minutes in exhibit core, 6.5 minutes less than survey respondents. NHM dwell times in the sections of the exhibit core served to confirm visitors’ interest in Darwin’s life-story, specifically relevant during the “Year of Darwin” and the celebration of the anniversary of his publication of *On the Origin of Species*. Hence visitors’ attraction to sections focusing on Darwin’s fieldwork, the publication of his research and his personal life at both venues demonstrates the exhibit’s effective scheduling and contextual relevance. Additionally, visitors’ lengthy dwell time in the section *A Trip Around the World*, reaffirms the assumption that visitors do spend more time engaging within the beginning of their visit, yet also confirms the great “holding power” of the display methods and techniques of this area consisting of live animals, taxidermy specimens and tactile models on diorama-type ‘insular’ displays. Finally, once again as expected, the last section of the exhibit core, *Evolution Today*, was the least popular. While consistent with expected visitor behaviour, it is significant to note again that this section, presenting mainly scientific content highlighting the current relevance of evolution within modern scientific research, ‘breaks away’ from the exhibit narrative mainly driven by Darwin’s life-story. Even though the NHM’s presentation of *Darwin* was ‘abridged’ and presented in a significantly smaller gallery than at the ROM, as this section comprises an explanation of evolution and the process of natural selection - the “scientific crunch” of the exhibit so-to-speak - it was perhaps presented too late in the visitor experience for effective engagement in scientific learning. Furthermore, visitor exit strategies,

generally directly from *Evolution Today*, coupled with very high dwell times serve to reinforce the assumption that visitors experienced museum fatigue while in the section *Evolution Today*.

As similar trends in dwell times in sections of the exhibit core were demonstrated at both venues, the focus of learning in visit experience was considered to be the same, on a decreasing trend from: Darwin's five-year voyage around the world, his research methodology, method of inquiry and initial analysis; to the publication of Darwin's research and his personal struggles; then Darwin's analysis, key scientific evidence and writing-up of his research; and finally Darwin's contribution to modern science and research.

5.2.3 Learning at the NHM: Acquisition of Knowledge and Learning within a Constructivist/Transformative Paradigm

The aim of the analysis of learning as the acquisition of knowledge was to compare pre-visit and post-visit responses, hence evaluating respondents' self-assessed assimilation of information provided in order to determine perceptions of impact of engagement on knowledge levels, once again maintaining the separation of knowledge and understanding of biographical/historical content and scientific content on a scale from no knowledge to expert knowledge.

Pre-visit interviews established the majority of NHM respondents stated either having little or average knowledge of the life of Darwin the man and the scientist: 26.7% of visitors interviewed stated having little knowledge, 10% little to average knowledge and 36.7% average knowledge.

Evaluation of post-visit knowledge of the exhibit's historical/biographical

theme demonstrated that 46.7% of respondents felt they had strong knowledge after visiting the exhibit, 10% average to strong knowledge and 36.7% had average knowledge. The following graph provides a comparison of pre-visit to post-visit knowledge levels.

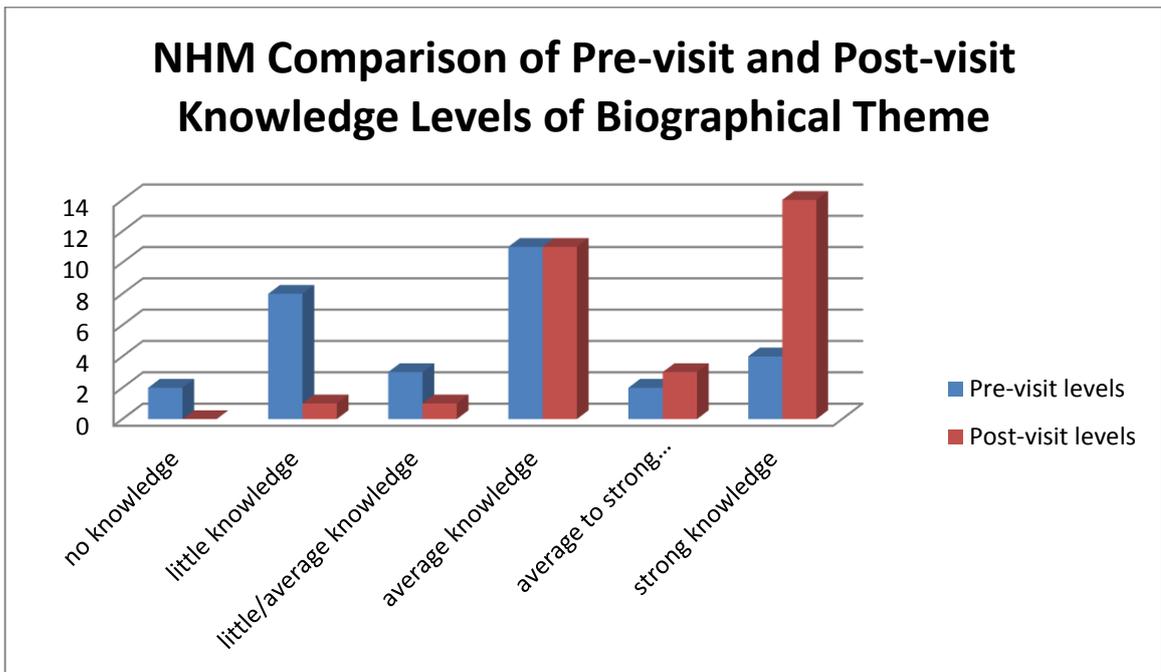


Table 5.12 NHM Comparison of Pre-visit and Post-visit Knowledge of Historical/Biographical Theme

Visitors' analysis of exhibit impact on knowledge of biographical content showed: 10 visitors felt their level of knowledge remained in the same category post-visit whereas 20 felt their knowledge level had been modified by their visit.

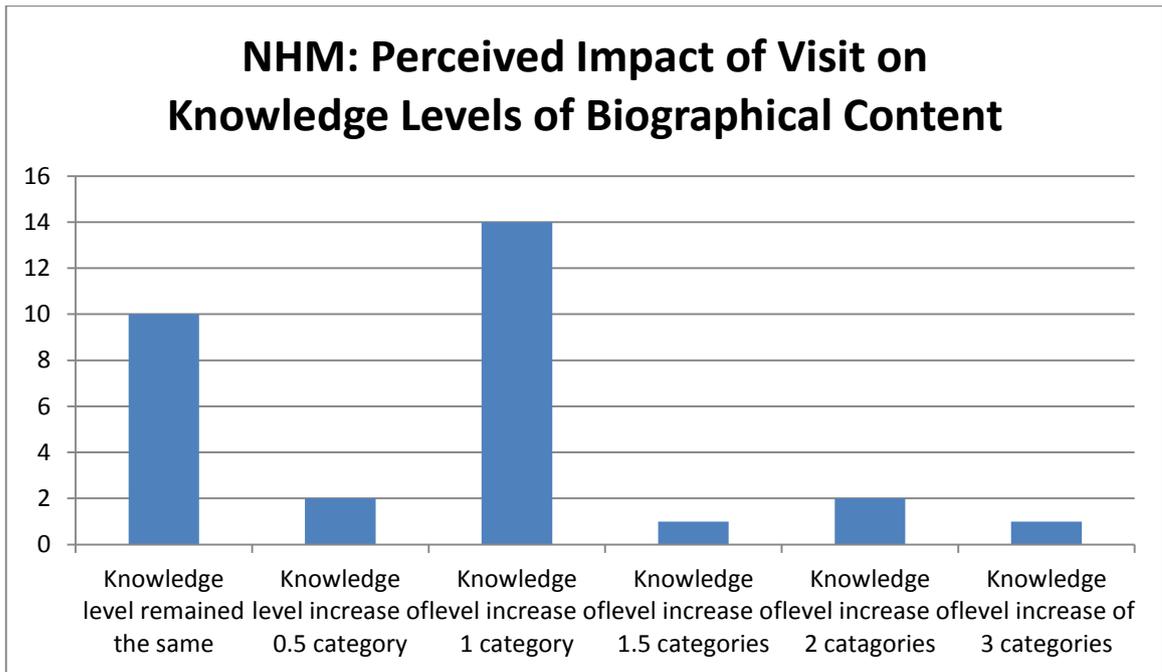


Table 5.13 Visitors’ Perceived Impact of Visit on Knowledge Levels of Biographical Content at the NHM

Implementing the ‘transformative learning scale’ in order to better understand the nature of learning experiences within a constructivist paradigm, as at the ROM, survey participants were asked to evaluate whether their knowledge and understanding of the life of Darwin, the man and the scientist, had stayed the same, been reinforced, enhanced or changed. Results demonstrated that the majority of NHM visitors interviewed, 20 of 30 respondents, felt their prior knowledge had been enhanced or ‘built upon’ through the acquisition of new knowledge during

their visit of *Darwin*.⁶¹⁴ It can therefore be stated that the nature of learning experiences on the exhibit's biographical/historical theme was an acquisition of new knowledge: NHM visitors' little to average pre-visit knowledge of Darwin the man and the scientist was therefore enhanced to an average to strong knowledge level post-visit. The analysis of the construction of new or revised beliefs or meaning schemes is provided in Chapter Six: Culture, Worldview, Perspectives and Transformative Learning.

Regarding knowledge and understanding of the theory of evolution and natural selection, the evaluation of pre-visit knowledge levels demonstrated: half of visitors interviewed (15 of 30 respondents or 50%) felt they had average of the theory of evolution and natural selection and a very impressive 36.7% felt they had strong knowledge before entering *Darwin*. Visitors' assessment of post-visit knowledge levels of the theory of evolution by natural selection showed: 56.7% felt they now had strong knowledge (as oppose to 36.7% strong pre-visit knowledge), and 33.3% felt they had average knowledge (as oppose to 50% average pre-visit

⁶¹⁴ Results of the implementation of a transformative learning paradigm for learning of Darwin, the man and the scientist at the NHM demonstrated only 2 of the 30 visitors interviewed (6.7%) felt they had the same knowledge after their visit as when they entered the exhibit. Thus 28 visitors agreed that the exhibition had impacted their knowledge of Darwin and his life: 6 visitors (20%) felt their previous knowledge had been reinforced; 5 (16.7%) felt their knowledge had been both reinforced and enhanced; 13 (43.3%) felt that their knowledge had been enhanced; 2 visitors (6.7%) felt it had been both enhanced and changed; 1 felt her knowledge of the life of Darwin, the man and the scientist had changed and one stated his/her knowledge had been reinforced, enhanced and changed. Thus almost half of visitors interviewed felt their prior knowledge was enhanced (43.3%) by their visit, a smaller portion felt their knowledge was reinforced (20%) and 4 visitors mentioned changes in their knowledge (13.3%).

knowledge). The following graph compares pre-visit to post-visit knowledge levels.

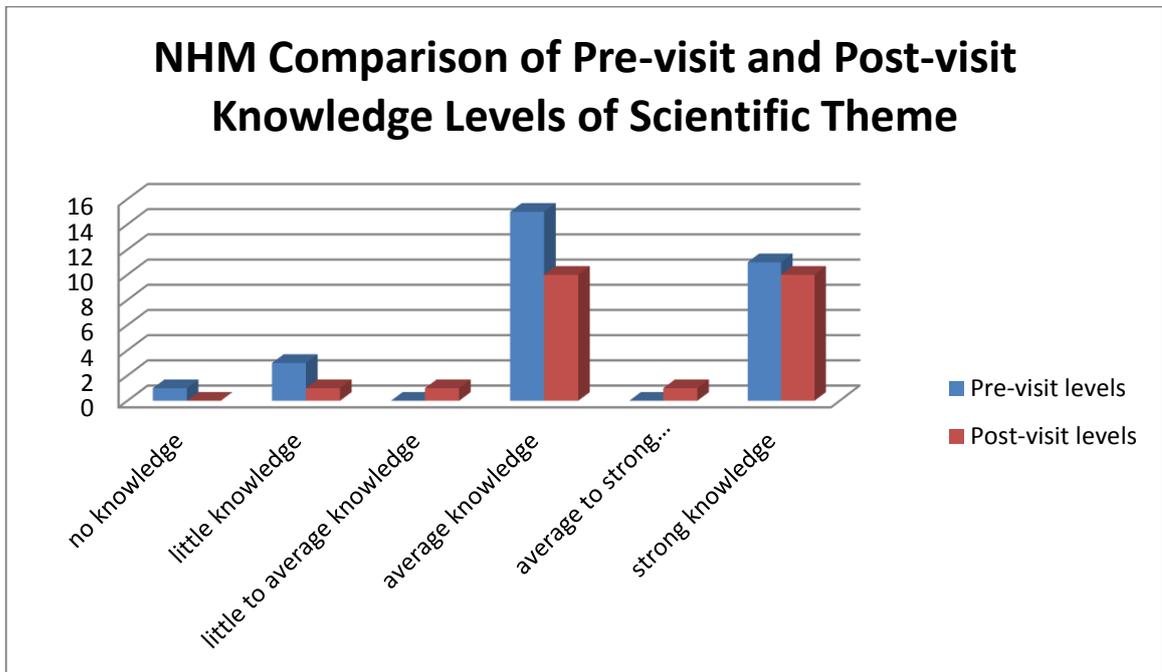


Table 5.14 NHM Comparison of Pre-visit and Post-visit Knowledge of Scientific Theme

After visiting the exhibition at the NHM, the 30 visitor survey respondents evaluated the impact of their visit on their knowledge levels of scientific content: 19 of 30 visitors (63.3%) felt their knowledge level remained at the same level as when they arrived; hence only 11 visitors (36.7%) felt their knowledge of the theory of evolution and natural selection had significantly increased during their visit. Modifications of knowledge levels were again calculated in order to quantify knowledge increases as demonstrated on the graph below.

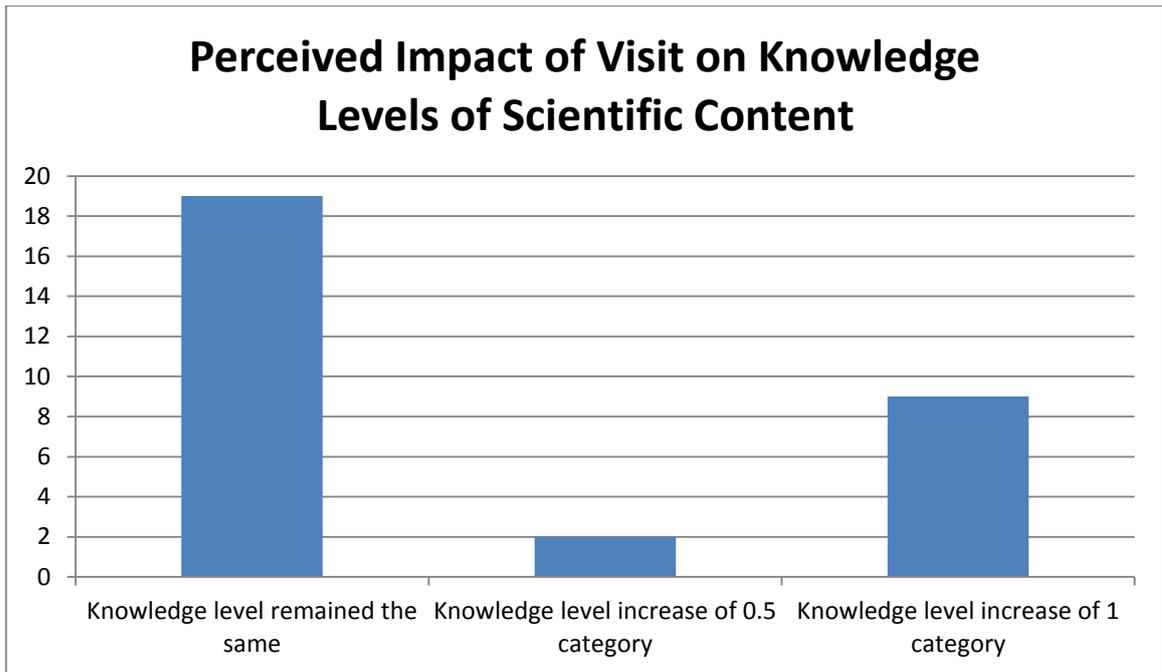


Table 5.15 Visitors' Perceived Impact of Visit on Knowledge Levels of Scientific Content at the NHM

Once again in order to better understand the nature of learning experiences, the 'transformative learning scale' was implemented within a constructivist paradigm: survey participants were asked to evaluate whether their knowledge and understanding of the theory of evolution had stayed the same, been reinforced, enhanced or changed. Results of the implementation of the 'transformative learning scale' demonstrated almost half of those interviewed, 14 of 30 respondents, felt their prior scientific

knowledge had been reinforced through their visit of the exhibit.⁶¹⁵ As at the ROM, based on visitors' average to strong pre-visit knowledge, the nature of learning experiences on the exhibit's scientific theme was generally a reinforcement of prior knowledge rather than enhancement through the acquisition of new knowledge. However, 11 of 30 visitors did describe an enhancement of prior knowledge. Furthermore, it is also significant that 8 of 30 NHM respondents felt their post-visit knowledge of the theory of evolution was the exactly the same as their prior knowledge.

Finally, it is once again demonstrated, as at the ROM, that visitors estimated their prior knowledge of the theory of evolution and natural selection between average and strong levels. Findings at the NHM therefore serve to reinforce the statement that the *Darwin* exhibit tended to attract visitors with significant prior knowledge of evolution, bringing into question the relevance of the NHM's learning objective of "validating confidence in evolutionary biology".⁶¹⁶

⁶¹⁵ Although within the analysis of increases in knowledge levels, the majority of visitors (63.3%) felt their level of knowledge level remained in the same category after visiting the exhibit (on a scale from no to expert knowledge), implementing the transformative learning scale: only 8 visitors (26.7%) said they felt their actual knowledge of the theory of evolution and natural selection remained the same as when as when they came in. Furthermore: 1 visitor (3.3%) felt their knowledge had both remained the same and was reinforced; 9 (30%) felt their previous scientific knowledge had been reinforced through their visit of the exhibit; 3 (10%) felt their knowledge had been both reinforced and enhanced; 7 (23.3%) felt that their knowledge had been enhanced; 1 (3.3%) felt their knowledge had changed; and 1 (3.3%) felt their previous knowledge had been reinforced, enhanced and changed.

⁶¹⁶ Dr. Robert Bloomfield.

5.2.4 Perceived Impact of Exhibit on Knowledge and Focus of Learning at the NHM

As at the ROM, in order to quantify visitors' perceived modifications in knowledge levels, as well as for comparative purposes, knowledge increases were once again calculated and defined as 'knowledge level increments'⁶¹⁷. For learning on the life of Darwin, the man and the scientist, NHM visitors had an 'overall knowledge level increment' of 23.5. The average visitor felt the exhibition's impact on their knowledge on the life of Darwin, the man and the scientist was an increase of slightly less than one category of knowledge as the 'average knowledge level increment' was valued at 0.78. It can be generally stated that NHM visitors felt they had learned substantial new information on the life of Darwin, the man and the scientist in *Darwin* as 20 of 30 visitors (66.7%) felt their knowledge level was increased, 46.7% of which rated their knowledge level a full category higher than before entering.

For learning of the theory of evolution and natural selection, the implementation of "knowledge level increments" demonstrated that, as at the ROM, visitors evaluated the impact of the exhibit on scientific knowledge at much lower levels than biographical/historical knowledge. NHM visitors had an 'overall knowledge level increment' of 10 and an 'average knowledge level increment' of 0.35, an increase of less than a half category of knowledge. As visitors estimated learning of the life of

⁶¹⁷ The following values have been attributed in order to define the "knowledge level increment": 0 for those who perceived their knowledge level to have remained the same, 0.5 for half a level of increase in knowledge, 1 for one level of knowledge increase, 1.5 for one-and-a-half levels of increase and 2 for two levels of increase in knowledge and 3 for three levels of increase.

Darwin at a much higher rate than scientific learning, the considerable divergence in pre-visit knowledge levels and the similarity in post-visit results must once again be highlighted.

NHM pre-visit knowledge levels demonstrated that participants felt they had much less prior knowledge of the life of Darwin, the man and the scientist than of the theory of evolution and natural selection. The majority of 30 NHM respondents stated they had either little or average knowledge of the life of Darwin: 26.7% of visitors interviewed felt they had little knowledge, 10% little to average and 36.7% had average knowledge. Pre-visit knowledge of the theory of evolution and natural selection was higher as 15 of 30 respondents (50%) felt they had average of the theory of evolution and natural selection and a very impressive 36.7% felt they had strong knowledge before entering the exhibit.

Visitors' self-assessment of post-visit knowledge of biographical content demonstrated that the majority placed their knowledge of the life of Darwin, the man and the scientist between average and strong: 46.7% of respondents felt they had strong knowledge, 10% average to strong knowledge and 36.7% average knowledge. Post-visit knowledge levels of the theory of evolution and natural selection were similar as the majority of visitors also placed their level of knowledge between average and strong: 56.7% felt they had strong knowledge of the theory of evolution (as oppose to 36.7% strong pre-visit knowledge), and 33.3% felt they now had average knowledge (as oppose to 50% average pre-visit knowledge).

Once again, the comparison of the calculated difference between pre-visit

and post-visit levels of knowledge is most relevant for an analysis of learning in *Darwin*: as previously stated, 20 of 30 visitors interviewed (66.7%) felt their knowledge level of Darwin's life, the man and the scientist had increased by their visit, 46.7% of which rated their knowledge level a full category higher than pre-visit knowledge levels whereas only 11 visitors felt their knowledge level of the theory of evolution and natural selection had been modified by visiting the exhibit (19 visitors or 63.3%) felt their knowledge level remained in the same category level as when they came in, exactly as at the ROM. The quantified 'knowledge level increments' showed resounding differences: an overall increment of 23.5 was determined for biographical content-related learning and 10 for science-related learning. As NHM pre-visit knowledge of Darwin's life was estimated at higher levels than at the ROM yet 'knowledge level increments' were lower than at the ROM meanwhile pre-visit knowledge of the theory of evolution and natural selection was almost exactly the same at both venues and knowledge level increments were identical for science learning, an analysis of the relationship between pre-visit knowledge, learning and dwell times, evaluating the effects of interest, prior knowledge and motivation⁶¹⁸ on visitor engagement, follows.

⁶¹⁸ See Falk, John H. 2009. *Identity and the Museum Visitor Experience*. Walnut Creek: Left Coast Press, Inc., p188-211.

5.3 Prior Knowledge, Interest, Engagement and Learning: Implications of Key Findings

This section aims to address the possible relationship between prior knowledge and interest as influencing factors of engagement and learning. Sigmund Tobias, in his article “Interest, Prior Knowledge and Learning”, reviews past research in this field, discussing previous findings of “a substantial linear relationship [that exists] between interest and prior knowledge”⁶¹⁹ (i.e. a correlation or dependence of direct proportionality). Tobias believes this commonly found result is due to a confusion or confounding of interest and prior knowledge within methodologies and analyses as oppose to a clear differentiation between these variables; he therefore re-examines research findings evaluating “whether the impact of interest on learning is independent of the effects of prior knowledge”⁶²⁰ and proposes an updated model of the “interest-knowledge relationship”.⁶²¹

Tobias asserts K. Anne Renniger’s definition of interest, “composed of value and knowledge”,⁶²² is most significant to research; he therefore

⁶¹⁹ Tobias, Sigmund. 1994. ‘Interest, Prior Knowledge and Learning’. *Review of Educational Research*. Vol. 64, No. 1, Spring. American Educational Research Association, p37.

⁶²⁰ Ibid, p39.

⁶²¹ Ibid, p37.

⁶²² Renninger, Karen Ann. 1992. ‘Individual interest and development: Implications for theory and practice’. In Renninger, Karen Ann, Hidi, Suzanne and Krapp, Andreas (eds). *The role of interest in learning and development*. Hillsdale: Lawrence Erlbaum Associates, Inc., Cited in Tobias, Sigmund. 1994. ‘Interest, Prior Knowledge and Learning’. *Review of Educational Research*. Vol. 64, No. 1, Spring. American Educational Research Association, p39.

suggests a focus on “topic or individual interest” defined as “peoples' relatively enduring preferences for different topics, tasks, or contexts and how they influence learning”.⁶²³ According to Tobias, the influence of interest on learning is indirect, “impacting on the cognitive processes controlling the acquisition, storage, and retrieval of learning” whereas “the impact of prior knowledge on learning is clearly more direct and, hence, likely to have a larger effect”.⁶²⁴ Furthermore, referring to studies performed by Schiefele and Krapp in 1991, interest is “related to self-report[ed] measures of activation, intensity of attention, use of elaborative strategies, and amount of note taking, while prior knowledge was correlated only with reading time.”⁶²⁵ This finding is significant within the context of audience evaluation in museums as the reading of exhibition texts is a fundamental component of visitor engagement significantly contributing to learning: it is therefore assumed that prior knowledge has significant correlation with visitor engagement with exhibit texts (i.e. reading times).

Although Tobias' model of the relationship between interest and knowledge is divided into high and low levels of both variables, he insists that the relationship is “continuous, rather than dichotomous”.⁶²⁶ Tobias

⁶²³ Tobias, Sigmund. 1994. 'Interest, Prior Knowledge and Learning'. *Review of Educational Research*. Vol. 64, No. 1, Spring. American Educational Research Association, p38.

⁶²⁴ Ibid, p46.

⁶²⁵ Ibid, p45.

⁶²⁶ Ibid, p48-49.

defines the influence of interest and prior knowledge levels on adult

learning as such:

- high interest is usually accompanied by substantial knowledge as “preference for a particular topic or activity predictably leads to greater engagement with it and to the accumulation of knowledge”⁶²⁷
- the connection between low interest and low knowledge is evident as “limited contact with a subject makes it unlikely that very much knowledge about that domain will be acquired”⁶²⁸
- the high interest with low knowledge category is considered “transitory” as situational interest - when “interest is elicited by aspects of a situation, such as novelty or intensity, and by the presence of a variety of human interest factors contributing to the attractiveness of different types of content”⁶²⁹ - can either lead to the development of topic interest thus encouraging the acquisition of knowledge, or inversely, to a loss of interest and no knowledge acquired⁶³⁰
- the category of low interest accompanied by significant knowledge is also considered transient and less relevant for adults (as oppose to school children who learn an imposed curriculum) as adults are “unlikely to renew or update such knowledge with ongoing activity”⁶³¹, eventually leading to a decrease in knowledge (i.e. transforming into a low interest, low knowledge category over time).⁶³²

The following analysis implements Tobias’ model to evaluate correlations between visitor pre-visit knowledge levels and degree of visitor

⁶²⁷ Tobias, Sigmund. 1994. ‘Interest, Prior Knowledge and Learning’. *Review of Educational Research*. Vol. 64, No. 1, Spring. American Educational Research Association, p49.

⁶²⁸ Ibid, p49.

⁶²⁹ Ibid, p38.

⁶³⁰ Ibid, p49.

⁶³¹ Ibid, p49.

⁶³² Ibid, p50.

engagement. The evaluation of the relationship between prior knowledge and dwell times was divided into the two themes of exhibit content. Firstly, regarding historical/biographical learning at the ROM, those who had less pre-visit knowledge of Darwin's life, the man and the scientist spent significantly less time in the exhibit core than those with more knowledge:

Correlation Between Pre-visit Knowledge of Biographical Content and Dwell Times at the ROM	
ROM Visitors' Pre-visit Knowledge Levels	Average Dwell Times in Exhibit Core
2 visitors with no pre-visit knowledge	26.5 minutes
17 visitors with little pre-visit knowledge	42.7 minutes
8 visitors with average pre-visit knowledge	69 minutes
2 visitors with strong pre-visit knowledge	75.5 minutes

Table 5.16 Correlation Between Pre-visit Knowledge of Biographical Content and Dwell Times at the ROM

Concerning scientific content-related learning, the link between pre-visit knowledge levels and engagement times on a progressive scale was less evident:

Correlation Between Pre-visit Knowledge of Scientific Content and Dwell Times at the ROM	
ROM Visitors' Pre-visit Knowledge Levels	Average Dwell Times in Exhibit Core
1 visitor with no pre-visit knowledge	5 minutes
4 visitors with little pre-visit knowledge	26 minutes
2 visitors with little to average pre-visit knowledge	66.5 minutes
14 visitors with average pre-visit knowledge	49 minutes
1 visitor with average to strong pre-visit knowledge	121 minutes
7 visitors with strong pre-visit knowledge	60 minutes

Table 5.17 Correlation Between Pre-visit Knowledge of Scientific Content and Dwell Times at the ROM

It should be noted however, if the data from one visitor is removed from the above analysis (the visitor with average to strong pre-visit knowledge on evolution) the relationship between pre-visit knowledge levels of evolution and average visit times spent in the exhibit core on a progressive scale is maintained.

Implementing Tobias' model of the interest-knowledge relationship in the analysis of visitor engagement, it can be therefore be deduced that ROM visitors with considerable prior knowledge were also most likely to be a high interest group as, comparing experts to novices:

[as it is] evident that experts in any field [...] would have both the highest interest and knowledge about that topic. One of the hallmarks of expertise in any area is an intense devotion to the subject.⁶³³

⁶³³ Tobias, Sigmund. 1994. 'Interest, Prior Knowledge and Learning'. *Review of Educational Research*. Vol. 64, No. 1, Spring. American Educational Research Association, p43.

Inversely, however, those with little or no prior knowledge of a topic can have variable interest levels, from low to high. If interest is high, the category of low prior knowledge should be considered transient and significant engagement should be observed, encouraged by situational interest. As the one ROM visitor survey participant, identified as having no prior knowledge of both Darwin's life and the theory of evolution, did not significantly engage with the exhibit, spending a mere 5 minutes in the exhibit core, it was concluded that topic interest was not present and situational interest, motivated by curiosity, was not generated. Tobias provides an explanation of the influence of curiosity on interest relevant in the analysis of visitor behaviour leading to the conclusion that this visitor demonstrated flight behaviour induced by anxiety:

An advantage of the curiosity construct over interest is that it can be related to three apparently different states: an eagerness to approach some activities and situations motivated by curiosity and interest, neutral reactions, and disinterest leading to flight induced by anxiety from other material. [...] Combining these curiosity measures with widely known anxiety scales can offer some potentially useful tools for research describing the continuum from attraction to some content motivated by curiosity/interest to flight from it induced by anxiety.⁶³⁴

The analysis of the relationship between prior knowledge and interest as influencing factors of engagement and learning at the NHM demonstrated a divergence with findings at the ROM.

⁶³⁴ Tobias, Sigmund. 1994. 'Interest, Prior Knowledge and Learning'. *Review of Educational Research*. Vol. 64, No. 1, Spring. American Educational Research Association, p47-48.

Firstly, regarding historical/biographical learning, the following trends were noted:

Correlation Between Pre-visit Knowledge of Biographical Content and Dwell Times at the NHM	
NHM Visitors' Pre-visit Knowledge Levels	Average Dwell Times in Exhibit Core
2 visitors with no pre-visit knowledge	90 minutes
9 visitors with little pre-visit knowledge	93.8 minutes
2 visitors with little to average pre-visit knowledge	78.5 minutes
12 visitors with average pre-visit knowledge	76.4 minutes
1 visitor with average to strong pre-visit knowledge	157 minutes
4 visitors with strong knowledge	68.8 minutes

Table 5.18 Correlation Between Pre-visit Knowledge of Biographical Content and Dwell Times at the NHM

At the NHM, visitors with higher pre-visit levels of knowledge of the life of Darwin, the man and the scientist spent overall less time in the exhibition than those with lower pre-visit knowledge. As the exhibit narrative and main exhibit theme consists of Darwin's life-story, perhaps the divergence in the correlation of prior knowledge and dwell times can be explained by NHM visitors' familiarity with the topic and higher prior knowledge. Furthermore, it is possible to deduce that NHM visitors with more knowledge of Darwin's life spent less time in the exhibit due to a presentation of information they may already have known. This is significant for travelling exhibits as educational content should be presented at an appropriate level in accordance with audience knowledge, hence neither aiming 'too high' nor 'too low'.

Regarding scientific content-related learning and dwell times at the NHM, the link between pre-visit knowledge levels and engagement times on a decreasing scale was not as significant. Firstly, as at the ROM, the one visitor with no pre-visit knowledge of evolution and natural selection spent the least amount of time in the exhibit (approximately 15 minutes less). All other visitors, regardless of prior knowledge level, basically stayed in the exhibit core for the same amount of time.

Correlation Between Pre-visit Knowledge of Scientific Content and Dwell Times at the NHM	
NHM Visitors' Pre-visit Knowledge Levels	Average Dwell Times in Exhibit Core
1 visitor with no pre-visit knowledge	60 minutes
3 visitors with little pre-visit knowledge	87.3 minutes
15 visitors with average pre-visit knowledge	85 minutes
11 visitors with strong pre-visit knowledge	84.7 minutes

Table 5.19 Correlation Between Pre-visit Knowledge of Scientific Content and Dwell Times at the NHM

Lengthy dwell times of less knowledgeable visitors (similar to those with more knowledge) may be representative of Tobias' high interest/ low knowledge category. Although Tobias considers this category as a "transitory" state, he clearly states that situational interest can lead to the development of topic interest and hence the acquisition of knowledge. It is therefore relevant to note that *Darwin: Big idea, big exhibition* was scheduled at the NHM during the period of the actual anniversary of Darwin's publication of *On the Origin of Species*. Furthermore, audience research was performed approximately one month before and one month after "Darwin Day" (the celebration of Darwin's birthday is on February

12th). Hence, public interest in London was possibly at a 'climax'; coupled with the pertinent timing of the exhibit showing, these factors combined may have significantly influenced visitor engagement at the NHM.

The perceived interrelationship between pre-visit knowledge levels and average visit times in the exhibit core may serve as indicators of the exhibit's target audience: as displayed both at the ROM and the NHM, no prior knowledge of the theory of evolution and natural selection appears to have been a deterrent to lengthy engagement in the exhibit (although at the NHM flight behaviour induced by anxiety was not observed). This may signify the exhibit's effective targeting of a more knowledgeable adult audience (on the theory of evolution and natural selection) and inversely the unsuccessful targeting of less knowledgeable adult visitors.

Conversely, the exhibit may also have more effectively targeted visitors with less knowledge of Darwin's life (no knowledge or little knowledge) than those with significant knowledge.

Finally, although the data analysis included an evaluation of the relationship between prior knowledge and interest as influencing factors of engagement and learning, it should also be stated that dwell times do not provide insight on actual levels of newly attained knowledge as engagement time within the exhibit does not simply correlate with level of new knowledge acquired. Hence, higher dwell times should not be understood as an indicator of comprehension of exhibit discourses or as signifying higher levels of acquired knowledge.

5.4 Language, Culture and Context

Although all constituents in the *Darwin* project shared the same language, it is significant to note that issues of language, culture and context arose. While ROM visitors did not express complaints over the use of American English in *Darwin*, NHM visitors did. Perhaps as Britain is “the home of the English language”,⁶³⁵ the use of American English in the exhibit, presented in London, caused significant audience reactions, generating considerable “visitor feedback” and complaints.⁶³⁶ Although the exact number of complaints was not officially communicated, all four NHM staff members raised the issue of extensive grievance letters and negative comments left in the exhibit’s ‘comment box’. All expressed the ultimate desire to have rewritten and reproduced the exhibit texts in British English, however, unfortunately due to NHM budget constraints and time restrictions, “Americanisms in language [in the exhibit] could not be changed”.⁶³⁷

The continuous, substantial inflow of negative visitor letters and comments regarding the use of American English led the NHM team to post a visitor information panel at the exhibit entrance (where visitors lined up for entry due to timed ticketing) to provide an explanation for the use of American English, in March 2009, stating: “This exhibition was developed by the

⁶³⁵ Grant Reid.

⁶³⁶ Ibid.

⁶³⁷ Ibid.

American Museum of Natural History and contains American spelling and grammar.”

Additionally worthy of note, the comparison of results of visitor observation at both research sites demonstrated that Toronto visitors engaged significantly less with audio-visual elements proposed than their London counterparts. Although the general aversion to video elements was analysed in relation to layout, technical sound issues and general trends in visitor behaviour in Section 5.1.2, it is perhaps significant that the first video *No Ordinary Man* was narrated by Randal Keynes (Darwin’s great, great grandson), who has a British accent and diction and the AMNH video *Natural Selection* was presented by American scientists, hence with American diction and accents. There is therefore a possibility that local ROM audiences were not drawn to videos for this reason. Furthermore, as significantly more NHM audience members observed engaged in the videos, it should also be noted that content was predominantly British, hence with British diction and accents, perhaps therefore more ‘culturally appropriate’. Thus, more research on issues of culture, language and contexts is required in order to establish whether the ROM visitors’ relative aversion to audio-visual components represents a genuine cultural difference, was due to the use of language from a another cultural context or was simply circumstantial (influenced by design and display methods, technical sound issues or visitor shortest route preference coupled with exit behaviour).

5.5 Conclusion: Summary and Reflection on Findings from Analysis Engagement, Experience and Knowledge Acquisition

Findings from the analysis of visitor experience and learning demonstrated various similarities as well as differences at the two fieldwork sites.

Although not a representative sample, it is significant that a majority of survey participants from both fieldwork sites were from a younger, highly educated adult audience segment. Additionally, the analysis of visitor experience and dwell times also showed various similarities and differences. Firstly, as anticipated, at both research sites dwell times of visitor survey participants in the first section of the exhibit core, *A Trip Around the World*, were the highest, and the lowest in the final section of the core *Evolution Today*. However, survey respondents did not consistently spend less time in successive exhibit sections as expected. The average times in each section demonstrated the same general trend of attraction to exhibit sections as both ROM and NHM visitors spent the highest average time in the section *A Trip Around the World* followed by the section *A Life's Work*. It was therefore concluded that the themes of these sections, as well as the concentration of historical/biographical content within the context of the international Darwin celebrations, had particular interest for audience members.

While dwell times in the exhibit were generally high at the two exhibit venues, audience research demonstrated that visitors to the NHM London spent considerably more time engaging in the exhibit core than their Toronto counterparts (84.3 minutes at the NHM in comparison to 50.45 minutes at the ROM). While this may simply constitute a cultural difference

(although more research is required in order to prove this point), it is also possible the NHM's significant adaption of the exhibit's presentation and abridgement of discourse may actually have contributed to lengthier dwell times. As beginning sections of the narrative were removed, NHM visitors directly began the storyline with Darwin's five-year voyage around the world. The first section of the exhibit core - also serving as the exhibit's introduction section - was significantly more popular in London than in Toronto: ROM visitors stayed in *A Trip Around the World* on average for 17 minutes whereas NHM visitors engaged on average 34.8 minutes, almost a full 18 minutes more. Hence, providing less contextual background to the historical discourse in order to "cut a lot of prevarication into the narratives"⁶³⁸ may have been more effective in encouraging visitor engagement. Furthermore, the significant overall decrease in exhibit size at the NHM may also have had a positive influence on visitor engagement (i.e. 'less is more').

Results from the evaluation of prior knowledge and knowledge acquisition on the life of Darwin through engagement with the exhibit demonstrated that NHM visitors rated their pre-visit knowledge at slightly higher levels than at the ROM and knowledge level increments in London were lower. Regarding the acquisition of knowledge on the theory of evolution and natural selection, although pre-visit knowledge levels varied slightly at the two venues, 'knowledge level increments' were exactly identical. The great divergence in 'knowledge level increments' on the two main exhibit themes

⁶³⁸ Dr. Robert Bloomfield.

demonstrated audiences in London and Toronto focused experience and learning on the historical/biographical information provided as oppose to scientific. It can therefore be stated that the exhibit was less effective in its 'teaching' of science than of Darwin's life.

The similar trend of low engagement in *Evolution Today*, the final section of the exhibit core, considering both institutions' substantial science learning objectives, is significant. In light of established trends in visitor engagement, the location of the section *Evolution Today* would have perhaps encouraged higher engagement times and science learning if presented in the beginning of the visit experience rather than at the end of a lengthy discourse. However, in comparison to acquired knowledge on evolution and natural selection, the exhibit's HPS approach focusing on historical and biographical information did appear to be widely popular and should therefore be considered as an effective tool for visitor engagement in the conception of new exhibitions on evolution.

Finally, the analysis of the relationship between prior knowledge and interest as influencing factors of engagement and learning through a correlation of pre-visit knowledge levels and dwell times demonstrated that no knowledge of the theory of evolution and natural selection served as a deterrent or barrier for engagement. These findings are relevant in relation to the adaptability of the exhibit's discourses to variable levels of knowledge; the research determined that while the extensive exhibit did effectively target and encourage engagement for knowledgeable individuals, those with no knowledge of evolution displayed significantly lower levels of interest and engaged less with exhibit content.

Chapter Six: Culture, Worldview, Perspectives and Transformative Learning

6.0 Introduction

This thesis has addressed the questions of culture and communication including cultural adaptations of exhibit messages as well as visitor experience and acquired learning. In this chapter, Mezirow's theory of transformative learning serves as a framework for the evaluation and analysis of the influence of worldview, perspectives and tacit assumptions in informal evolution learning. The study therefore examines individual perceptions, assumptions and perspectives as "in every realm of activity, we seek and make opportunities to create, express, and affirm who we believe ourselves to be – our sense of self."⁶³⁹

As the exhibition focus is on Darwin's life-story, his research process and subsequent publication of *On the Origin of Species* as well as the components of the theory of evolution by natural selection, the evaluation of transformative learning was also based on the assumption that individuals' beliefs, perspectives, cultural frameworks and/or worldviews may conflict or concord with principles or components of the theory of evolution. Based on transformative learning theory within a constructivist paradigm, individuals are perceived as possessing the ability, through critical reflection, to actively choose to accept or reject scientific theory or specific 'conflicting' components, ultimately recognising or refuting the

⁶³⁹ Silverman, Lois H. 1995. 'Visitor Meaning-Making in Museums for a New Age'. *Curator: The Museum Journal*. Vol. 38. Issue 3. September, p161.

claims or facts of science. The objective is not to apply value judgement or reject individuals' perspectives or worldviews but to better understand visitor perspectives on evolution including issues of conflict, discord and concern. The evaluation of transformative learning that follows therefore includes an analysis of visitors' tacit assumptions, perspectives, points of view and beliefs with the objective of determining the impact of the visit experience on meaning perspectives within a process of life-long, transformative learning.

6.1 Acceptance of the Theory of Evolution – A Review of Recent Research Comparing Attitudes in Canada, the UK and USA

Studying audience reception of the international travelling exhibition *Darwin: The Evolution Revolution* in the Canadian and British contexts presented a valuable opportunity for analysing how science and worldview interact within individual and cultural frames of reference. It is within a certain tension between science and worldview, both past and present, that Darwin's work takes on great significance and encounters resistance, both historically and currently. As Michael R. Matthews states the international celebration of the 150th anniversary of Darwin's *On the Origin of Species* in 2009 was not simply a recognition of "significant scientific achievement", a commemoration and celebration of "the birth of a new

worldview” initiating “a transformation of modern worldviews and a new understanding of the place of human beings in the natural world.”⁶⁴⁰

The ‘global’ Darwin celebrations inspired a wealth of literature on current attitudes to evolution both across and within several countries; this section therefore aims to present views and attitudes in the three countries relevant to the thesis research. Most relevant to audience research of the *Darwin* exhibit is an Angus Reid public opinion poll, conducted from August to September 2012, comparing attitudes toward evolution and creationism in three countries: Canada, England and the United States. Angus and Reid poll confirms a distinct cultural perspective in American society as “people in Britain and Canada are more likely to vouch for the theory of evolution than their counterparts in the United States”.⁶⁴¹ Key findings of the Angus Reid were:

69% of Britons, 61% of Canadians and 30% of Americans think human beings evolved from less advanced life forms over millions of years” and “51% of Americans, 22% of Canadians and 17% of Britons think God created human beings in their present form within the last 10,000 years.”⁶⁴²

Furthermore, the Angus and Reid results demonstrated that male respondents from all three countries were more likely to “endorse evolution” than females. However, results according to age group were shown to vary: both Canadian and US studies showed progressive

⁶⁴⁰ Matthews, Michael R. 2009. ‘Science, Worldviews and Education: An Introduction’. In Matthews, Michael R. (ed). *Science, Worldviews and Education*. 1st edition. Springer, p1-2.

⁶⁴¹ Angus Reid. 2012. ‘Creationism and Evolution’. *Angus Reid Public Opinion Poll*. September 5. New York: Angus Reid, p1. http://www.angus-reid.com/wp-content/uploads/2012/09/2012.09.05_CreEvo.pdf (accessed 5.09.2012)

⁶⁴² Ibid, p1.

decreases in the acceptance of evolution with age while the results for Britain followed an opposite trend.

Respondents who agreed that “human beings evolved from less advanced life forms over millions of years”	Age 18-34	Age 35-54	Age 55+
Canada	65%	64%	55%
United States	35%	30%	23%
Great Britain	67%	69%	69%

Table 6.1 Decrease in Acceptance of Evolution with Age: Statistics in Canada, the United States and Great Britain. Angus and Reid Public Opinion Poll 2012.

The same trends are revealed regarding creationist views on man’s origins and evolution.

Respondents who agreed that “God created human beings in their present form within the last 10,000 years”	Age 18-34	Age 35-54	Age 55+
Canada	20%	21%	26%
United States	45%	53%	60%
Great Britain	20%	16%	16%

Table 6.2 Increase in Creationist Views with Age: Statistics in Canada, the United States and Great Britain. Angus and Reid Public Opinion Poll 2012.

These recent statistics suggest attitudes toward evolution and creationism are similar in Britain and Canada whereas American attitudes are distinctive. Further studies demonstrate American attitudes to evolution

are significantly negative in comparison to other Western countries,⁶⁴³ and the “US exception” will be examined.

While most research focuses on the religion versus science debate to understand the acceptance of evolution, there are attempts to widen the framework and consider factors affecting attitudes toward evolution. Age and gender discussed by Angus Reid is notable as are political views, to which I turn next.

Jon D. Miller, Scott and Shinji Okamoto’s poll research into the acceptance of evolution in the US, Europe and Japan over the past 20 years is enlightening for this thesis.⁶⁴⁴ Their conclusion states “the acceptance of evolution is lower in the United States than in Japan or Europe, largely because of widespread fundamentalism and the politicization of science in the United States.”⁶⁴⁵ The study reveals three

⁶⁴³ Examples of significant articles, studies and polls include: Owen, James. 2006. ‘Evolution Less Accepted in U.S. Than Other Western Countries, Study Finds’. *National Geographic News*. August 10. <http://news.nationalgeographic.com/news/pf/21329204.html> (accessed 8.05.2012); Miller, Jon D., Scott, Eugenie C. and Okamoto, Shinji. 2006. ‘Public Acceptance of Evolution’. *Science*. 11 August, Vol 313, No. 5788, p765. <http://www.sciencemag.org/content/313/5788/765.full.pdf> (accessed 8.05.2012); and Spiegel, Amy N., Evans, Margaret E., Gram, Wendy and Diamond, Judy. 2006. ‘Museum Visitors’ Understanding of Evolution’. *Museums & Social Issues*. Vol. 1, Number 1, Spring, pp. 69–86. Copyright © Left Coast Press, Inc. <http://www-personal.umich.edu/~evansem/SpiegelEvansGramDiamond.pdf> (accessed 3.3.2012).

⁶⁴⁴ Miller, Jon D., Scott, Eugenie C. and Okamoto, Shinji. 2006. ‘Public Acceptance of Evolution’. *Science*. 11 August, Vol 313, No. 5788, p765. <http://www.sciencemag.org/content/313/5788/765.full.pdf> (accessed 8.05.2012).

⁶⁴⁵ Ibid.

main factors influence attitudes toward evolution in the US: “the structure and beliefs of American fundamentalism historically differ from those of mainstream Protestantism in both the United States and Europe” encouraging a literal interpretation of the book of Genesis and the rejection of scientific findings that oppose this biblical literal view; the “evolution issue has been highly politicized and incorporated into the current partisan division in the United States in a manner never seen in Europe or Japan” (i.e. political opposition to evolution is not present in EU countries or Japan); and a substantial portion of the American public “have adopted a human exceptionalism perspective” demonstrating issues with “genetic literacy” and the effectiveness of science education.⁶⁴⁶ Miller, Scott and Okamoto’s research of the effect of US political views on the acceptance of evolution, a significant link was discovered between American “pro-life beliefs” and “conservative beliefs and a conservative partisan view” and the rejection of the theory of evolution, identified as additive factors for refuting evolution.⁶⁴⁷ This suggests the American cultural, religious, historical and political environment has significant influence on attitudes toward evolution, representing rather unique circumstances within Western culture. Furthermore, reviewing statistics

⁶⁴⁶ Miller, Jon D., Scott, Eugenie C. and Okamoto, Shinji. 2006. ‘Public Acceptance of Evolution’. *Science*. 11 August, Vol 313, No. 5788, p766. <http://www.sciencemag.org/content/313/5788/765.full.pdf> (accessed 8.05.2012).

⁶⁴⁷ *Ibid*, p766.

from international polls on the acceptance of the theory of evolution, only Turkish respondents were less accepting of evolution than Americans.⁶⁴⁸

Angus and Reid provide further significant findings for audience research of the *Darwin* exhibit, comparing attitudes toward evolution and creationism in the three geographical areas of focus: the Canadian province of Ontario, the Northeastern United States and London, England.

Respondents who agreed with the following statements:	Northeastern United States	Ontario, Canada	London, England
“human beings evolved from less advanced life forms over millions of years”	37%	60%	60%
“God created human beings in their present form within the last 10,000 years”	48%	24%	23%
Not sure	15%	16%	18%

Table 6.3 Attitudes on Human Evolution and Divine Creation in Geographical Areas of Research Focus. Angus and Reid Public Opinion Poll 2012.

Table 6.3 demonstrates similar views on evolution and creationism within the geographical regions of focus, although the project’s main American constituent validates a significantly higher rate of non-acceptance of human evolution. While undoubtedly the Northeastern United States (including New York) represent most accepting of the theory of evolution (in comparison to the Midwest, South and Western regions), results of the acceptance of human evolution in the north-east were still considerably

⁶⁴⁸ Miller, Jon D., Scott, Eugenie C. and Okamoto, Shinji. 2006. ‘Public Acceptance of Evolution’. *Science*. 11 August, Vol 313, No. 5788, p766. <http://www.sciencemag.org/content/313/5788/765.full.pdf> (accessed 8.05.2012), p765.

lower than in Ontario and London (as a difference of 23% was determined).

The 'unique American circumstances' regarding attitudes to evolution are significant as the main constituent of the international travelling exhibit analysed, the American Museum of Natural History, and the exhibit curator are American. Thus, if points of view communicated in the exhibit are derived from an American contextualisation and cultural perspective of the 'science versus religion debate', there is a risk that the relevance of the exhibit discourse 'across cultures' through appropriate international contextualisation may be hindered. It is also plausible that local audiences in Toronto and London may identify the cultural provenance of exhibit perspectives, which may in turn essentially influence visitors' perceptions of the local cultural relevance of the exhibit.

6.2 Audience Research of Transformative Learning at the ROM

Rather than present all the statistics and findings generated in the analysis of data collected, the evaluation of transformative learning deliberately concentrates on significant – as opposed to general - findings from the implementation of the 'transformative learning scale', devised for the purpose of the study, and the evaluation of critical reflection. Although an overview of survey participants' worldviews and perspectives from pre-visit interviews is provided in order to contextualise individual responses in relation to those of the survey sample, the focus is on modifications of

perspectives, assumptions and understandings generated through critical reflection.

6.2.1 ROM Pre-visit Worldviews, Habits of the Mind and Points of View Regarding the Relationship between Science and Truth

During the ROM pre-visit interviews, the 30 survey participants were asked: “How would you describe your worldview? How do you feel about science and truth?” Responses were divided into five categories according to visitor descriptions and information provided: a ‘scientific worldview’ based on realism; secular realism; synthesis perspectives; cultural relativism, postmodernism and/or idealism; and unsure, undecided or divided worldviews. Notably, although the analysis of science as worldview or as having worldview input in Chapter 2 determined that according to definition, science cannot be considered a complete or comprehensive worldview, this worldview category was maintained due to the significance in visitor responses and descriptions. Hence a discrepancy resides between theory and visitors’ perception of their frames of reference.

Worldviews of ROM Survey Participants

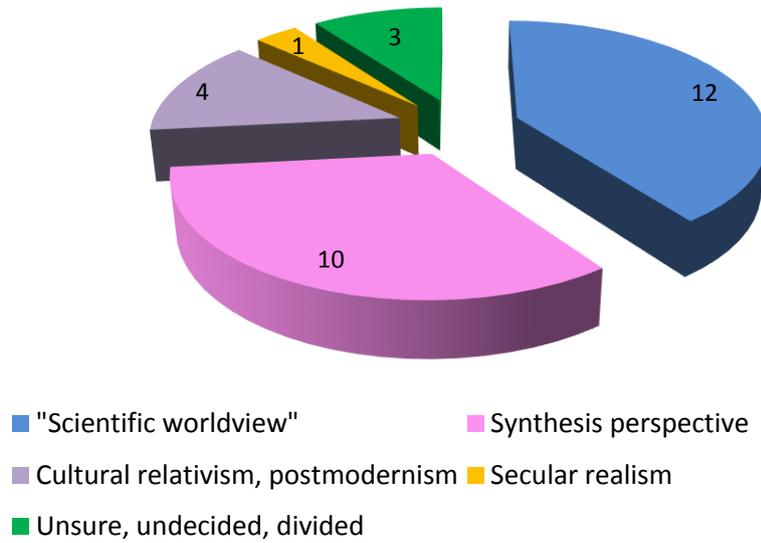


Table 6.4 Distribution of Worldviews of Visitor Survey Participants at the ROM.

'Scientific Worldview' Based on Realism:

Of the 30 participants, 12 visitors (40%) expressed the view that science is highly relevant and contributes “exclusively” to their understanding of the world and reality. These visitors often flatly stated “science is truth” and articulated a worldview based on realism and a high esteem of rationalism, with logic and reason as a fundamental source of knowledge. As they explained science as a singular system of principles supporting and providing their worldview, scientific research, findings and principles are considered as the framework or “filter” for both interpretation and meaning-making processes, hence constituting their meaning perspective.

Although surveys intentionally did not include questions on religion, an attempt to determine attitudes to science and religion according to Michael Shermer’s model within data analysis was made. The analysis established an equal division between those who adhered to NOMA or the ‘separate

worlds model'⁶⁴⁹ where “science and religion are neither in conflict nor in agreement”⁶⁵⁰ and those who expressed negative views of religion⁶⁵¹ or viewed the science and religion as “mutually exclusive ways of knowing, one being right and the other wrong”,⁶⁵² through the “conflicting-worlds model” or “warfare model”.

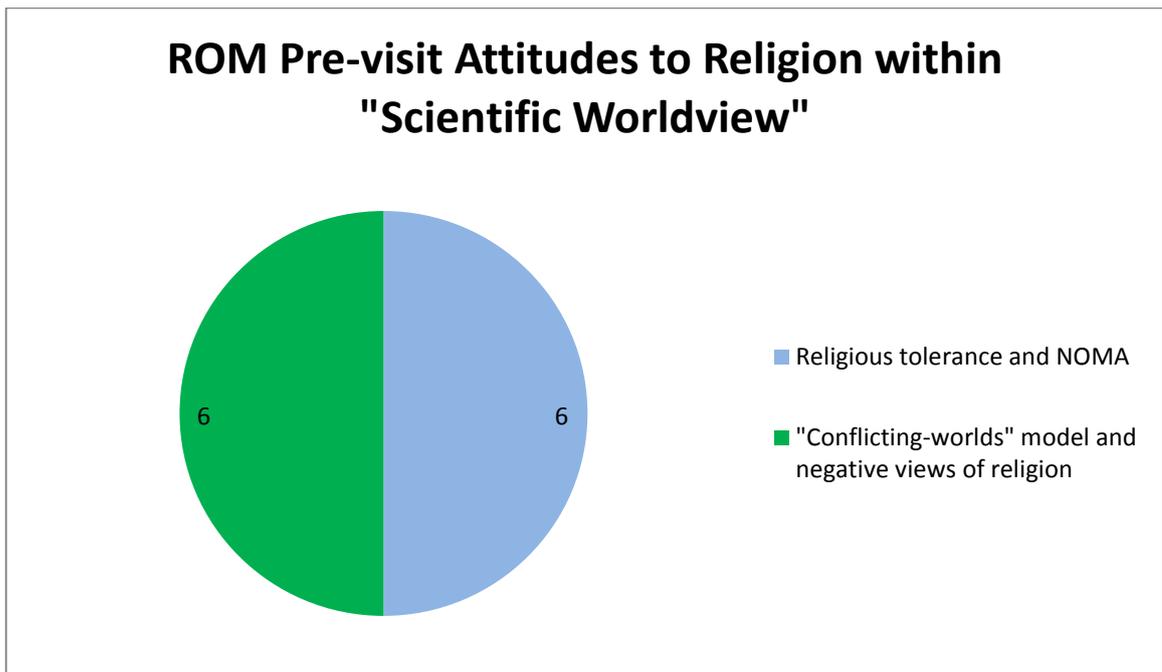


Table 6.5 Pre-visit Attitudes to Religion of Visitors with a 'Scientific Worldview' at the ROM.

Examples of visitors' “conflicting-worlds” attitudes provided are: “I am a hard-core atheist” and religion is “harmful” both to individuals and to

⁶⁴⁹ ROM.Visitor.2/3/7/11/12/16

⁶⁵⁰ Shermer, Michael. 2006. *Why Darwin Matters, The Case Against Intelligent Design*. New York: Henry Holt and Company, LLC, p120.

⁶⁵¹ ROM.Visitor.9/14/25/27/29/30

⁶⁵² Shermer, Michael. 2006. *Why Darwin Matters, The Case Against Intelligent Design*. New York: Henry Holt and Company, LLC, p119-120.

society,⁶⁵³ “science is truth” as opposed to “blind faith”⁶⁵⁴ or “spiritual truth”;⁶⁵⁵ “I don’t feel comfortable with support systems that are strictly [...] faith-based [...] and resent this dichotomy”;⁶⁵⁶ and “the general population is quite ignorant... they are overwhelmed by different dogmas.”⁶⁵⁷

Synthesis Perspective, a ‘Combined Frame of Reference’:

Of the 30 survey participants, 10 visitors (one-third) explained that both science and religion combine and contribute to their worldview, henceforth defined in the thesis as a synthesis perspective. These visitors expressed both a value of science, scientific research and findings as well as of religious or spiritual beliefs that combine to shape their view of the world, thus serving to guide interpretation and meaning-making processes.

In pre-visit interviews, establishing whether visitors upheld a “separate-worlds” or “same-world” model proved difficult hence the following graph presents visitor responses and views.

⁶⁵³ ROM.Visitor.14

⁶⁵⁴ ROM.Visitor.29

⁶⁵⁵ ROM.Visitor.30

⁶⁵⁶ ROM.Visitor.27

⁶⁵⁷ ROM.Visitor.9

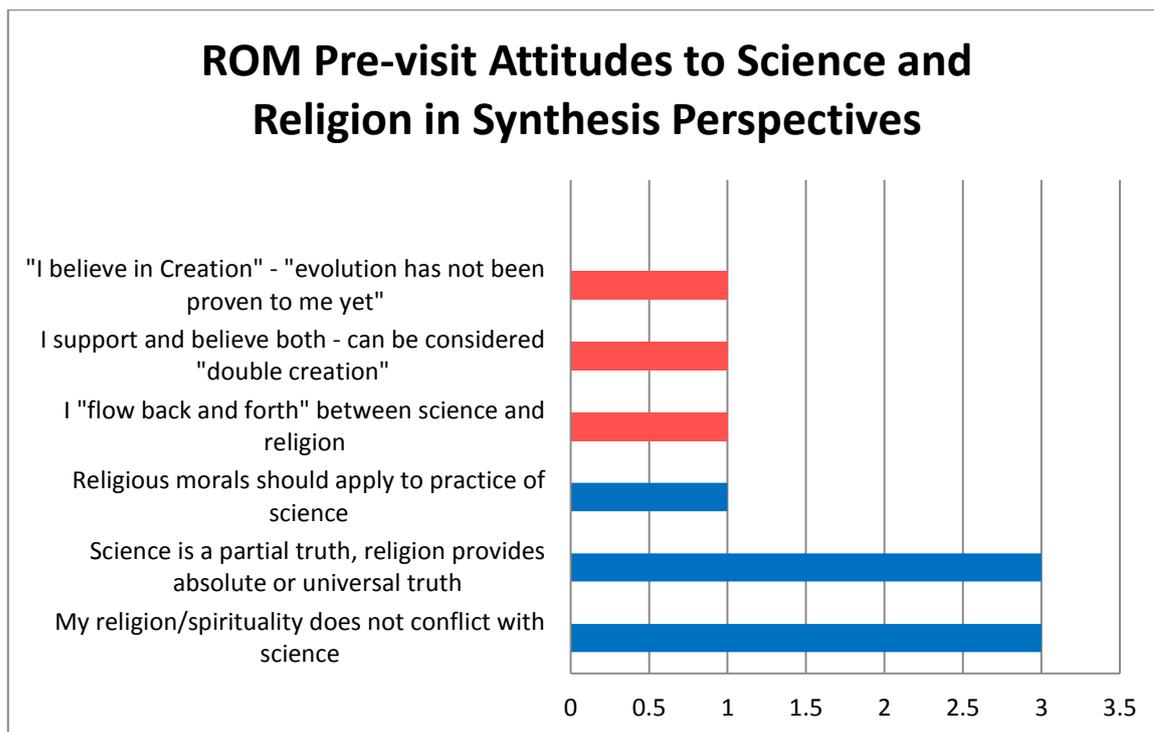


Table 6.6 Pre-visit Attitudes to Relationship between Science and Religion of Visitors with a Synthesis Perspective at the ROM.

Worldviews based on Cultural Relativism, Postmodernism and/or Idealism:

At the ROM, 4 visitors expressed what they described as a “global view” within which the diversity of human perceptions of truth and reality are both recognised and valued, hence considered as articulating worldviews based on cultural relativism, postmodernism and/or idealism; the existence of multiple truths and realities according to subjective experience, individual understanding and cultural perspectives is considered as guiding their interpretation and meaning-making processes.

Two visitors described themselves as “open-minded”, upholding a “global view” based on extensive travel and knowledge of multiple cultures, languages and perspectives⁶⁵⁸ (i.e. cultural relativism). Another visitor

⁶⁵⁸ ROM.Visitor.4/24

(ROM.Visitor.28) explained that “the world is subjective” and that individually held truths constitute truth (i.e. truth relativism).⁶⁵⁹ The fourth visitor described science as “a social and cultural construction [...] informed by social values”⁶⁶⁰ of “privileged [...] white, middle and upper-class men [...] [who] write science [and] have their view taken as truth.”⁶⁶¹

(Philosophical) Secular Realism as Worldview:

One ROM survey participant, an academic teacher with a PhD in philosophy, defined his worldview as secular realist and articulated his position on the relationship between science, truth and religion that guides his interpretation and meaning-making processes:

I think that aesthetic values, moral values and normative values of goodness and badness, in the general sense not just in the ethical sense, are definitely real phenomenon in the world. But I am secular in the sense that I don't need to ground their existence in anything but humans.

ROM.Visitor.5

Furthermore, he specified humans are not separate from the physical world or the universe as the world “places demands” that are “grounded in factual existence”; decision to act on these physical demands is dependent on human agency rather than “grounded in the dictates of a certain religion.”⁶⁶²

⁶⁵⁹ ROM.Visitor.28

⁶⁶⁰ ROM.Visitor.13

⁶⁶¹ ROM.Visitor.13

⁶⁶² ROM.Visitor.5

Although his worldview, apparently based on Aristotelian realism is therefore both compatible with science and supportive of the value of science, as a philosopher he expressed concern over perspectives of scientism which he believes certain scientists adhere to and advocate stating: “the pursuit of truth is not exclusive to the natural sciences” as science is “not the only way to get out the facts that are in the world”;⁶⁶³ “religion is another way” of searching for truth, although non-scientific.⁶⁶⁴

Unsure, Undecided or Divided Worldviews:

Finally, three ROM survey participants expressed a degree of uncertainty or division in their worldview and perspectives; it was therefore not possible to establish a distinctive perspective or “world model” they uphold or support. One visitor highlighted the “big role” of science in the world; however, regarding truth simply stated “science is part of it but not all of it”.⁶⁶⁵ Another was either unsure of her own worldview, does not have a worldview and appeared indifferent: describing herself as “open-minded”, she stated “I don’t have any specific beliefs about anything. I believe in the possibility of everything.”⁶⁶⁶

The third visitor in this category described a divided worldview: she explained being “torn between” a strictly scientific or rational outlook and a more “emotional” outlook supportive of the “creative arts” as these were

⁶⁶³ ROM.Visitor.5

⁶⁶⁴ ROM.Visitor.5

⁶⁶⁵ ROM.Visitor.8

⁶⁶⁶ ROM.Visitor.18

the opposing perspectives her parents held, hence significant in her upbringing.⁶⁶⁷ She has therefore not fully resolved the negotiation of perspectives through critical reflection in the aim of formulating a personal and comprehensive worldview.

6.2.2 ROM Pre-visit Understanding of the Current Relevance of the Theory of Evolution

In pre-visit interviews, visitors were asked whether they felt the theory of evolution and natural selection are important or relevant today and to explain why. One visitor abstained from answering as she had no knowledge of the theory of evolution. Of the remaining 29 respondents: 10 visitors had highly positive responses; 12 had positive answers; 4 were hesitant (stating “I think so” or “somewhat”); 1 stated evolution is “not as relevant today”; 1 considered evolution as currently relevant but stated, “but I think it’s still just a theory”;⁶⁶⁸ and finally 1 visitor, who within her synthesis perspective embraces both Creation and evolution, feels the theory of evolution has current relevance however stated: “I guess it [evolution] has not been proven to me yet.”⁶⁶⁹

Before entering the exhibit, 23 of visitors agreed that the theory of evolution has current relevance while 4 felt the scientific theory was historically relevant yet unsure of the relevance today and 2 felt the theory of evolution has not been sufficiently proven.

⁶⁶⁷ ROM.Visitor.26

⁶⁶⁸ ROM.Visitor.17

⁶⁶⁹ ROM.Visitor.20

Visitor explanations for the current relevance of the theory of evolution and natural selection were analysed thematically as shown below. (Note: respondents provided multiple answers.)

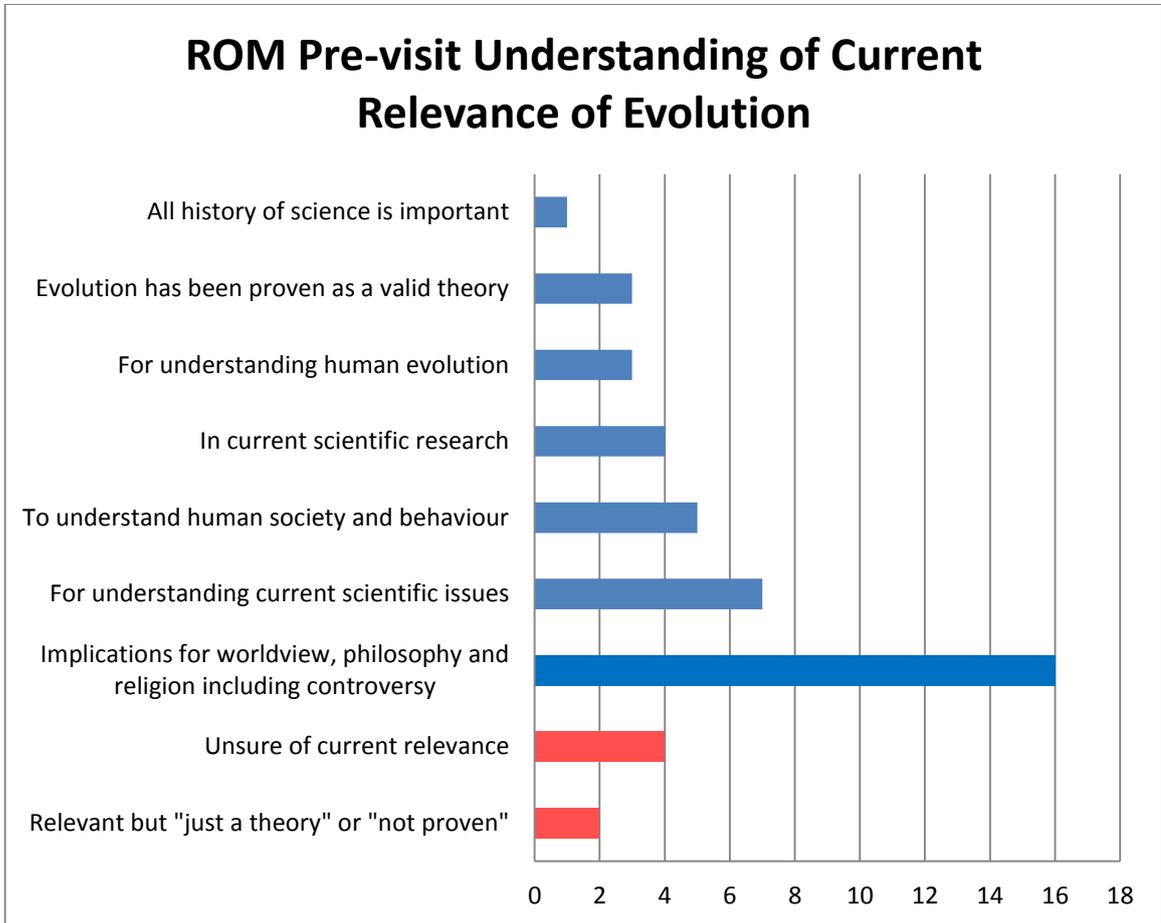


Table 6.7 Pre-visit Understanding of the Current Relevance of the Theory of Evolution at the ROM.

6.2.3 ROM Pre-visit Perspectives of Darwin

Within the pre-visit interview, audience research participants were asked to voice their opinions of “who Darwin is” and “what he represents”. Visitor responses were once again analysed according to themes raised and visitors provided multiple responses.

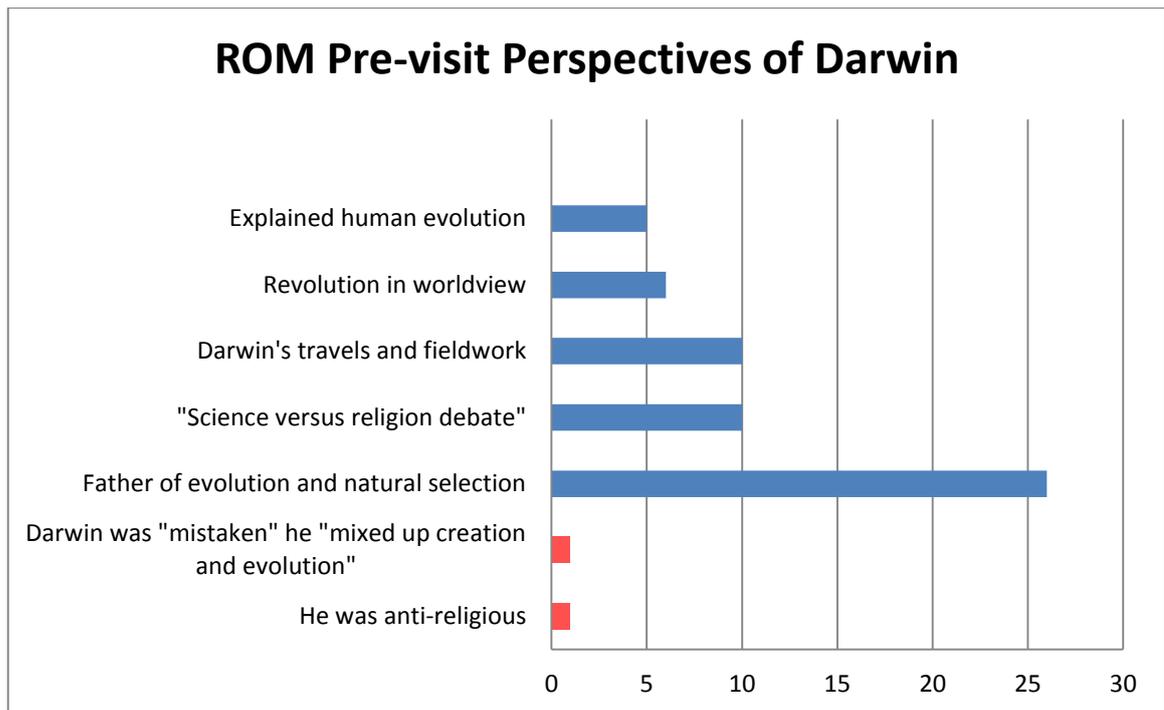


Table 6.8 Pre-visit Perspectives of Darwin at the ROM.

It is significant that before entering the exhibit, one-third of ROM survey participants spontaneously discussed “religious controversy” surrounding the theory of evolution when discussing Darwin. This supports the perception that Darwin himself has become a symbol of the ‘science versus religion debate’. One visitor interviewed even stated she knew nothing of Darwin or evolution other than the fact that he had a very “different view on religion”. However, one visitor cast Darwin in a negative light: he claimed Darwin was “mistaken” as he “mixed up creation and evolution” which are “two separate things”. Furthermore, only one visitor mentioned the fact that although Darwin himself evokes ‘controversy’ with religion, Darwin himself was actually a “religious man”, thus indicating that issues of contention due to the publication of his research findings were not Darwin’s intention. It is therefore highly possible that ROM visitors

generally believe evolution itself ‘contradicts’ religious tenets, that Darwin was an atheist or that he opposed religion.

It was concluded that before entering the exhibit, ROM visitors generally had a strong grasp of the importance of Darwin’s scientific contribution, his research and method as well as the significance of the publication of *On the Origin of Species* due to the worldview implications of the theory of evolution. However, the ‘science versus religion debate’ was also very present in visitors’ views and perspectives of Darwin, the man and the scientist.

6.2.4 ROM Visitors’ Post-visit Understanding of Exhibit Authorship, Perspective and Stance

In order to discern whether ROM visitors understood the travelling and collaborative nature of *Darwin*, survey participants were asked to identify the exhibit producers hence establishing visitors’ perceptions of exhibit authorship. Of the thirty respondents, an overwhelming 19 of 30 (63.3%) clearly stated they “do not know”. The remaining 11 visitors felt they possibly knew, however only 2 who were aware *Darwin* was a travelling exhibit but could not recall the names of partner institutions, 1 remembered the names of three institutions, and finally 1 knew the names of the five institutions; thus only 4 visitors were clearly aware of the collaborative authorship of the travelling exhibit after their visit.

Notably, one visitor stated being aware of an American and UK contribution as he was significantly disappointed with the American cultural contextualisation of the ‘science versus religion debate’:

This is, I think, a very American show [...] it obviously has greater resonance in the US. [...] It would have been nice to have provided context of our [Canadian] views here... you know, our views that are much different. If the data exists, then it should have been included. If it doesn't exist... then it raises a question.

ROM.Visitor.27

The absence of a Canadian cultural contextualisation of the 'science versus religion debate' reinforced this visitors' impression of exhibit content as derived from an American cultural perspective.

The bewilderment of the vast majority of those interviewed when asked to identify the museum or museums that had produced *Darwin* led to the assumption that most visitors did not question authorship at all during their visit and that local perspectives do essentially prevail. Hence, the ROM's objective to communicate build corporate image through partnerships with world leading institutions can be considered largely unfulfilled.

During the post-visit interviews, respondents were also asked to identify the ROM's position or stance on evolution as both institutional and learning objectives are tied to visitors' understanding the Museum's official position in support of the theory of evolution. Although 14 of 30 visitors clearly stated that the position of the ROM was both pro-evolution and pro-Darwin, this represents less than half of those interviewed. Of the remaining 16 respondents: 5 visitors were completely unsure as to the ROM's position, 2 felt that the ROM did not have a position and significantly 9 visitors employed the term "neutral" to describe the ROM's position on evolution. The perception of a position of neutrality, while perhaps valued and understood as an unbiased stance, may actually

represent a degree of public resistance to the ROM's objective of reinforcing the public's view of the essential role of museums in shaping public discourse about ideas of great significance⁶⁷⁰.

6.2.5 Critical Reflection on Perspectives at the ROM

In order to evaluate the exhibit's capacity to foster critical reflection, survey participants were asked to indicate whether during their visit they reflected on their "personal perspective", stance or views regarding evolution by natural selection in relation to other positions or beliefs and to explain. They were also asked whether they felt supported or challenged in their personal views (during their visit).⁶⁷¹ Findings demonstrated that 8 of 30 visitors engaged in conscious critical reflection, 7 visitors did not and 15 were unsure.

The two main contributing factors in fostering critical reflection on personal perspectives and those of 'others' were: understanding the position of the exhibition (as a pro-evolution stance) and worldview. Firstly, it is highly significant that 6 of the 8 visitors who engaged in critical reflection understood the position of the ROM as pro-Darwin and pro-evolution, establishing that the perception or understanding of a position or stance – as oppose to neutral or biased – was a critical factor. Second, personal worldviews also played a fundamental role in fostering critical reflection at

⁶⁷⁰ Christine Lockett.

⁶⁷¹ The actual question asked (as written on the exit survey) was: At any time during your visit, did you become aware of your position or stance on the evolutionary debate in relation to other positions or beliefs? Did you feel "challenged" or "supported" at any point? Please explain.

the ROM: 5 of the 8 visitors who engaged in critical reflection had synthesis perspectives, 1 a cultural relativist perspective and postmodernist worldview, 1 a secular realist worldview and 1 a 'scientific worldview'.

As visitors also explained whether they experienced feelings of support or challenge of their personal perspectives during their visit, of the 8 visitors who engaged in critical reflection: 3 explained feeling supported during their visit, 1 felt good (i.e. supported), 1 felt neutral, 2 felt challenged and 1 felt neither supported nor challenged but was disappointed with the stance and views expressed in the exhibit. The focus and impact of critical reflection therefore follows.

6.2.6 Worldviews, Perspectives, Assumptions and Transformation at the ROM

The results of the previous analysis demonstrated that critical reflection is significantly linked to individual worldviews and understanding the exhibit stance as pro-evolution. As perspectives expressed and experiences described were highly personal, the evaluation of the impact of critical reflection and the exhibit's capacity to foster transformative learning experiences will be addressed through a holistic approach to individual experience.

Firstly, only one visitor who articulated a 'scientific worldview' engaged in critical reflection during his visit and explained feeling "very excited" during his visit. He had expressed a "conflicting-worlds model" attitude to the relationship between science and religion and had voiced a fear of general

“public ignorance” and individuals being “overwhelmed by dogmas”.⁶⁷²

During his exit interview, he referred several times to his life in Russia as a child and during his youth, hence both his “cultural frame of reference” and worldview guided his interpretation. Understanding the exhibit’s pro-evolution stance, he engaged in critical reflection on his own perspective in relation to those of others, expressing “hope” that those who are “overwhelmed by dogmas” could be “reached” through “education”.⁶⁷³ He therefore reflected on the educational qualities of the exhibit in relation to those who reject evolution.

One visitor articulating a cultural relativist worldview, as having “travelled to over 40 countries and lived in many”, engaged in critical reflection. She understood the position of the ROM as “pro-evolution” and felt “totally supported” in her “strong pro-evolution” stance. She described her perspective on science as “medical” and explicated her process of critical reflection in the exhibit:

There was a point when I would have liked to have seen what he [Darwin] had to say about people with mental or physical disabilities. [...] I wanted to know where he stood on humans and the ‘weak’ qualities... whether he felt that was an evolutionary thing and they would all eventually die off... or should be sterilised. That content was missing.⁶⁷⁴

⁶⁷² ROM.Visitor.9

⁶⁷³ ROM.Visitor.9

⁶⁷⁴ ROM.Visitor.24

Although she attempted to engage in objective reframing or “critical reflection on the assumptions of others”⁶⁷⁵ she did not “encounter” the perspective of Darwin she was searching for in the exhibit narrative – only a minor, short text was presented with very little detail. Her question of Darwin’s perspective on disability was therefore unanswered and her concerns remained. She felt her worldview was “exactly the same” as when she had arrived.

Another visitor to have engaged in critical reflection “works for the Anglican Church” and had articulated a harmonious combination of science and religion within his worldview which he explained is due to the views of his Church: “you don’t have to check your brain at the door” therefore “science is not an issue.”⁶⁷⁶ He felt the exhibit was “clearly for evolution” and engaged in critical reflection on what he perceived as the main message of the exhibit: “the nature of science” and “social reactions at the time.”⁶⁷⁷ Reflecting only on the historical ‘debate’, not only did he engage in objective reframing, but also in critical reflection on the assumptions of others in another cultural and historical context (19th century Victorian England). He felt supported in his views and has the same worldview as when he entered.

⁶⁷⁵ Keagan, Robert. 2000. ‘Learning to Think Like and Adult’. In Mezirow, Jack and Associates (ed). *Learning as Transformation: Critical Perspectives on a Theory in Progress*. San Francisco: Jossey Bass Inc., p23.

⁶⁷⁶ Rom.Visitor.1

⁶⁷⁷ Rom.Visitor.1

A 30 to 34 year-old female with a Bachelor degree in political science had described her worldview as a synthesis perspective that combines “a little bit of both” science and spirituality. She had described herself as “jaded” and explained a “flow back and forth” within a “separate-worlds” model of science and religion.⁶⁷⁸ She felt the ROM’s position on evolution was neutral and therefore felt neither supported nor challenged in her personal perspectives. She engaged in critical reflection on the content of the exhibit’s timeline of *Social reactions to Darwin* which includes historical reactions in England at the time of publication of *Origin* and issues in America such as the *Scopes Monkey Trial* up until today. She had reflected on the educational value and the significance of reactions to evolution. While her critical reflection can be considered to consist of objective reframing, she at no time mentions the relationship of her own perspective with those of others, hence it is deduced that subjective reframing or a critical assessment of her own assumptions did not take place.

An architect with a degree in human biology and a harmoniously combined synthesis perspective had described the “cultural effects” of scientific findings and variation in answers as well as his belief in universal truth.⁶⁷⁹ Although he stated not knowing the position of the ROM on evolution, he did mention “a little hint of a message of the spiritual...and then the

⁶⁷⁸ ROM.Visitor.23

⁶⁷⁹ Rom.Visitor.10

science...⁶⁸⁰ In his opinion, “trying to bring that awareness to the public”⁶⁸¹ was both positive and important. Furthermore, felt the discussion of Darwin’s personal faith was important as “people may think that there’s no religious background to the theory [of evolution] which is not true!”⁶⁸² He engaged in critical reflection on the “truth in science” and felt supported in his views. Unfortunately he did not explain whether this reflection was on the relationship between faith and religion or simply on the validity and importance of the scientific method.

Only one visitor with a synthesis perspective that engaged in critical reflection actually stated feeling her personal perspective was challenged during her visit. As described in the analysis of pre-visit worldview responses, this 24 year-old with a degree in English and Geography employed the term “double creation” to describe her belief in Creation (and the Catholic religion) and equal support of science, signifying a “side-by-side” co-existence of separate yet conflicting meaning schemes. She had justified her “separate-worlds” stance as “science is truth” and religion is based in “faith”, however, religious postulates dominated her meaning perspective as she also stated “I guess it [evolution] has not been proven to me yet”.⁶⁸³

⁶⁸⁰ Rom.Visitor.10

⁶⁸¹ Rom.Visitor.10

⁶⁸² Rom.Visitor.10

⁶⁸³ Rom.Visitor.20

She explained her engagement in critical reflection as due to her personal lack of conviction or a strong position on evolution. She felt the exhibit strongly supported evolution and natural selection and explained having made this realisation when viewing the human evolution display in *Evolution Today*. She stated, “Before that I hadn’t really felt that they had an angle.” It would therefore appear that it is human evolution that she has either not yet fully accepted or perceives simply as a hypothesis.

The presentation of a pro-evolution stance made her feel she was obliged to maintain a specific position within the ‘science versus religion debate’, thus requiring a personal choice. She explained: “I am wishy-washy. [...] Most people take sides.” She therefore felt “slightly challenged” in her inability to take a position in an either/or debate on evolution (and religion). Significantly, she engaged with exhibit content specifically designed to counter this reaction such as the video such as in *What is a Theory* – which communicates the position of NOMA upholding the view that a choice is not required as even certain influential scientists maintain a non-conflicting relationship between their “personal religion” and science – and the text on the panel *Social Reactions to Darwin* presenting the views of Pope John Paul II:

Some also embrace the notion, as expressed by Pope John Paul II, that evolution may be a valid scientific explanation for the origins of body form and other aspects of the material world, but that God alone is responsible for the origin of the human soul.⁶⁸⁴

⁶⁸⁴ AMNH. 2005. *Darwin: The Evolution Revolution*. Exhibition Text ‘Social Reactions to Darwin: Long-standing Controversies’ from Section ‘A Life’s Work’.

Essentially, during her visit, she consciously engaged in self-examination and subjective reframing when confronted⁶⁸⁵ with a presentation of multiple perspectives of ‘the debate’. Although she describes no shift in her perspectives she may revise her point of view or habit of the mind⁶⁸⁶ and adopt a “position” in the debate.

Two visitors who engaged in critical reflection in the exhibit had strong negative emotional reactions to the experience. Firstly, a 55 to 64 year-old educator with a graduate degree had described herself as “very spiritual” although completely accepting of the theory of evolution and the value of science. In her post-visit interview she explained her experience as a “Creationist” in *Darwin* was one of “constant” engagement in critical reflection.⁶⁸⁷ Although she felt neither supported nor challenged in her views, she was extremely “disappointed” with the exhibit’s position and arguments, notably the “misrepresentation” of her Creationist perspective as “including Intelligent Design”.⁶⁸⁸ She felt she had strong knowledge of both positions as her husband (who accompanied her) is a “staunch believer in Intelligent Design”. Her issue was a “lumping together” of two fundamentally different and distinct religious perspectives. Greatly disappointed with the exhibit’s clear pro-evolution stance, she explained

⁶⁸⁵ See the importance of the confrontational approach in encouraging critical reflection in Gardner, Howard. 1999. *Intelligence Reframed: Multiple Intelligences for the 21st Century*. New York: Basic Books, p164-165.

⁶⁸⁶ Keagan, Robert. 2000. ‘Learning to Think Like and Adult’. In Mezirow, Jack and Associates (ed). *Learning as Transformation: Critical Perspectives on a Theory in Progress*. San Francisco: Jossey Bass Inc., p19.

⁶⁸⁷ Rom.Visitor.21

⁶⁸⁸ Rom.Visitor.21

being dismayed by the obvious “bias” of views expressed.⁶⁸⁹ Furthermore, throughout her visit, she was “bothered” by the exhibit’s use of the words “evidence” and “theory”, qualifying them as “valuating terms”, implemented “to make the public agree”, which she felt was a clear “manipulation”.⁶⁹⁰ Her critical reflection focused on objective reframing of the perspective she encountered in the exhibit and at no point explained engaging in a process of self-examination or subjective reframing. It would therefore appear that she experienced the effects of a counter-narrative experience of a “consensus narrative” or a “negotiated” response due to the presentation of a narrative based on “normative assumptions” of “ideal visitors”⁶⁹¹ which was further complicated by a misrepresentation of her own perspective. The other visitor who had a very strong negative response to *Darwin* content was an academic teacher with a PhD in philosophy upholding a secular realist worldview. He claimed having engaged in critical reflection during his visit and felt his personal views were challenged. While viewing the video *What is a Theory*, he displayed physical signs of frustration or negative emotions and suddenly left the exhibit. He explained he had a desire to actually “argue” with scientists that were discussing the scientific use of the term ‘theory’ as he found their position controversial from a philosophical point of view. However, before his visit

⁶⁸⁹ ROM.Visitor.21

⁶⁹⁰ ROM.Visitor.21

⁶⁹¹ Scott, Monique. 2007. *Rethinking Evolution in the Museum: Envisioning African Origins*. Hooper-Greenhill, Eilean and Kaplan, Flora (eds). Museum Meanings Series. London and New York: Routledge, p114.

he had expressed his “frustration” with views that the “pursuit of truth” is “exclusive to the sciences”⁶⁹² and found representation of scientism in the video that was not intended to purport this perspective. It is viable that his “expectations and ideas about [...] science”⁶⁹³ influenced his interpretation and reading of unplanned message⁶⁹⁴ as a “cultural imagining”.

Finally, one visitor experienced a disorienting dilemma during and perspective transformation (although he did not indicate having engaged in critical reflection). Before entering, this 58 year-old African-American corporate manager with a college diploma (originally from Jamaica) described his worldview, focusing on the relationship between science and truth within his Buddhist meaning perspective:

⁶⁹² ROM.Visitor.5

⁶⁹³ Macdonald, Sharon. 1999. ‘Cultural Imagining Among Museum Visitors’. In Hooper-Greenhill, Eilean (ed). *The Educational Role of the Museum*. 2nd Ed. London: Routledge, p270.

⁶⁹⁴ Ibid, 270.

I look at truth as a mirror.⁶⁹⁵ I look at science as looking at more *that* one aspect of that mirror at a given time and based on the knowledge at the time, they know that to be a truth. But I think we mix up absolute truths with truth based on our current thoughts. And alot of people think that science is an absolute truth when in actuality, in my opinion, it's merely giving credibility or inspiration to given laws and what have you... based on the knowledge they have at the time.

ROM.Visitor.15

Notably he cast Darwin in a very negative light, understanding him to be “mistaken” as he had “mixed up creation and evolution” which are “two separate things.”⁶⁹⁶

During visitor observation, he displayed high interest in exhibit texts regarding Darwin's faith and his views on human evolution and spent significant time reading *Brothers Under the Skin*. He also showed visible signs of disorientation and immediately ended his visit, performing the post-visit interview, upon his request, on a bench in front of Darwin's study (hence he did not enter the sections *Evolution Today* or *Legacy* until his exit from the exhibit). Deep within a process of critical reflection of tacit assumptions and intellectually grasping the full implications of revised

⁶⁹⁵ The Stanford Encyclopedia of Philosophy provides a clear explanation of Buddha's philosophical perspective of truth: “The theory of the two truths is the heart of the Buddha's philosophy. It serves as the mirror reflecting the core message of the Buddha's teachings and the massive philosophical literature it inspired. At the heart of the theory of the two truths is the Buddha's ever poignant existential and soteriological concerns about the reality of things and of life.” For more information please see Thakchoe, Sonam. 2011. ‘The Theory of Two Truths in India’. In Zalta, Edward N. (ed). *The Stanford Encyclopedia of Philosophy*. Summer Edition. <http://plato.stanford.edu/archives/sum2011/entries/twotruths-india/> (accessed 19.01.2012).

⁶⁹⁶ ROM.Visitor.15

perspectives and assumptions, a degree of disorientation continued.

Firstly, he described a modified view or shift in his understanding of evolution based on a corrected tacit assumption or misconception of Darwin's perspective:

Well I looked at it [evolution] from a theological standpoint as oppose to an evolutionary one. I had Darwin acting incorrectly as an atheist... which he wasn't!

ROM.Visitor.15

Correcting his pre-visit perspective of Darwin as an atheist involved a "challenge of misconceptions"⁶⁹⁷ of Darwin and of the driving motivation of Darwin's research. When asked to describe his new perspective of Darwin he exclaimed: "It's changed! [...] I don't consider him to be such a bastard!"⁶⁹⁸ He then explained another corrected tacit assumption he had of Darwin as racist or pro-slavery countered by learning of Darwin's abolitionist views: "He [Darwin] adopted his [grand]father's view... that it [slavery] shouldn't exist."⁶⁹⁹ He then expanded:

⁶⁹⁷ Gardner, Howard. 1999. *Intelligence Reframed: Multiple Intelligences for the 21st Century*. New York: Basic Books, p164-165.

⁶⁹⁸ ROM.Visitor.15

⁶⁹⁹ ROM.Visitor.15

And that is the one that also a church would make its problem... and I'm speaking from a stand-point of slavery now... If it was determined that they are all human then they should be treating them in a human and right fashion. It was decided by the church at the time that there are human and there are sub-human. And that would justify certain types of treatment. I don't think that whoever was the dominant culture at the time would have done any different. So I don't consider this to be a black-white issue. I consider it to be the ones that are dominant and the others right?

ROM.Visitor.15

Finally, while he felt the exhibit significantly impacted his knowledge of the theory of evolution (he had estimated his pre-visit knowledge as average and post-visit as strong), however he also felt a reinforcement of his "own belief system." In reference to his pre-visit perception of the existing separation between creation and evolution, he states "And actually he [Darwin] really didn't dispute that. I had been trying to say that he did."⁷⁰⁰ He explains that his view of Darwin, now that he has gone through the exhibit, has been "changed for the better."

This visitors' learning experience consisted both objective and subjective reframing⁷⁰¹ and a transformation of meaning perspectives: as explained by Mezirow, self-examination is involved when meaning perspectives are transformed as "we must critically assess our own presuppositions in relationship with those of others, becoming critically aware of how these assumptions serve to "constrain" our perception and structure our

⁷⁰⁰ ROM.Visitor.15

⁷⁰¹ Keagan, Robert. 2000. 'Learning to Think Like and Adult'. In Mezirow, Jack and Associates (ed). *Learning as Transformation: Critical Perspectives on a Theory in Progress*. San Francisco: Jossey Bass Inc. p23.

expectations.⁷⁰² Thus, ROM.Visitor.15's transformative learning experience hinged upon learning of Darwin's perspectives and correcting misconceptions of Darwin as both atheist and racist. Furthermore, these assumptions had served in his interpretation of the theory of evolution; once confronted and modified, a new interpretation of evolution was possible. ROM.Visitor.15's perspective transformation was triggered by a disorienting event, followed by engagement in critical reflection and an evaluation of tacit assumptions and perspectives in relation to those of others, then a decision to reject previous perspectives and adopt a new one, until new perspectives are put into action, the perspective transformation process is considered incomplete.

6.3 Audience Research of Transformative Learning at the NHM

This section implements the method of analysis at the ROM. It employs transformative learning theory to examine the impact of the visit on critical reflection and focuses on significant findings as opposed to general statistics of the participants. An overview of survey participants' worldviews and perspectives provides context for individual perspectives.

6.3.1 NHM Pre-visit Worldviews, Habits of the Mind and Points of View Regarding the Relationship between Science and Truth

As at the ROM, during pre-visit interviews NHM survey participants were asked: "How would you describe your worldview? How do you feel about

⁷⁰² Mezirow, Jack. 1991. *Transformative Dimensions of Adult Learning*. Knox, Alan B. (ed). San Francisco: Jossey -Bass Inc., p167.

science and truth?" The analysis of visitor responses established four worldview categories: a 'scientific worldview' based on realism; synthesis perspectives; cultural relativism, postmodernism and/or idealism; and unclear or undefined worldviews. The following graph demonstrates findings.

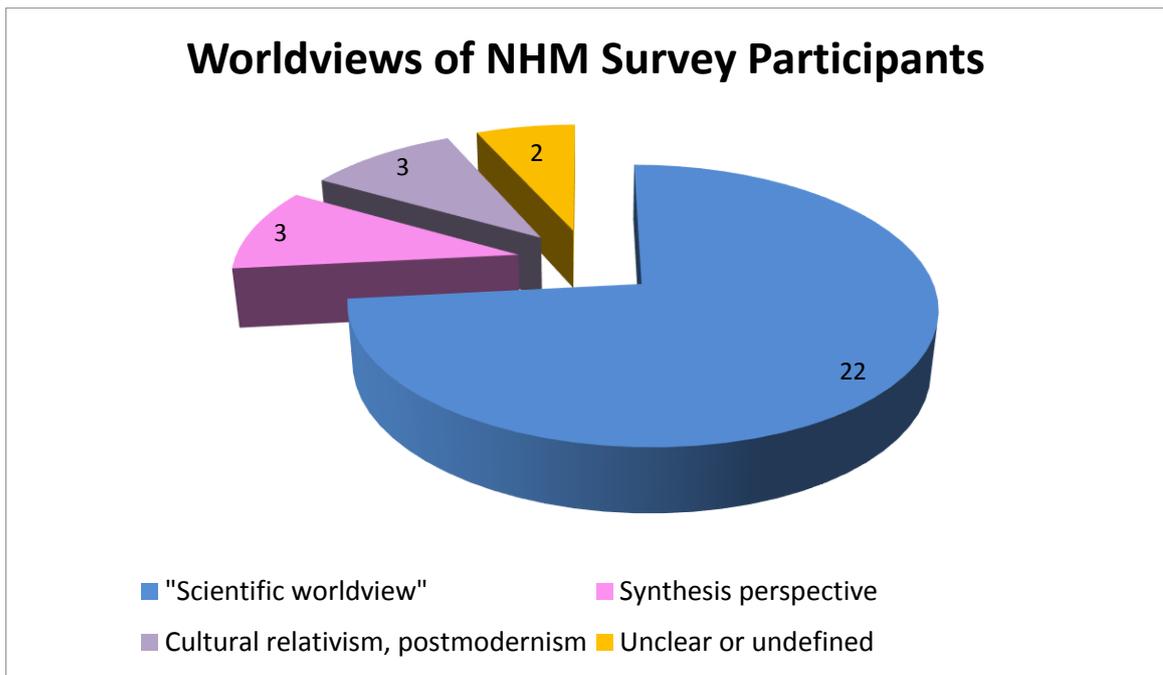


Table 6.9 Distribution of Worldviews of Visitor Survey Participants at the NHM.

‘Scientific Worldview’ Based on Realism:

The majority of NHM respondents, 22 of 30, articulated a ‘scientific worldview’ based on realism and expressed high value of rationalism, with logic and reason as a fundamental source of knowledge, hence constituting their epistemological stance. Many explained science as a singular or exclusive system of principles supporting and providing their worldview: scientific research, findings and principles therefore providing the framework or “filter” for both interpretation and meaning-making processes, hence constituting their meaning perspective. Evidently, all visitors within this category both fully accept and highly value the theory of evolution and natural selection. Visitor responses within this category were analysed in order to determine perspectives of religion in relation to their personal meaning perspective (i.e. identifying perceptions of conflict, harmony or indifference), as shown on the graph below.

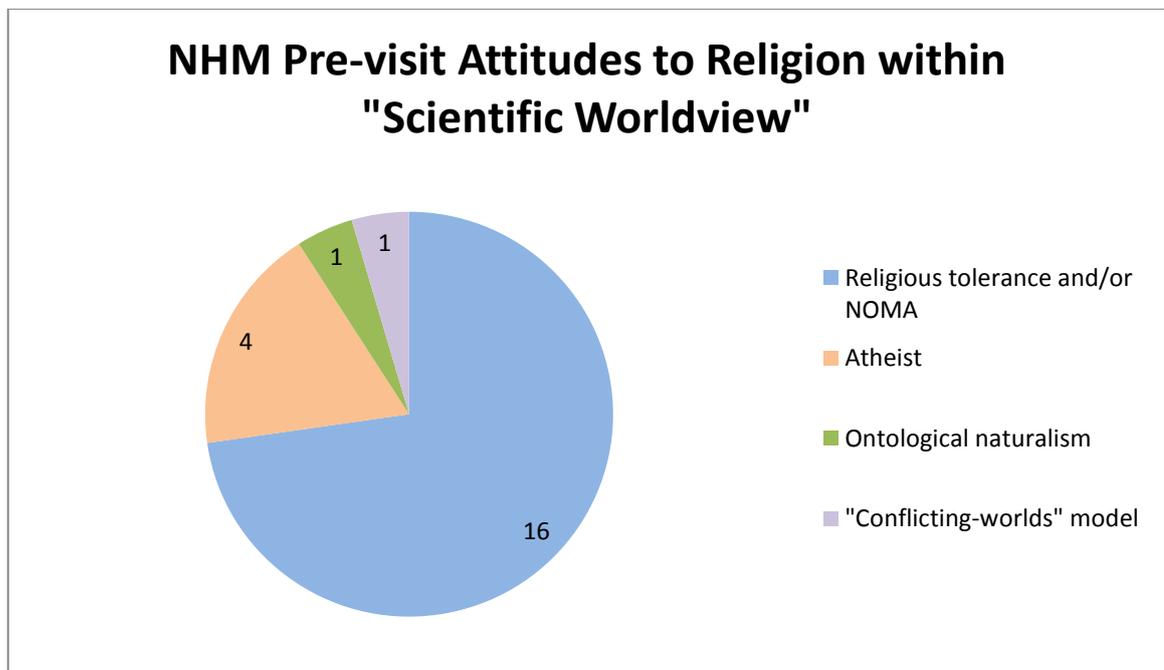


Table 6.10 Pre-visit Attitudes to Religion of Visitors with a ‘Scientific Worldview’ at the NHM.

Synthesis Perspectives or a ‘Combined Frame of Reference’:

Relatively few visitors articulated synthesis perspectives or ‘combined frames of reference’. Of the 30 NHM respondents, only 3 visitors (10%) expressed both a value of science, scientific research and findings as well as of religious or spiritual beliefs that combine to shape their view of the world, therefore guiding their interpretation and meaning-making processes. Findings from the analysis of the relationship between science and religion within their worldviews demonstrated that while two visitors described a tendency to lean more toward scientific as oppose to religious postulates – one tends to be agnostic⁷⁰³ and the other is a scientist⁷⁰⁴ - the third visitor appeared to contextualise and interpret science through his religious perspective. Although he stated “science is a truth”⁷⁰⁵ and expressed valuing both medical and technological research and advancements, he questioned how science and Islam can combine to form a comprehensive framework. He clarified he was currently reading “Understanding Islam” which addresses the relationship between science and religion from the Muslim perspective. Furthermore, he brought the book with him to *Darwin*, holding it in his hand throughout his visit. His visit was motivated by an “effort to negotiate contested meanings [and] [...] assumptions.”⁷⁰⁶

⁷⁰³ NHM.Visitor.2

⁷⁰⁴ NHM.Visitor.15

⁷⁰⁵ NHM.Visitor.18

⁷⁰⁶ Keagan, Robert. 2000. ‘Learning to Think Like and Adult’. In Mezirow, Jack and Associates (ed). *Learning as Transformation: Critical Perspectives on a Theory in Progress*. San Francisco: Jossey Bass Inc., p3.

Worldviews based on Cultural Relativism, Postmodernism and/or Idealism:

Relatively few visitors articulated worldviews based on cultural relativism, postmodernism and/or idealism. Of the 30 NHM respondents, 3 visitors (10%) described a “broad” worldview or “global view” within which the diversity of human perceptions of truth and perspectives are both recognised and valued. All three expressed high value of science within their meaning perspectives.

One visitor explained he had “travelled widely” and worked extensively abroad within combat zones providing him with “a very broad perspective of global issues.”⁷⁰⁷ He described science as a “kind of prism through which you can view any set of circumstances”⁷⁰⁸ and truth as a combination of scientific principals with cultural and philosophical aspects.⁷⁰⁹ An art gallery assistant explained “truth is subjective” and highlighted the variability of human perception within the interpretation of the natural world, stating: “How we interpret it is very important. But that doesn’t mean that’s how nature, in its most generalised form of the world, may necessarily go along.”⁷¹⁰ Finally, the third visitor, with a postgraduate degree in law, simply explained perceptions of truth are culturally and individually defined.⁷¹¹

⁷⁰⁷ NHM.Visitor.9

⁷⁰⁸ NHM.Visitor.9

⁷⁰⁹ NHM.Visitor.9

⁷¹⁰ NHM.Visitor.21

⁷¹¹ NHM.Visitor.25

Unclear or Undefined Worldviews:

Finally, two visitors described the importance and value of science however expressed their personal worldview with a degree of evasiveness or uncertainty making it difficult to establish distinctive meaning perspectives or a “world model” they uphold or support. One visitor’s explanation was simply unclear: “First of all, I don’t think there is one truth. And science is really something that is not representative of truth. It’s just something we test and test and test all the time...”⁷¹²

The second visitor remained purposefully evasive: while he described valuing science as a “system of investigation” that has been proven or “backed up”, he also stated, “But I wouldn’t look into it too deeply because it conflicts with other things.”⁷¹³ Unfortunately he did not elaborate on possible sources of conflict nor elucidate whether he himself upholds conflicting meaning perspectives or if it is for other individuals that issues of conflict may arise.

6.3.2 NHM Pre-visit Understanding of the Current Relevance of the Theory of Evolution

In pre-visit interviews, visitors were asked whether they felt the theory of evolution and natural selection are important or relevant today and to explain why. Of the 30 survey respondents: 19 visitors had positive answers”; 7 very positive answers; and 4 were hesitant or unsure. Visitor explanations for the current relevance of the theory of evolution and

⁷¹² NHM.Visitor.13

⁷¹³ NHM.Visitor.17

natural selection were analysed according to theme. Visitor survey respondents often provided multiple reasons as to why evolution is significant today.

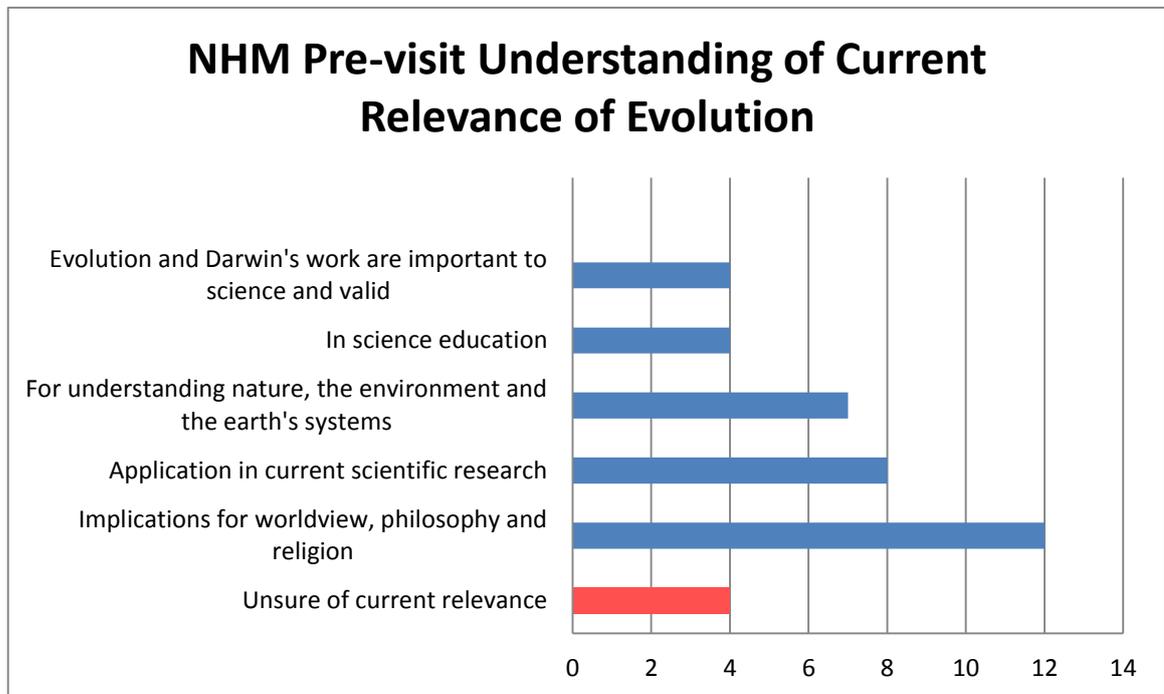


Table 6.11 Pre-visit Understanding of the Current Relevance of the Theory of Evolution at the NHM.

Value of exhibit themes are often important motivators driving museum visitation, it was therefore expected that a vast majority of visitors to *Darwin* exhibit consider the theory of evolution to be currently relevant. Notably, the four visitors who were unsure of the current relevance of the theory of evolution and natural selection were however convinced of the theories' historical relevance.

6.3.3 NHM Pre-visit Perspectives of Darwin

Within the pre-visit interview, audience research participants were asked to voice their opinions of “who Darwin is” and “what he represents” in order

to establish pre-visit perspectives. Visitor responses were once again analysed according to themes raised and visitors provided multiple responses.

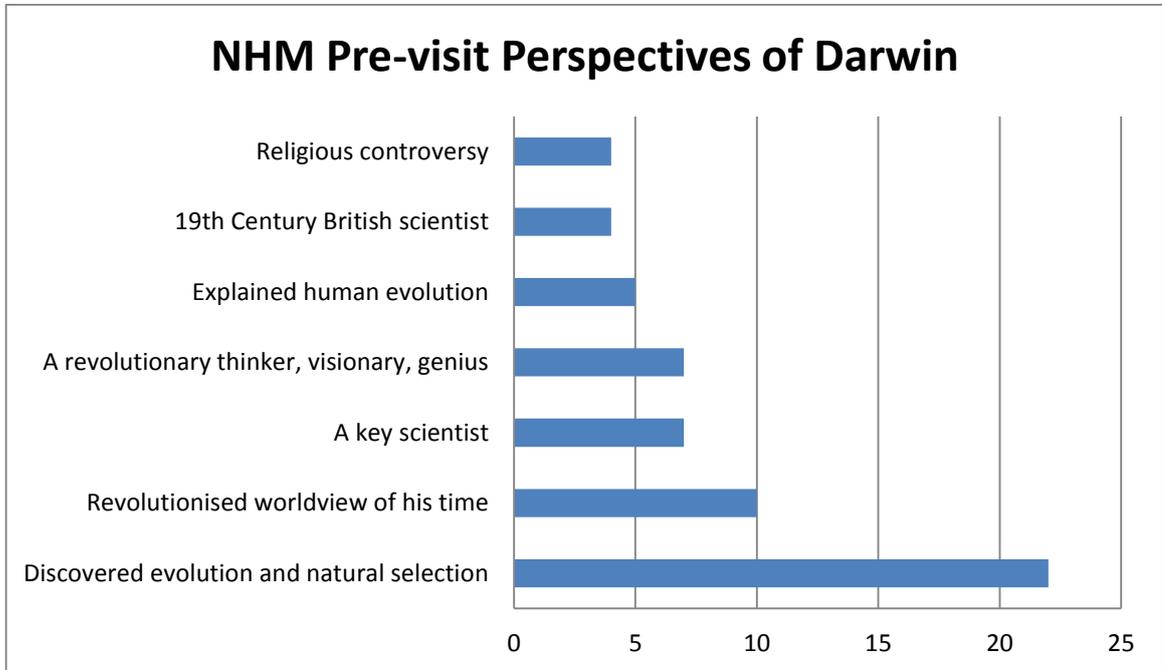


Table 6.12 Pre-visit Perspectives of Darwin at the NHM.

Overall, before entering the exhibit, NHM visitors mainly regarded Darwin as the founder of the theory of evolution and natural selection, a “revolutionary” and “visionary” scientist (even genius) who put forward a “ground-breaking theory” that “challenged the views at the time” (i.e. 19th century Victorian England) and profoundly “revolutionised the way we think about humanity”.

6.3.4 NHM Visitors’ Post-visit Understanding of Exhibit Authorship, Perspective and Stance

Firstly, visitor understanding of the international collaborative aspect of the exhibit is directly tied to the institutional objective of effectively

demonstrating the international dimension of the NHM's work through strategic partnerships for "cultural engagement abroad".⁷¹⁴ In order to discern whether NHM visitors understood the travelling and collaborative nature of *Darwin*, survey participants were asked to identify the exhibit producers in an attempt to define visitors' perceptions of exhibit authorship. Once again, the aim was to identify whether the public perceived the exhibit as jointly produced, as an American exhibit, an AMNH exhibit, a travelling exhibit or as an "in-house" NHM exhibit. This question did not seem to provoke as much surprise or bewilderment as at the ROM.

Of the 30 survey participants: 14 visitors simply stated they did not know who had produced the exhibit (although 2 mentioned noting American accents and 2 noted the use of American English); 13 visitors were aware of an American contribution (5 of which specify the AMNH and another 3 mention an American collaboration with the NHM London); and 3 visitors believed the exhibit was produced solely by the NHM (although UK loaning institutions for certain documents were also mentioned). Thus, 46.7% of respondents felt unable to answer the question on exhibit provenance, 10% assumed an "in-house" NHM production and 43.3% were aware of an American contributor.

Overall, 3 of the 30 visitors interviewed were clearly aware the exhibit was a travelling exhibit, two of which were drawn to this conclusion simply by the exhibit's use of American English. The exhibit's use of American

⁷¹⁴ Dr. Robert Bloomfield.

English was raised in 5 of the 30 interviews: two mentioned American accents and American scientists - as oppose to British scientists - in video content and three noted the use of American spelling and grammar in exhibit texts. While this prompted two to seek information on the exhibit's provenance (i.e. to read the list of collaborators provided at the end of the visit), the third described simply being "put off" by the use of American English, stating: "It's obviously an American Exhibition. American spelling is fine in America but certainly not in England!"

Next, in order to better understand visitors' critical reflection on tacit assumptions and perceptions, it was first necessary to determine their understanding of the NHM's stance or position regarding evolution as communicated in the exhibition. The NHM had a written official position on evolution and science teaching which served as a basis for the creation of a video of NHM scientists discussing evolution and science teaching meant to address the debate from both a UK cultural perspective as well as an internal NHM point of view. A learning objective for *Darwin* was to effectively and accurately communicate the NHM's official position.⁷¹⁵

Visitors' understanding of the position of the NHM on the theory of evolution demonstrated 18 Of 30 visitors had understood the stance of the NHM, via the exhibit, as pro-evolution: 14 visitors stated the NHM's stance was clearly pro-evolution; 3 visitors explained the NHM's position as evolution has been scientifically proven or validated; and 1 visitor explained that "evolution is their means". Additionally, 7 of 30 "presumed"

⁷¹⁵ Alexandra Gaffikin and Lorraine Cornish.

the NHM's stance was pro-evolution. Of the remaining 5 visitors: 2 visitors avoided the question yet did seem aware of the NHM's pro-evolution stance and 3 visitors stated they simply did not know.

Interestingly, 6 visitors also spontaneously provided their opinion of the NHM's position on religion or religious views as communicated in the exhibition (although this question was not asked): 3 visitors made positive comments as they felt the position on creationism and religion communicated was "not openly aggressive", "objective and non-patronising" and "didn't get preachy"; 1 visitor simply stated she was "not sure where they [the NHM] stand with religion. It is so difficult to believe in one and in the other as well"; and 2 visitors made somewhat negative comments regarding the treatment of religious views stating "I thought they were really pushing the theory of creationism because of controversy. I thought... we don't really want to make that a big point because of the science..." and another simply stated that she would recommend to those who are very religious not to come to the exhibit.

The NHM's pro-evolution stance and the significance of evolution both for the Museum as well as in research were well understood by survey participants, however, one visitor did mention it gave the exhibit a feeling of "defending" Darwin and evolution.

6.3.5 Critical Reflection on Perspectives at the NHM

This portion of the analysis aims to evaluate visitors' critical awareness of personal perceptions during the visit experience and hence to evaluate the ability of the exhibit to encourage reflection on individual assumptions and

expectations in relation to those of others. The following section therefore serves to analyse NHM visitors' perceptions and understanding of the position of the exhibit on the theory of evolution and science teaching (which includes the science versus religion debate) in relation to personal positions, views and worldviews as well as those of others.

Visitor exit survey participants were asked to indicate whether during their visit they reflected on their "personal perspective", stance or views regarding evolution by natural selection in relation to other positions or beliefs and to explain. They were also asked whether they felt supported or challenged in their personal views (during their visit).

Findings demonstrated that 15 visitors (50%) engaged in conscious critical reflection, 7 visitors did not and 8 were unsure or unaware. As at the ROM, one of the main contributing factors in fostering critical reflection on personal perspectives and those of 'others' was understanding the position of the exhibition (as a pro-evolution stance). Firstly, it is highly significant that of the 15 visitors who engaged in critical reflection 9 understood the position of the NHM as pro-Darwin and pro-evolution, 2 understood the NHM's stance as evolution has been scientifically proven or validated 3 presumed it was pro-evolution, and 1 had not responded but seemed aware of the NHM's stance in his answers to other questions. All those who engaged in critical reflection therefore either presumed or were aware of the NHM's position. Hence once again, it was established that the perception or understanding of a position or stance – as opposed to neutral or biased – was a fundamental factor in fostering critical reflection. Additionally, worldview was a second contributing factor along with views

regarding the relationship between science and religion. Firstly all visitors describing a cultural relativist perspective or postmodernist worldview at the NHM (3 survey respondents) engaged in critical reflection on perspectives. However, the majority of those who engaged in critical reflection, 10 of 15 respondents, had articulated a 'scientific worldview', 3 of whom stated being atheist. Two other visitors engaged in critical reflection: 1 had a synthesis perspective and had already engaged in critical reflection before entering the exhibit (regarding the implications of evolution and within Islam) and 1 visitor who was unclear on his worldview engaged in critical reflection. The latter two visitors were the only NHM respondents who explained feeling challenged in their personal perspectives during the visit. The 13 remaining visitors felt their perspectives were supported in the exhibit. The analysis of the impact of critical reflection on perspectives and assumptions therefore follows.

6.3.6 Worldviews, Perspectives, Assumptions and Transformation at the NHM

Once again, the results of the transformative learning analysis demonstrated an association between visitors' understanding of the exhibit stance, worldviews, and critical reflection. The following section therefore serves to present the impact of visitors' critical reflection and to analyse the exhibit's capacity to foster transformative learning experiences and perspective transformation.

In London, the exhibit's presentation of multiple perspectives and the 'science versus religion debate' constituted the prime influencing factor in initiating critical reflection on personal perspectives and those of others.

Almost all those who had engaged in critical reflection (13 of 15 visitors) described critically reflecting on multiple perspectives related to alternate frames of reference and points of view essentially in an attempt to understand perspectives of Creationism and Intelligent Design and attitudes of rejection of evolution.

According to transformative learning theory, this constitutes “objective reframing [which] involves critical reflection on the assumptions of others encountered in a narrative or in task-oriented problem solving”.⁷¹⁶ These visitors, confronted by exhibit content which included a presentation of perspectives different from their own, engaged in an effort to understand counter-narratives to evolution. The “confrontational approach” to learning through “multiple perspectives”,⁷¹⁷ as highlighted in Howard Gardner’s multiple intelligence theory, was therefore proven an effective method for encouraging critical reflection in *Darwin*. While 11 visitors simply explained endeavouring to understand “how” and “why” Creationists and followers of Intelligent Design reject evolution, 2 visitors explicated the result of their critical reflection.

Firstly, a 30 year-old interior designer originally from Hong Kong who had expressed an unclear worldview claimed to have engaged in critical reflection “all the time” throughout his visit, feeling both supported and

⁷¹⁶ Keagan, Robert. 2000. ‘Learning to Think Like an Adult’. In Mezirow, Jack and Associates (ed). *Learning as Transformation: Critical Perspectives on a Theory in Progress*. San Francisco: Jossey Bass Inc., p23.

⁷¹⁷ Gardner, Howard. 1999. *Intelligence Reframed: Multiple Intelligences for the 21st Century*. New York: Basic Books, p164-165.

“slightly challenged”. He explained he reflected on religious perspectives and the rejection of the theory of evolution (by others), a position he continued to struggle to understand after the visit of *Darwin*. He stated: “Evolution is the truth about the world. Questioning it is strange... So I don’t understand that.”⁷¹⁸ As he had little knowledge of the counter-arguments of Creationism and Intelligent Design, the explanations provided were not sufficient, consisting mainly of a presentation of reactions to evolution. This demonstrates the fundamental importance of providing adequate information to those lacking knowledge for understanding alternate perspectives and counter-narratives. Furthermore, counter-narratives to evolution of Creationism and Intelligent Design, while undoubtedly well-known perspectives in North America, are perhaps lesser known in the UK.

Second, a 25 to 29 year-old army officer who had travelled extensively and expressed a worldview based on postmodernism and cultural relativism explained engaging in critical reflection as he questioned how individuals are able to “not completely buy into the theory [of evolution]” when faced with the facts and evidence. He described the impact of this reflection: “it strengthened my stance against a creationism and Intelligent Design debate” and “reinforced my view that it [creationism and ID] is a dark, closed, closed-minded view.”⁷¹⁹ This raises the important issue of whether presenting alternate perspectives should encourage

⁷¹⁸ NHM.Visitor.13

⁷¹⁹ NHM.Visitor.9

understanding - perhaps by explicating underlying reasons - or the rejection of counter-narrative perspectives as they oppose evolution (and as the exhibit is presented in a natural history museum and national scientific research organisation).

Another visitor, an art gallery assistant age 55 to 64 with a postmodernist worldview, engaged in critical reflection for a very different reason. Her critical reflection consisted of an attempt to apply natural selection to humans and to understand the implications. She therefore appears to have solicited “logical-mathematical intelligence” which “involves the capacity to analyse problems logically, carry-out mathematical operations and investigate issues scientifically.”⁷²⁰ Hence rather than involving objective or subjective reframing, her critical reflection was based on Mezirow’s “instrumental learning” which involves the “hypothesis testing and deductive logic of the natural sciences.”⁷²¹

Finally, the last visitor to have engaged in critical reflection, an 18 to 24 male originally from Liberia with a University Degree in Political Science, described a “slight shift” in perspectives based on: an attempt to understand multiple perspectives presented in the exhibit (Darwin’s perspective, the Christian perspective and science), an evaluation of dual or divided personal “cultural frames of reference”⁷²² as provided by his

⁷²⁰ Gardner, Howard. 1999. *Intelligence Reframed: Multiple Intelligences for the 21st Century*. New York: Basic Books, p42.

⁷²¹ Keagan, Robert. 2000. ‘Learning to Think Like and Adult’. In Mezirow, Jack and Associates (ed). *Learning as Transformation: Critical Perspectives on a Theory in Progress*. San Francisco: Jossey Bass Inc., p5.

⁷²² Ibid, p5.

parents in his upbringing, an attempt to contextualise and understand the implications of evolution according to his habit of the mind (i.e. religion) and finally the correction of a misconception, misconstrued tacit assumption or expectation. As the prime influences of his perspective transformation are multiple and complex, his process of critical reflection are therefore explained in detail.

Firstly, motivating his visit was a desire to learn more about Darwin and a desire to answer questions he had about views of evolution within Islam. He explained currently reading “Understanding Islam” in order to better understand the relationship between science and religion (and even carried the book with him throughout his visit). Originally from Africa, he explained that he knew very little about Darwin himself as this was not taught.

Secondly, he recalled his “cultural frames of reference”⁷²³ during his visit. He described the counter or dual “cultural frames of reference” of his parents: his father is Muslim – and he has adopted his father’s religious views – whereas his mother, originally from Guinea-Conakry, unschooled and “illiterate”, taught him at a very young age that “man came out of animals”. His mother’s words therefore constantly came to his mind throughout his visit as he suddenly realised a connection exists with Darwin’s theory of evolution.

⁷²³ Keagan, Robert. 2000. ‘Learning to Think Like and Adult’. In Mezirow, Jack and Associates (ed). *Learning as Transformation: Critical Perspectives on a Theory in Progress*. San Francisco: Jossey Bass Inc., p5.

Third, he engaged in critical reflection on Darwin's perspective and position on religion. Based on learning of Darwin's life, his "view of the world" and how he "took a stand one hundred-fifty years ago within a culture "ruled by religion", he explained his new perception of Darwin:

He was confused a little bit because he takes a different stand from Christian religion in terms of how they view the world and how the world came about. [...] Religion... we all share the view that man was created by God... Darwin somehow rejects that. [...] So that's something that... I have a different standpoint." [...] "...of course it was a difficult position for him.

NHM.Visitor.18

He felt both supported and challenged in his personal perspective during his visit experience, stating "except the religious side, there are views I agree with."⁷²⁴ Furthermore, he described the difficult process of contextualising evolution and the implications for worldview in relation to Islam during his visit as the exhibit only presents the perspective of Christianity.

In the evaluation of his understanding of the theory of evolution on the 'transformative learning scale', he stated his knowledge had changed. The underlying reason for this change, in his point of view, was that during his visit he "asked himself a lot of questions." He then described his revised perspective of evolution: "it has changed in that now I start to look at how man has come into existence". He also described a "little shift" in his worldview and perspectives regarding the theory of evolution, religion and truth:

⁷²⁴ NHM.Visitor.18

Sometimes I consider the system [evolution] as it has to do with my religious belief and science contradicts a little bit of that. So far it has been proven in many cases. But there are still many questions for me to answer... and in particular for Darwin... What makes it more difficult to challenge his theory was the fact that he believed in God. He just tried to see the way that humans have evolved! So in that sense, it is difficult to challenge his theory. But there are questions remaining...

NHM.Visitor.18

Hence perspective transformation, while undoubtedly involved important questions and “cultural frames of reference”, fundamentally also involved a “challenge of misconceptions”⁷²⁵ as his perception of Darwin had also changed through a new-found understanding of his personal religious beliefs (at the time of his research on the *HMS Beagle*).

Thus, the shift in his perception of Darwin served to modify his assumptions of the underlying motivations driving Darwin’s research which in turn caused a shift in his understanding of the theory of evolution. Once again, changing or shifting visitors’ views and perspectives of the theory of evolution hinged upon understanding Darwin’s research motivations. The popular view of Darwin as atheist and/or anti-religious man appears to encourage non-acceptance of the theory of evolution by certain individuals with strong spiritual belief. ‘Correcting’ this view or tacit assumption essentially serves to modify individuals’ view of the driving motivation behind the “discovery” of evolution and thus change perspectives of the scientific theory of evolution itself. Learning of Darwin’s religious

⁷²⁵ For the role of challenging misconceptions through a confrontational approach to learning please see Gardner, Howard. 1999. *Intelligence Reframed: Multiple Intelligences for the 21st Century*. New York: Basic Books, p164-165.

perspective during his fieldwork can therefore be considered highly relevant to understanding the theory of evolution within a social and cultural context (both historical and current), contributing to a better understanding of Darwin's inspiration and motivations for researching evolution and natural selection.

Transformative learning - as defined in Chapter 2 – is a process, it is therefore important to highlight that NHM.Visitor.18 commenced critical reflection before entering *Darwin*: critical reflection during the visit can be considered a continuation of this process. According to Mezirow, transformation is triggered by “an acute internal and personal crisis”⁷²⁶ or disorienting dilemma, for which there is no information or proof as initiation of transformative learning resided ‘outside of’ the visit experience. However, according to Edward Taylor, transformation may also be triggered by “integrating circumstances”⁷²⁷ such as the search for something that is lacking in an individual's current life, not necessarily a profound, “life-threatening event.”⁷²⁸ While integrating circumstances possibly constituted a trigger for NHM.Visitor.18's perspective transformation, in his point of view, his shift in perspective was mainly based on questions. Howard Gardner discusses “intelligence of

⁷²⁶ Taylor, Edward W. 2000. 'Analysing Research on Transformative Learning Theory'. In Mezirow, Jack and Associates. *Learning as Transformation: Critical Perspectives on a Theory in Progress*. San Francisco: Jossey Bass Inc., p298.

⁷²⁷ Ibid, p299.

⁷²⁸ Ibid, p299.

questions”⁷²⁹ in his analysis of “existential intelligence” which he defines as “manifested by anyone who exhibits facility, clarity or depth in thinking about ultimate issues.”⁷³⁰ It can be argued that critical reflection for NHM.Visitor.18 in Darwin involved soliciting “existential intelligence”. Situating NHM.Visitor.18’s within Mezirow’s ten phases of transformative learning: he experienced a trigger for transformative learning (or questions) before entering, then engaged in “self-examination” and a “critical assessment of assumptions”.⁷³¹ During this process, he engaged in both subjective reframing (critical reflection of one’s assumptions) as well as objective reframing (critical reflection of others’ assumptions).⁷³² His learned “cultural frames of reference” were significantly involved, including his habit of the mind. Finally, the correction of his misconception or expectation of Darwin as non-religious (or anti-religious), confronted in the exhibit, changed his view of Darwin and subsequently both his understanding and perspective of evolution. However, the process of transformative learning remains incomplete: he explained leaving the exhibit with “many questions to be answered” and according to Mezirow

⁷²⁹ Gardner, Howard. 1999. *Intelligence Reframed: Multiple Intelligences for the 21st Century*. New York: Basic Books, p60.

⁷³⁰ Gardner, Howard. 1999. *Intelligence Reframed: Multiple Intelligences for the 21st Century*. New York: Basic Books, p69.

⁷³¹ Mezirow, Jack. 2009. ‘Transformative Learning Theory’. In Mezirow, Jack and Taylor, Edward W. (eds). *Transformative Learning in Practice: Insights from Community, Workplace and Higher Education*. San Francisco: Jossey Bass Inc., p19.

⁷³² Taylor, Edward W. 2000. ‘Analysing Research on Transformative Learning Theory’. In Mezirow, Jack and Associates. *Learning as Transformation: Critical Perspectives on a Theory in Progress*. San Francisco: Jossey Bass Inc., p298.

learners must have a “planned course of action” and integrate their “new perspective” into their life in order to complete the process.⁷³³

6.4 Conclusion: Reflection on Findings at both Institutions

The aim of this chapter was to analyse and better understand the influence of culture, worldview and perspectives on visitors’ interpretation of messages as fundamental influencing factors in meaning-making. While culture had significant relevance in fostering objective reframing through critical reflection in London, worldview fundamentally influenced subjective reframing in Toronto: NHM visitors engaged in critical reflection in an attempt to understand counter-narratives to evolution (which culturally they are less familiar with) whereas ROM visitors’ critical reflection mainly focused on issues in the ‘science versus religion debate’ (historical and current) and personal perspectives. Furthermore, research findings in London demonstrated that within the process of objective reframing and critical reflection on perspectives of Creationism and Intelligent Design, it was unclear whether visitors understood (or how they understood) these perspectives. It is noteworthy that neither partner institution had specific learning objectives for understanding counter-narratives to evolution.

The research found significant divergence in visitors’ understanding of the exhibit’s ‘pro-evolutionary stance’: overall, almost twice as many NHM

⁷³³ Mezirow, Jack. 2009. ‘Transformative Learning Theory’. In Mezirow, Jack and Taylor, Edward W. (eds). *Transformative Learning in Practice: Insights from Community, Workplace and Higher Education*. San Francisco: Jossey Bass Inc., p19.

visitors engaged in critical reflection in comparison to the ROM. It is therefore relevant that while both the ROM and the NHM had clearly stated objectives regarding the communication of a 'pro-evolution' stance, the actual strength and clarity of their respective positions varied. As the NHM's position was evaluated as significantly stronger (due to content of the 'in-house' video *Evidence and Evolution* that specifically addresses pseudoscience and presents the NHM's official position on issues of faith and science teaching), the significant variation in engagement in critical reflection may simply reflect difference in strength of positions.

However, results may also have been influenced by both contextual and cultural differences. Thus, the divergence in institutional context for the *Darwin* exhibit merits emphasis: the Natural History Museum of London is explicitly a museum of natural sciences and a national research organisation whereas the Royal Ontario Museum has a dual focus on science and culture with separate galleries dedicated to natural history and world cultures. This variance may have influenced visitor interpretation.

Furthermore, it is significant that only ROM survey participants employed the term 'neutral' when describing the museum's stance. While this may signify that the ROM's position was less understood, it may actually indicate a cultural difference in visitor expectations. The perceived 'neutrality' of the ROM's position may therefore reflect visitor expectations of the ROM's stance or serve to indicate a divergence in Canadian cultural

expectations of museums in general and their role in society.⁷³⁴

The analysis of perspective transformation demonstrated that only a small portion of survey participants experienced a significant shift in meaning perspectives: these two visitors' perspective transformation was based on a correction of tacit assumptions of Darwin's views on religion (while performing his research) which in turn led to a reframing of perspectives and a reinterpretation of evolution. As both had articulated synthesis perspectives, understanding the driving motivation behind research on evolution was not to counter religious beliefs was established as the prime contributing factor to perspective transformation.

While the analysis of critical reflection demonstrated that transformative learning was taking place in *Darwin* at both venues in the study, it is important to note that not all visitors at the ROM who perceived evolution as insufficiently proven or a "hypothesis" engaged in critical reflection. One visitor who had described evolution as "just a theory" felt the ROM's stance was neutral; she therefore felt supported in her personal perspective and did not engage in critical reflection. After her visit of *Darwin* she made the same statement on evolution. This serves to demonstrate the fundamental importance of including a strong and clear

⁷³⁴ It is possible that a portion of the Canadian audience may expect museums to maintain a neutral position due to high value of neutrality within Canadian culture. This issue requires further audience research both within the ROM (in order to determine whether neutrality constitutes an institutionally-based visitor expectation) as well as within different Canadian cultural institutions (in order to determine whether neutrality constitutes a Canadian expectation of museums in general or whether expectations of a science museum diverge from other museums).

position or stance in order to create opportunity for critical reflection.

Finally, the “confrontational approach” to tackling misconceptions and tacit assumptions was proven effective in fostering critical reflection and perspective transformation. However two ROM visitors had negative readings of the exhibit messages, likely due to MacDonald’s “cultural imaginings”. The research demonstrates, as Viv Golding contends, visitors bring their minds *and* their bodies into the Museum.⁷³⁵ This thesis highlights the importance of emotion *and* cognition within transformative learning, as challenging and changing “long-held beliefs” is often an emotional experience which may cause resistance and even a projection of negative emotions on the educator,⁷³⁶ or in this case the museum.

While numerous authors suggest a need for creating a safe and trusting environment, a tension seems to exist between establishing a comfortable environment that allows students [in this case visitors] to explore meaning in their own lives and constructing experiences in order to create feelings often associated with disorienting dilemmas such as discomfort or unrest.⁷³⁷

⁷³⁵ Golding, V. 2009. *Learning at the Museum Frontiers: Identity, Race & Power*. Surrey and Burlington: Ashgate, p165-166.

⁷³⁶ Taylor, Edward W. and Jarecke, Jodi. 2009. ‘Looking Forward by Looking Back’. In Mezirow, Jack and Taylor, Edward W. (eds). *Transformative Learning in Practice: Insights from Community, Workplace and Higher Education*. San Francisco: Jossey Bass Inc., p283-284.

⁷³⁷ Ibid, p283.

Transformative learning experiences generate tension and unease as learners are led “to the edge in order to foster transformation.”⁷³⁸ Taking in consideration the transformative experiences of visitors and the research method employed, providing an opportunity for dialogue and for visitors’ questions and concerns to be heard can not only effectively ease tension, but also foster a relationship of trust and respect.

⁷³⁸ Taylor, Edward W. and Jarecke, Jodi. 2009. ‘Looking Forward by Looking Back’. In Mezirow, Jack and Taylor, Edward W. (eds). *Transformative Learning in Practice: Insights from Community, Workplace and Higher Education*. San Francisco: Jossey Bass Inc., p283.

Chapter Seven Conclusion: Implications, Applications and Recommendations

7.0 Introduction

The main subject of this thesis is audiences, culture, worldview and informal evolution learning focusing on audience research of the international travelling exhibition *Darwin: The Evolution Revolution* through a constructivist and transformative learning paradigm. The study aimed to fill a significant gap in visitor studies of travelling exhibitions to increase understanding of the theoretical implications of effective communication and learning through international travelling exhibitions, including the effect of culture on the exhibition medium, as well as to significantly contribute to knowledge of the influence of culture, worldviews, perspectives and assumptions on evolution learning in the museum. The importance and original contribution of the thesis research are: the establishment of a new line of inquiry which addresses the cultural aspects of communication and learning in travelling exhibitions, the conception and testing of new methods of audience research devised for the evaluation of transformative learning in the museum context, and the focus on the influence of culture, worldview and perspectives in informal evolution learning.

The study's research questions were narrowed down to the following 'causal puzzle':⁷³⁹ How do culture and context affect the exhibition

⁷³⁹ According to Mason, Jennifer. 2002. *Qualitative Researching*. 2nd Ed. London: Sage Publications.

medium, the communication of messages, the “reading” of the exhibition, visitor meaning-making and museum learning? Based on the implementation of Mezirow’s transformative learning theory in audience research of *Darwin: The Evolution Revolution*, a focused research question was devised: How are culture, worldview, frames of reference, habits of the mind, meaning schemes (beliefs or attitudes), tacit assumptions and points of view implicated or involved in meaning-making processes in evolution learning?

The defined scope and limitation of research is a cross-cultural evaluation of visitor reception and learning in a travelling exhibition centring on local adult audiences (age 18 and up) in two exhibit venues: the Royal Ontario Museum in Toronto and the Natural History Museum in London. The desired research outcomes were: to obtain a better general understanding of the effectiveness (and non-effectiveness) of specific communicative methods in international travelling exhibitions; to determine any essential differences and similarities in visitor behaviour and audience reception in the travelling exhibition; to gain knowledge on the effect of culture, worldview and perspectives on informal adult evolution learning in the UK and Canadian contexts; to establish recommendations based on empirical research for truly international communication methods for institutions currently striving to transfer knowledge to multiple audiences on an international scale by fostering effective cross-cultural learning; and to both encourage and contribute to a new focus in travelling exhibitions, putting visitor experience and cultural relevance at the forefront of effective communication practices.

Focusing on the implications and applications of research findings, the final chapter of the thesis will address: the importance of context and objectives for the promotion of travelling exhibitions and collaboration, the importance of local relevance of exhibit narratives and appropriate audience targeting, issues with the exhibit stance and cultural contextualisation of the 'science versus religion debate', language as a cultural issue and finally the implications of the research of culture, worldview, critical reflection and transformative learning. Reflection on the theoretical framework of the thesis and the outcomes of research questions will also be provided. And finally, in order to fulfil the desired outcome of the thesis research, recommendations for best-practices for international travelling exhibits will be presented directly within respective chapter sections.

7.1 The Importance of Context and Objectives for the Promotion of Travelling Exhibitions and Collaboration

Although not included in the research questions, the museum staff interviews determined programming motives for participating institutions. Underlying motives for programming decisions are relevant findings for cultural institutions currently promoting their work through travelling exhibition programmes, serving essentially as indicators of which museums to target in order to effectively increase scheduling prospects.

The ideal context for proposing collaboration, partnership and hosting of travelling exhibitions was demonstrated to be during periods of major renovation (in potential host institutions) where institutions remain open to

the public yet continue to offer temporary exhibits. Staff availability issues for the creation of 'in-house' exhibits directly and significantly contributed to acceptance of programming and partnership of the *Darwin* exhibit. Additionally, taking into consideration lengthy loan period requirements for touring exhibits, museums performing major renovation while remaining closed to the public were identified as ideal lending sources for artefacts.

Although the context of major renovations in museums remaining open to the public was determined to be a significant contributing factor in host institutions' participation and programming decisions, the pertinence of the exhibit theme proposed and the timing of the exhibit were both fundamental. Further important determining factors for participating institutions surveyed included site-specific institutional goals for international collaboration and an anticipated fulfilment of learning objectives related to host museums' mission and educational policy, which included target audiences. Furthermore, both partner museums had constituted a detailed business plan which included projected financial targets and budget investment. Essentially, host institutions must foresee a possible benefit of participation whether it be a potential increase of institutional reputation, a financial gain (through increased attendance), an exceptional opportunity to showcase a unique or timely exhibit, or simply the resolution of staff availability issues.

Finally, as educational objectives and target audiences were established as significant motivations for programming decisions, a forward-thinking approach within the travelling exhibit creation processes (through the

inclusion of targeted content), at least for partner institutions but also for potential host institutions, would serve to limit adaptation requirements by ensuring (multiple) institutional relevance of exhibit discourses.

7.2 The Importance of Local Relevance of Exhibit Narratives and Appropriate Audience Targeting

In order to address research questions regarding international communication strategies and methods, cultural adaptations required and effective practice, the first phase of fieldwork consisted of an analysis of the original exhibit type, presentation and approach to communication and education. The analysis determined that *Darwin* was a concept-oriented, didactic exhibit with a chronologically defined narrative and directional layout. The AMNH's method of communication focused on exhibit messages (rather than objects) and the transmission of knowledge, based on the basic transmission model; the approach to communication and learning was therefore defined as traditional, authoritative and unidirectional.

Adaptations were carried out at both participating museums, however, the main issues identified in staff interviews, driving adaptations, differed according to institution. The enhancement of local relevance for the NHM was primarily based on exhibit content while the ROM's adaptations focused mainly on issues of target audience adaptations (although a small amount of content adaptations were also executed). Both institutions based their adaptation decisions on staff members' perceptions of the

relevance of the exhibit within their own specific institutional and cultural contexts.

Local cultural relevance of exhibit narratives was determined to be a crucial factor in defining exhibit adaptation plans. A significant “cultural issue” identified in the empirical research regarding the relevance of exhibit discourse for the NHM was the exhibit’s substantial inclusion of “Victorian Heritage” for which there “is lesser interest” in the UK given the cultural context.⁷⁴⁰ While the exhibit narrative was considered by ROM staff members as culturally relevant for local audiences, this was not the case at the NHM; thus, as explained in Chapter 4, the NHM presentation intentionally broke away from chronology,⁷⁴¹ omitting specific exhibit sections considered extraneous and/or culturally “irrelevant”⁷⁴² (sections *Introduction* and *Young Naturalist*) and reorganised the ‘storyline’. The justification for the removal of exhibit sections presenting content on Darwin’s youth and family heritage at the NHM and inclusion at the ROM was confirmed by findings from the analysis of prior knowledge: visitors’ knowledge of Darwin before entering the exhibit was estimated at a significantly higher level at the NHM - 26.7% little knowledge, 10% little to average and 36.7% average knowledge – than at the ROM where 50% of respondents had little knowledge.

⁷⁴⁰ Dr. Robert Bloomfield and Grant Reid.

⁷⁴¹ Ibid.

⁷⁴² Dr. Robert Bloomfield and Alexandra Gaffikin.

Finally, objectives regarding target audience were identified as a crucial factor in defining exhibit adaptation requirements. Although both cultural institutions in the study acknowledged the exhibit's primary focus on adult audience segments, however, institutional views of the exhibit's audience adaptability diverged and institutional objectives for target audiences generated opposing approaches to modification. At the ROM, aside from adult audiences, *Darwin* was considered capable of targeting families with children age twelve and up;⁷⁴³ thus, in order to align with the institutional objective to regain the portion of the Museum's target "family audience",⁷⁴⁴ supplementation of a child-focused area was necessary⁷⁴⁵ in order to broaden the reach of the exhibit and increase visitor attraction,⁷⁴⁶ essentially adapting *Darwin* to suit all ages and knowledge levels.⁷⁴⁷

In contrast, NHM staff members considered *Darwin* a "niche exhibition"⁷⁴⁸ that "includes attractions for younger audiences [such as live animals yet] is more adult focussed".⁷⁴⁹ The decision was therefore made to target an

⁷⁴³ Julian Kingston.

⁷⁴⁴ Jason French.

⁷⁴⁵ Christine Lockett.

⁷⁴⁶ Julian Kingston.

⁷⁴⁷ Christine Lockett.

⁷⁴⁸ Dr. Robert Bloomfield.

⁷⁴⁹ NHM. 2008. *Business Plan, Darwin Exhibition November 2008 – April 2009*. Authors Mark Hepworth and Grant Reid, Commercial Department and Project Office. Approval Date August 5.

adult “learned liberal audience”⁷⁵⁰, aged 45 and over,⁷⁵¹ “typified as middle-to-older-aged ‘culture vultures’ who are ABC1 biased [an upper to lower middle class demographic category], well educated, cultured, outward-looking, socially aware and strong-minded”.⁷⁵² Fundamentally, the NHM maintained the exhibit’s adult focussed appeal while the ROM supplemented the exhibit with the *Young Naturalist* children’s activity area with the objective of providing a “value-added experience” for family visitors with children under 12 years of age.⁷⁵³

While research intentionally excluded family audiences and children, justified through the exhibit’s adult-centred approach and appeal, indications of the exhibit’s actual target audience within the adult audience segment were defined in the analysis of visitor demographics of survey participants. As demonstrated in Chapter 5, the main audience constituent consisted of visitors between the ages of 18 to 34 with a university education. This well-educated younger adult audience segment can be

⁷⁵⁰ As discussed with Grant Reid during the staff interviews, the decision to maintain an adult focus for the exhibit was based on two main factors: budget constraints and staff availability. Essentially, the NHM would have had to rewrite a substantial amount of exhibit texts and produce new text panels in order to effectively target younger audiences. As a collaborative travelling exhibition project, extensive adaptation was not intended. Therefore a supplementary budget had not been arranged. Furthermore, the addition of a child-focussed area as at the ROM was not possible due to space constraints of the exhibit gallery.

⁷⁵¹ Alexandra Gaffikin.

⁷⁵² NHM. 2008. *Business Plan, Darwin Exhibition November 2008 – April 2009*. Authors Mark Hepworth and Grant Reid, Commercial Department and Project Office. Approval Date August 5.

⁷⁵³ Julian Kingston.

considered a high interest group consisting of the exhibit's actual target audience.

The analysis of the interrelationship between prior knowledge and engagement (dwell times) in *Darwin* further delimited the actual target audience of the exhibit: it was demonstrated that the exhibit more effectively targeted those with higher pre-visit knowledge of evolution and natural selection and was hence less effective in targeting those less knowledgeable of the scientific theme and conversely, regarding prior knowledge of Darwin's life, the exhibit more effectively targeted visitors with less knowledge than those with significant knowledge. Thus, ideal target audience members consisted of highly educated individuals between 18 to 34 years of age with strong prior knowledge of evolution and little knowledge of Darwin's life. Finally, the analysis also established that no prior knowledge of the theory of evolution and natural selection was a significant deterrent to lengthy engagement in the exhibit, calling into question the actual capacity of *Darwin* to target youth, children and all less knowledgeable audiences without significant mediation.

Although a limitation of the research was the exclusion of youth and family audiences from visitor surveys, the analysis of institutional perceptions of cultural relevance of exhibit narratives and the comparison of anticipated target audiences to actual target audience demonstrates the importance of front-end research including host institutions' museum staff and their audience members before the creation of an international turn-key travelling exhibit.

7.3 Issues with Exhibit Stance and the Cultural Contextualisation of the 'Science versus Religion Debate'

Although the previous section identified adaptations based on issues of local cultural relevance of exhibit content, narratives and target audiences, one major communicational element both participating museums deemed necessary to adapt was the AMNH position on the theory of evolution and stance in the 'science versus religion debate' included in the original exhibit. Both ROM and the NHM staff members emphasized the utmost importance of communicating the official position of their respective institutions.⁷⁵⁴ A second issue of concern staff members highlighted was the relevance of the AMNH's approach and presentation of 'the debate' within a different cultural context.⁷⁵⁵ Thus, institutional positions and perspectives diverged and the cultural contextualisation of 'the debate' provided in the exhibit was challenged.

As discussed in Chapter 4, the exhibit's main voice was that of science; while the position of NOMA was intended to 'relieve tension' between science and religion considered as separate, non-overlapping realms, based on the nature of science and the scientific paradigm, the validity of the theory of evolution was clearly not 'open to debate'. Through the principle of NOMA and in alignment with the position of the AAAS, "religious counter-narratives" were explained as non-scientific alternatives to the theory of evolution. Any practice of science which does not adhere

⁷⁵⁴ Christine Lockett and Dr. Robert Bloomfield.

⁷⁵⁵ Christine Lockett, Dr. Robert Bloomfield and Alexandra Gaffikin.

to the scientific method and uphold the seven essential “pillars of science” is therefore considered pseudoscience. Refuting evolution was explained within Christian religion through both historical and modern-day perspectives of Creationism and Intelligent Design.

Museum staff interviewed generally agreed that the original exhibit’s presentation of the ‘science versus religion debate’ was derived from an American perspective and American context (particularly the current debate).⁷⁵⁶ While the AMNH’s ‘creationism versus science’ approach to the debate was recognised as pertinent for American audiences, this approach was considered less relevant for local audiences at both museums in the study due to variations in cultural setting.⁷⁵⁷

Essentially, the ROM felt that adherence to creationism and Intelligent Design is less significant in the Canadian context and religion is not generally brought into ‘public life’. As stated by Christine Lockett:

I think in Canada we are so diverse and so tolerant and in general don’t bring religion into public life as much as in the United States. I think that’s a definite difference between Canada and the [United] States. Culturally I think Canada is more ready to embrace the idea of a museum having an exhibition on evolution.⁷⁵⁸

At the NHM, Dr. Robert Bloomfield highlighted the exhibit’s American cultural perspective of the “Christian lobby” that contributed to a “strict science versus creationism debate” which does not represent the UK

⁷⁵⁶ Christine Lockett, Dr. Robert Bloomfield and Alexandra Gaffikin.

⁷⁵⁷ Ibid.

⁷⁵⁸ Christine Lockett.

context.⁷⁵⁹ In order to maintain local cultural relevance, the religious diversity of the NHM audiences would require a presentation of perspectives from other religions (including for instance Judaism and Islam *as well as* Christianity) including variable reactions and oppositions.⁷⁶⁰

Furthermore, a significant issue raised by Dr. Bloomfield was the AMNH's position in the 'science versus religion debate' as communicated in original exhibit content. According to the ROM, the exhibit takes the position of NOMA, explaining many scientists are Christian and have therefore "reconciled personal and scientific beliefs".⁷⁶¹ ROM staff members interviewed were generally satisfied with the AMNH presentation of worldview and/or religious issues and did not expect any strong reactions to the exhibit. According to NHM staff members interviewed, the original AMNH exhibit expressed the point of view that "science and faith can be perfectly compatible" whereas the NHM's position on evolution and what constitutes scientific research needed to be more firm or "robust" (according to institutional goals and perspectives).⁷⁶² Thus, views of the relevance of the exhibit's stance diverged.

Both the ROM and the NHM's approach to adaptations was to maintain the original exhibit text panel *Social Reactions to Darwin: Long-standing*

⁷⁵⁹ Dr. Robert Bloomfield and Grant Reid.

⁷⁶⁰ Dr. Robert Bloomfield and Alexandra Gaffikin.

⁷⁶¹ Julian Kingston.

⁷⁶² Dr. Robert Bloomfield and Grant Reid.

Controversies and the accompanying timeline as well as the AMNH video component *What is a Theory?* Both participating institutions consequently added an ‘in-house’ video component addressing local contexts, albeit with very different objectives. Featuring Canadian scientists discussing the significance of the theory of evolution in current scientific research, the objective of the ROM’s audio-visual component was to address research performed in the Department of Botany at the University of Toronto and to make cross-reference to the ROM.⁷⁶³ Unfortunately the video’s poor sound quality and the absence of explanatory texts meant this added element had no effect on visitor experience, nor any consequence on exhibit discourse. The NHM’s ‘in-house’ video component *Evidence and Evolution*, on the other hand, essentially served to strengthen the position of the original exhibit⁷⁶⁴ - regarding the nature of science and what constitutes pseudoscience – as well as to include the NHM’s official position on evolution and science teaching (from both a UK cultural perspective as well as an internal NHM point of view).

As visitors’ perspectives of the relationship between science and religion (as well as philosophy) were analysed in the empirical research as well as their perceptions of the position of the exhibit, it is therefore important to address issues with the exhibit stance and cultural contextualisation of the ‘science versus religion debate’ from the public’s standpoint. Significantly, one visitor interviewed at the ROM who described herself as Creationist

⁷⁶³ Christine Lockett.

⁷⁶⁴ Dr. Robert Bloomfield and Grant Reid.

had a strong affective reaction to the exhibit's stance that, from the perspective of science, religious counter-narratives to evolution are simply non-scientific and therefore not validated. ROM.Visitor.21's perception of the exhibit's stance was of strong "bias", "manipulation" and a "debunking" of perspectives of Creationism and Intelligent Design. Moreover, the presentation of the relationship between Creationism and Intelligent Design, in her perspective, was misconstrued. This raises the subject of museums' normative assumptions of visitors and issues of social inclusion in the presentation of 'the debate'. Firstly, it should not be assumed that visitors with a strong belief in Creationism would not visit *Darwin*. Furthermore, a significant "dimension of social inclusion is the need for a corporate citizenry that fosters tolerance for difference and cross-cultural understanding"⁷⁶⁵ whereas this visitor was essentially marginalised, due to her perspective, 'in the name of science'. Finally, the lack of Canadian contextualisation of the 'science versus religion debate' was mentioned by one ROM visitor. As this constituted his motivation for visiting the exhibit, he was disappointed with the *Darwin*'s purely American treatment of recent issues of debate.

As was anticipated by NHM staff members, the exhibit's religious contextualisation of the 'science versus religion debate' was raised as a significant issue by one survey participant in London. NHM.Visitor.18 experienced difficulty in relating issues of debate presented from the perspective of Christianity to his personal religious belief based in Islam.

⁷⁶⁵ Sandell, R. (ed) 2002. *Museums, Society, Inequality*. London and New York: Routledge, p51.

This evidence serves to highlight the need for the presentation of a wider context of religious denominations. Notably, although the issue of cultural relevance of the main constituents opposing evolution presented in *Darwin* in relation to NHM audience members was raised by NHM staff members in interviews,⁷⁶⁶ specific, adapted content was neither created nor included. NHM.Visitor.18 therefore left the exhibit with “many questions to be answered”.⁷⁶⁷

Finally, both the ROM and the NHM staff members had expressed a desire to communicate their respective institutional positions on evolution. While the strength of their positions did vary (the NHM’s position was significantly stronger), both museums had communicational objectives that included visitors’ understanding of a ‘pro-evolution’ stance. It is therefore significant that at the ROM, 14 of 30 survey participants clearly stated that the position of the ROM was both pro-evolution and pro-Darwin, which represents less than half of those interviewed, and 9 of 30 visitors employed the term “neutral” to describe the ROM’s position on evolution. At the NHM, however, 18 of 30 visitors had understood the stance of the NHM, via the exhibit, as pro-evolution: 14 visitors stated the NHM’s stance was clearly pro-evolution and 7 of 30 “presumed” the NHM’s stance was pro-evolution. None of the NHM survey participants employed the term ‘neutral’. Thus the ‘pro-evolution stance’ of the exhibit was better understood in London, evidently contingent on the content of NHM

⁷⁶⁶ Dr. Robert Bloomfield and Alexandra Gaffikin.

⁷⁶⁷ NHM.Visitor.18

adaptations and visitor interpretation as well as institutional context. It is therefore noteworthy that the Natural History Museum of London is explicitly a museum of natural sciences and national research organisation whereas the Royal Ontario Museum has separate galleries dedicated to natural history and world cultures. Thus, physical contexts, not only cultural contexts, may have also influenced visitors' understanding of the exhibit stance and institutional position.

Although significantly more visitors understood the stance of the exhibit to be 'pro-evolution' at the NHM, an issue worth mentioning is the possibility of mixed messages within the NHM's adaptation of the presentation of the 'science versus religion debate'. As the 'in-house video *Evidence and Evolution* discussed the issue of exclusive teaching of science in the science classroom and religion in courses addressing faith, it was possible to call into question the exhibit's presentation of religious perspectives within a science organisation, notably from the perspective of science.

As the research aimed to provide recommendations for communication and learning in international travelling exhibits, it is important to highlight the importance of clear objectives for the inclusion of multiple perspectives. While the presentation of the 'science versus religion debate' was determined to be a significant factor contributing to critical reflection at both venues within the study, a final concern regarding the presentation of counter-narratives to evolution emanates from surveys. At the NHM, 13 of 15 visitors who engaged in critical reflection described attempting to understand perspectives of Creationism and Intelligent Design and attitudes of rejection of evolution and several visitors at both

venues stated not understanding the rejection of scientific findings based on religious views. A shortcoming of the empirical research is that it was unclear (for most visitors) whether the 'lack of comprehension' of these perspectives expressed was due to insufficient information or a simple rejection of counter-positions. The actual grasp of these perspectives should therefore be included in future audience research.

The educational benefits of the presentation of the 'science versus religion debate' perhaps required further contemplation including the establishment of specific learning objectives. This is not to say that the AMNH should have forgone presentation of American cultural contextualisation, as pertinent for three partner institutions, however, it is regrettable that the opportunity for a wider cultural contextualisation of 'the debate' was not exploited.

Perhaps a more effective approach would have been to highlight the "US exception" in attitudes to acceptance of evolution, as discussed in Chapter 6, due to "widespread fundamentalism and the politicization of science in the United States"⁷⁶⁸ – as demonstrated in the analysis of research polls in Chapter 6 – and to provide a comparison with attitudes within the cultural contexts of the projects' non-American partners. This method would not only ensure local relevance for all partners but also significantly increase the impact of the presentation of 'the debate' through a comparison of multiple cultural contexts. Regarding the presentation of counter-

⁷⁶⁸ Miller, Jon D., Scott, Eugenie C. and Okamoto, Shinji. 2006. 'Public Acceptance of Evolution'. *Science*. 11 August, Vol 313, No. 5788, p765 <http://www.sciencemag.org/content/313/5788/765.full.pdf> (accessed 8.05.2012).

perspectives, it is also essential to be aware of potential 'misrepresentations' of perspectives in 'the eyes' of the constituent concerned, perhaps once again the best method for avoiding strong negative reactions is by performing front end research.

7.4 Language as a Cultural Issue and Impact on Communication

Cultural contextualisation was not the only influencing factor in defining local cultural relevance: language was an unexpected barrier at the London venue considering all five partner institutions derive from English speaking countries, hence highlighting the importance of language as a sign system. Discussing the limits and processes of interpretation, Umberto Eco highlights the "conjectures about the possible sender" of messages made which have "nothing to do with the intentions of the sender, but [...] certainly has to do with researching the cultural framework of the original message."⁷⁶⁹ Visitors at the NHM, whose language code represents significant cultural difference from America in comparison to their Canadian counterparts, engaged in identification of the cultural framework of messages. While none of the survey participants in Toronto mentioned the use of American English in *Darwin*, American English was raised as an 'issue' in 5 of 30 interviews in London as visitors had evidently reflected on the cultural framework of exhibit messages.

⁷⁶⁹ Eco, Umberto. 1994. *The Limits of Interpretation*. First Midland Book Edition. Bloomington: Indiana University Press, p5.

Furthermore, NHM staff expressed dismay at the regular substantial influx of visitor grievances due to the use of American English in *Darwin*.

The identification of the cultural framework of exhibit messages was demonstrated to have significant impact on perceptions and understanding of exhibit authorship. While only 4 ROM visitors were clearly aware of the collaborative authorship of the travelling exhibit after their visit, 43.3% of NHM survey participants were aware of an American contributor to the exhibit. Further research is required in order to determine the impact of diverging language codes on visitors' perceptions of cultural relevance of exhibit discourses. However, this issue serves to demonstrate, as portended in the thesis' approach to communication it is false to perceive communication as a "one-sided" process. Culture must be considered a fundamental factor influencing both the encoding and decoding of exhibit messages: culture therefore not only influences museum visitors and the reception of messages, but also museum workers themselves and the messages they create.

7.5 Culture, Worldview, Critical Reflection and Transformative Learning

Based on a constructivist transformative learning paradigm, the thesis research established that transformative learning does occur in the museum. It is therefore important to highlight how transformative learning transpired as well as significant variations in findings at each research site. The research question driving the line of inquiry for audience research of transformative evolution learning was: How are culture, worldview, frames

of reference, habits of the mind, meaning schemes (beliefs or attitudes), tacit assumptions and points of view implicated or involved in meaning-making processes in evolution learning?

The promotion of critical reflection was established through data analysis to be contingent on two main factors: understanding of the exhibit stance as pro-evolution and personal worldviews. Within the analysis of transformative learning, the empirical research established worldview as the fundamental factor defining visitors' engagement in subjective or objective reframing.

The exhibit presented several opportunities for critical reflection on perspectives: the pro-evolution stance of the exhibit, the 'perspective' of science, counter-narratives to evolution (Creationism and Intelligent Design) including historical and current perspectives, positions in the 'science versus religion debate' and Darwin's perspective. Visitors could therefore potentially engage in objective reframing understood in transformative learning theory as "critical reflection on assumptions"⁷⁷⁰ (of 'others') or subjective reframing defined as "critical self-reflection on assumptions."⁷⁷¹ Significantly, all visitors upholding a 'scientific worldview' that engaged in conscious critical reflection explained contemplating multiple perspectives related to alternate frames of reference and points of view essentially in an attempt to understand perspectives of Creationism

⁷⁷⁰ Kreber, Carolin. 2013. *Authenticity in and Through Teaching in Higher Education: The transformative potential of the scholarship of teaching*. New York: Routledge, p106.

⁷⁷¹ Ibid, p106.

and Intelligent Design and attitudes of rejection of evolution. This is likely due to concordance with the scientific perspective of the exhibit and support of meaning perspectives.

Conversely, fostering of subjective reframing in critical reflection was almost exclusive to visitors with a synthesis perspective, with the exception of 1 ROM visitor with a secular realist worldview. Furthermore, of the four visitors who engaged in conscious critical reflection, three expressed feeling their personal perspective was challenged in their interpretation of exhibit messages and one experienced disappointment with the exhibit's stance.

As two ROM visitors had strong negative emotional reactions to exhibit content, one self-identified Creationist upholding a synthesis perspective (ROM.Visitor.21) and one with a secular realist (philosophical) worldview (ROM.Visitor.5), it is important to highlight a major gap within transformative learning theory: Mezirow does not include affective cognition. While Mezirow does not deny importance of "imagination, intuition, and emotion,"⁷⁷² he explains "criticism [due to relative exclusion of affect in his theory] is partially justified"⁷⁷³ and admits that as "transformation is often a difficult, highly emotional passage, a great deal of additional insight into the role of imagination is needed and overdue."⁷⁷⁴

⁷⁷² Mezirow, Jack. 2009. 'Transformative Learning Theory'. In Mezirow, Jack and Taylor, Edward W. (eds). *Transformative Learning in Practice: Insights from Community, Workplace and Higher Education*. San Francisco: Jossey Bass Inc., p27.

⁷⁷³ Ibid, p27.

⁷⁷⁴ Ibid, p28.

However, as explained in the previous chapter, the negative emotional reactions of these two visitors' may be due to a combination of "cultural imaginings" and expectations as "our expectations powerfully affect how we construe experience; they tend to become self-fulfilling prophecies."⁷⁷⁵ ROM.Visitor.21 engaged in critical reflection throughout her entire visit due to the effects of a counter-narrative experience of a "consensus narrative" or a "negotiated" response due to the presentation of a narrative based on "normative assumptions" of "ideal visitors".⁷⁷⁶ Her negative response was based on the perception of an exhibit stance that consisted of "debunking" Creationism and Intelligent Design. As she did not engage in a process of self-examination or subjective reframing, perspective transformation was not possible. ROM.Visitor.5 engaged in critical reflection during his visit and felt his personal views were challenged. His strong negative reaction was based on his interpretation of scientists' explanations of the nature of science and scientific theory in the video *What is a Theory* from a philosophical point of view. Although his interpretation of the scientists' position as consisting of scientism is significant, he had revealed a frustration before visiting the exhibit with scientists who purport the view that the "pursuit of truth" is "exclusive to the sciences".⁷⁷⁷ As the video

⁷⁷⁵ Mezirow, Jack. 2009. 'Transformative Learning Theory'. In Mezirow, Jack and Taylor, Edward W. (eds). *Transformative Learning in Practice: Insights from Community, Workplace and Higher Education*. San Francisco: Jossey Bass Inc., p28.

⁷⁷⁶ Scott, Monique. 2007. *Rethinking Evolution in the Museum: Envisioning African Origins*. Hooper-Greenhill, Eilean and Kaplan, Flora (eds). Museum Meanings Series. London and New York: Routledge, p114.

⁷⁷⁷ ROM.Visitor.5

was not intended to purport this perspective, it was concluded that his “expectations and ideas about [...] science”⁷⁷⁸ influenced his interpretation and reading of an unplanned message⁷⁷⁹ as a “cultural imagining”.

Two visitors experienced perspective transformation through the “questioning of integrity of deeply held assumptions and beliefs based on prior experience [...] prompted in response to an awareness of conflicting thoughts, feelings and actions.”⁷⁸⁰ Notably, due to the importance of “dialogue with the self and others” as the “essential medium through which transformation is promoted and developed,”⁷⁸¹ only critical reflection that involves subjective reframing can lead to perspective transformation.⁷⁸² While both visitors (ROM.Visitor.15 and one NHM.Visitor.18) articulated synthesis perspectives, the trigger for perspective transformation - simply defined as “the revision of meaning structures from experiences”⁷⁸³ – was the correction of a misconstrued tacit assumption which had fundamentally

⁷⁷⁸ Macdonald, Sharon. 1999. ‘Cultural Imagining Among Museum Visitors’. In Hooper-Greenhill, Eilean (ed). *The Educational Role of the Museum*. 2nd Ed. London: Routledge, p270.

⁷⁷⁹ Ibid, 270.

⁷⁸⁰ Taylor, Edward. W. 2009. ‘Fostering Transformative Learning’. In Mezirow, Jack and Taylor, Edward W. (eds). *Transformative Learning in Practice: Insights from Community, Workplace and Higher Education*. San Francisco: Jossey Bass Inc., p7.

⁷⁸¹ Ibid, p9.

⁷⁸² Ibid, p7.

⁷⁸³ Taylor, Edward W. 1998. *The Theory and Practice of Transformative Learning: A Critical Review*. Information Series No. 374. Columbus: ERIC Clearinghouse, p6.

influenced their previous interpretation of the implications of the theory of evolution. Both visitors perceived Darwin as atheist or as having 'anti-religious' views, understood this perspective as the driving motivation behind Darwin's research of evolution and therefore described him as "confused". The correction of this assumption essentially led to a reinterpretation of evolution, or prior understanding (although for the ROM visitor a second important misconception of Darwin was corrected: his view of Darwin as pro-slavery and racist). As explained by the NHM visitor, understanding Darwin upheld religious views during his research process essentially rendered the theory of evolution difficult to dispute. Research findings therefore demonstrated the fundamental importance of correcting tacit assumptions of Darwin as atheist, especially for visitors upholding synthesis perspectives, in the promotion of subjective reframing and perspective transformation.

As perspective transformation was demonstrated to be contingent on subjective reframing, an important methodological recommendation for future research on critical reflection and transformative learning is a clear distinction in evaluation tools between objective and subjective reframing. Additionally, the desired learning outcomes for the presentation of multiple perspectives should be included in the method of inquiry, if possible.

7.6 Reflection on Theoretical Framework, Methodology and Analysis

The theoretical framework of the thesis was based on semiotics, constructivism and transformative learning theory and included socio-cultural learning perspectives as well as the contextual model of learning. Understanding communication and learning in the international travelling exhibition through a semiotic lens proved essential to addressing the thesis' causal puzzle by enabling the analysis of the influence of culture on the construction of exhibit messages as well as interpretation. Culture was determined to have significant impact on the perspectives and contextualisation provided both of the 'science versus religion debate' and Darwin's life story. The AMNH's approach to the construction of the travelling exhibit content, albeit taking into consideration partner institutions' concerns on the relevance of exhibit discourses for local audiences, was determined to be considerably influenced by American perspectives and cultural context. Thus, although having participated in a collaborative production process, the ROM and the NHM still faced decisions regarding content modifications based on staff perceptions of the pertinence of exhibit discourses for their audiences as well as the exhibit's ability to fulfil institutional goals and educational objectives. Both partner institutions executed adaptations designed to enhance the local relevance of exhibit discourses.

The semiotic approach to communication processes also proved essential in the evaluation of visitor reception as the audience research showed that participants did engage in critical discourse during post-visit interviews on

the cultural framework of exhibit messages, of which language, as a semiotic system, was a critical factor.⁷⁸⁴ Visitors' identification of the exhibit's American cultural framework was demonstrated to have significant impact on perceptions and understanding of the exhibit's authorship (which was connected to the fulfilment of institutional objectives). However, as local perspectives did prevail, the importance of a 'glocalized' approach to international travelling exhibitions based on the contextual model of learning – hence taking into consideration not just the physical context (which undoubtedly is a significant challenge for travelling exhibits) but also personal and socio-cultural contexts - was emphasised. The postmodernist ontological position coupled with the understanding of audiences as active learners rather than passive was also vital to the research, justifying the focus on individual, subjective understandings of (objective) science. Embracing the existence of multiple narratives was fundamental as the research validated the relevance of individual frames of reference, habits of the mind and points of view on the theory of evolution as well as assumptions about Darwin himself within meaning-making process based on the transformative learning framework. Thus, the epistemological position of the research, consisting of constructivism and transformative learning theory as a sub-set, was critical to both methodology and analysis. Including visitors' prior knowledge and understandings in the research method of inquiry provided a point of

⁷⁸⁴ While the exhibit's use of American English (including diction and accents of presenters in the videos) was the main determining element for survey participants in London, American perspectives and contextualisation of the 'science versus religion debate' was a causal factor at both research venues.

comparison for visitors' (self-evaluated) acquired knowledge levels as well as facilitated the identification and analysis of 'counter-narratives' and 'cultural imaginings'. Enabling the evaluation of the impact of visit experience and learning on pre-visit understandings and assumptions, the implementation of a constructivist/transformational paradigm also made it possible to determine when the interpretation of 'unintended messages' or negative reactions to exhibit content - such as with ROM.Visitor.5 (with philosophical secular realism as worldview) and ROM.Visitor.21 (upholding a synthesis perspective) - were based on visitors' 'counter-narratives', pre-visit assumptions and/or pre-visit expectations.

As previously stated, audience research of *Darwin* incorporated the concept of 'visitor-as-critic' or 'expert visitor' that relies on the learner's capacity to critically reflect on both the conceptual pertinence and cultural relevance of exhibition narratives and to engage in critical discourse. Grounded in semiotic theory and based on an understanding of visitors as active learners, the 'expert visitor' concept defined by Jean Davallon, Hanna Gottesdiener and Marie-Sylvie Poli asserts visitors' capacity to engage in critical discourse, reflecting on social, historical and cultural contexts of exhibition discourses.⁷⁸⁵ Davallon, Gottesdiener and Poli maintain the results of audience research of visitor reception of the exhibit *Difference: Three Museums, Three Perspectives* demonstrates museum

⁷⁸⁵ Davallon, Jean, Gottesdiener, Hanna and Poli, Marie-Sylvie. 2000. 'The "expert visitor" concept'. *Museum International*. Vol 52, Issue 4, Oct.-Dec. Paris: UNESCO, p62.

visitors' capacity to 'overstand'⁷⁸⁶ exhibit discourses. 'Overstanding' essentially "goes much farther than understanding" exhibit content and what is expected of the "model reader".⁷⁸⁷ The thesis' analysis of interview data therefore included the identification of visitors' critical discourse and a thematic categorising of issues and topics discussed (such as the worldview implications of the theory of evolution, the implications for mankind and the 'science versus religion debate'). Findings of the audience research of *Darwin* asserted (once again) visitors' 'expert' capacity to engage in critical discourse as participants analysed the exhibit discourse within a wider framework or context than provided.

Finally, the evaluation of transformative learning processes through the research method specifically designed for the thesis served to prove that transformative learning experiences can and do take place in the museum. However, it is fundamental to highlight that significant outcomes – such as corrections of assumptions, misconceptions and perspective transformation - were demonstrated to be dependent on subjective reframing within the process of critical reflection on 'contested meanings'. Although a confrontational approach was taken in the exhibit, visitors who did not fully accept the theory of evolution (ROM.Visitor.17 had stated evolution is "just a theory" and ROM.Visitor.20 explained evolution "has

⁷⁸⁶ Davallon, Gottesdiener and Poli base the idea of overinterpretation on J. Culler's work in semiotics. Culler, Jonathan. 1992. 'In Defence of Overinterpretation'. In Eco, Umberto (ed). *Interpretation and Overinterpretation*. Cambridge: Cambridge University Press, pp 109-125.

⁷⁸⁷ Davallon, Jean, Gottesdiener, Hanna and Poli, Marie-Sylvie. 2000. 'The "expert visitor" concept'. *Museum International*. Vol. 52, Issue 4, Oct.-Dec. Paris: UNESCO, p63.

not been proven to me yet”) were shown to maintain their pre-visit understandings, frames of reference and worldviews due to the absence of subjective reframing through critical reflection. The utmost importance of the constructivist paradigm’s recognition of visitors as active learners within audience research of evolution learning was proven. Furthermore, the need to move away from the transmission model of communication and positivist approaches to the evaluation of learning in the museum was reinforced.

7.7 The Relevance and Original Contribution of the Thesis Research

The thesis focus on audiences, culture, worldview and transformative learning offers a new research perspective and significantly contributes to knowledge in informal evolution learning as well as to understanding of the implications of culture in communication and meaning-making in international travelling exhibitions. As communities are often multicultural as oppose to mono-cultural, composed of individuals with diverging perspectives and worldviews, the research findings from this study may be applied both within diverse cultures as well as across cultures.

Furthermore, the thesis proposes a novel research method of inquiry specifically devised for the evaluation of transformative learning in the museum. The recommended application of this method is within audience research of exhibits that present issues of significant social and cultural relevance such as: difficult history, social equality, diversity and social justice. The aim of the thesis is to inspire future similar research and

continued use of the study's methodology in order to build a larger body of knowledge in the field within variable institutional and cultural contexts. Although the thesis intentionally focuses on the analysis of transformative learning and perspective transformation in evolutionary biology, the approach to learning and research methods proposed have a much wider application in audience research in art, history and ethnography museums. Moreover, audience research in travelling exhibitions is an important valuable source presenting a unique opportunity for evaluating the influence of culture on communication and learning in the museum.

7.8 Reflection on Research Questions and Closing Remarks

The thesis was initiated by specific goals for analysing communication and learning in international travelling exhibitions. Several research questions, serving to drive the thesis' line of inquiry, focused on travelling exhibitions as an international communicative medium:

- What happens to the effectiveness of educational theory and methods used in exhibitions when they are transferred from one culture to another?
- Do truly international communication strategies and methods for the museum exhibition exist?
- Aside from the obvious question of the translation of texts, do certain changes and adaptations need to be made to exhibit content in order to ensure that the chosen communication strategy stays effective across cultures?
- Are the adaptations required in a travelling exhibition's message content-based, communication/education-based or both?
- Is visitor meaning making in museums similar across cultures, thus allowing the international travelling exhibition to communicate effectively in any number of countries?
- Is an effective international travelling exhibition truly possible?

Adaptability is perhaps *the* key concern for (international) travelling exhibitions. While the emphasis of current practice in the field highlights the important issues of adaptable design and effective approaches to logistics, rather than simply addressing issues arising from variable physical contexts, the thesis purposefully addressed the adaptability of exhibit messages for variable cultural and institutional contexts. According to the empirical research summarised in previous sections, from the standpoint of host institutions, adaptations required in order to ensure that the chosen communication strategy stays effective across cultures were both content-based and communication/education-based. Perceived issues in local relevance lead to adaptations at both participating institutions: however, while certain adaptations aimed to enhance the exhibit's local cultural relevance, others were intended to heighten institutional relevance.

From an audience standpoint, the audience research determined that adaptations required were related to language and cultural contextualisation. Thus, for visitors these key elements (which are communication-based and content-based) should ideally be adapted to local cultures in order to ensure that the chosen communication strategy stays effective. Furthermore, the visitor study served to establish that the effectiveness of educational theory and methods used in exhibitions is impacted when they are transferred from one culture to another. Exhibit content is often produced to target specific age groups and knowledge levels. The travelling exhibit, however, is implemented in multiple museums with variable target audience segments. As was demonstrated,

the ROM had clear institutional objectives to target family and younger audiences via an adult-focussed exhibit. This led to considerable supplementation of *Darwin* in the Toronto venue. A limitation of the research, therefore, is the exclusion of younger audiences and the analysis of the ROM's 'discovery area' from the audience research. However, the empirical study did determine that the main audience constituent consisted of visitors between the ages of 18 to 34 with a university education. This well-educated younger adult audience segment was considered a high interest group consisting of the exhibit's actual target audience. Thus, the actual educational adaptability of the Darwin exhibit for younger audiences was questioned.

While actual target audiences were demonstrated to be similar at both research sites, visitor meaning-making and learning somewhat diverged and appeared to be culturally and institutionally contingent. Prior knowledge of the exhibit's biographical/historical theme was higher at the NHM and visitors' assessment of post-visit knowledge of the life of Darwin, the man and the scientist was also significantly higher. The fact that Charles Darwin originated from Britain and the NHM has significant Darwin holdings may have influenced learning due to heightened local cultural relevance of the exhibit theme (undoubtedly coupled with the pertinent timing of the exhibit). Findings from the analysis of knowledge acquisition on the exhibit's scientific theme, on the other hand, were essentially identical at both venues. A further divergence was revealed through the analysis of transformative learning and critical reflection: almost twice as many survey respondents at the NHM engaged in critical

reflection than at the ROM. However they mostly engaged in objective reframing whereas the ROM participants tended to engage in subjective reframing. As NHM respondents were shown to have reflected on the perspectives of Creationism and Intelligent Design in an attempt to understand perspectives that oppose evolution, it is possible it is the American contextualisation of the 'science versus religion debate' that generally did not foster subjective reframing for London audiences. Overall, visitor meaning making and learning demonstrated significant similarities as well as differences.

The last two research questions to be discussed are: Do truly international communication strategies and methods for the museum exhibition exist? and Is an effective international travelling exhibition truly possible? The analysis of the exhibit adaptations executed combined with the results of the audience research serve to highlight the relevance of a 'glocalised' approach to communication and learning, thus considered the most effective strategy for international travelling exhibitions.

On a final note, while the collaboration and partnership of the *Darwin* exhibit project undoubtedly had various benefits (ranging from the sharing knowledge and experience and collective budgeting to solving scheduling and staff availability issues), the drawback of a single institution generating curatorial content requires mentioning. Ideally, the collaborative exhibit production process for travelling exhibitions should include more effective cross-cultural curatorial cooperation and input, integrating a balance between global and local relevance, hence simultaneously broadening *and*

focusing the cultural framework of exhibit discourses and contextualisation. This is particularly essential for 'turn-key' exhibits which are not intended to undergo a significant adaptation process. But perhaps most importantly, including the cultural contextualisation of exhibit discourses according to *all* partners of an international exhibit within the original content would have potentially increased the exhibit's ability to foster critical reflection on alternate points of view and cultural contexts and encourage subjective reframing. Thus, through a 'glocalized' approach, the thesis maintains that effective international travelling exhibitions are truly possible.

Finally, the limitations of the research sample and research situation merit mention. The first limitation that requires highlighting is the research situation. The thesis explicitly focuses on the analysis of one international travelling exhibit in two distinct settings: the Royal Ontario Museum in Toronto and the Natural History Museum in London. Hence, adaptations required as well as the evaluation of communication and learning in other host institutions of the *Darwin* exhibit reside outside of the scope of the research. Findings from the empirical study of *Darwin* need to be compared with future research of other exhibits in more cultural institutions. Secondly, the research sample is also limited: although a representative sample based on statistics regarding attitudes to evolution within Toronto and London populations was desirable, the ability of the research to do so was somewhat restricted. While underlying reasons included significant time constraints due to the travelling and temporary nature of the exhibit, the main contributing factor was the exhibit's 'actual

audience'. While it is significant that visitors upholding synthesis perspectives including habits of the mind that included belief in Divine creation were interviewed at both research sites, the proportion of visitors upholding creationist views and/or rejecting human evolution (or the theory of evolution altogether) was not representative of attitudes within the general population. The issue, therefore, is a discrepancy between 'actual visitors' - whose motivation for visiting was based on a high value of science coupled with significant knowledge of the theory of evolution - and 'potential visitors'. Essentially, in order to obtain a representative sample, purposeful sampling as opposed to the random selection of survey participants would have been a research requirement, thus including 'potential visitors' who would have chosen not to attend. Future research evaluating the possible discrepancy between 'actual' and 'potential visitors' to natural history exhibitions on evolution based on individual worldviews and habits of the mind is therefore necessary. Visitor studies evaluating evolution learning in the museum implementing a purposeful research sample would also significantly contribute to knowledge in the field.

In closing, the empirical research served to prove the critical influence of culture on communication and meaning-making in the context of international travelling exhibitions. Furthermore, the study also provided significant evidence of the interrelationship of culture, worldview, perspectives and assumptions and their vital role in transformative learning. Although the thesis intentionally focused on the analysis of transformative learning and perspective transformation of individuals, the

wider context and implications of findings, through the expanded definition of transformative learning must also be considered.

The theory of evolution was demonstrated to provide considerable worldview input. As the expanded definition of transformative learning perceives the individual as a part of a human system, evolution learning provides the possibility for an “expansion of consciousness in any human system, thus the collective as well as the individual”.⁷⁸⁸ Significant learning of evolution and natural selection can therefore contribute to group perspective transformation, as “this expanded consciousness is characterized by new frames of reference, points of view or habits of the mind as well as by a new structure for engaging the system’s identity.”⁷⁸⁹

Although somewhat idealistic, within today’s global society, we must consider the cultural and religious implications of the theory of evolution by natural selection within a wider, perhaps global, framework encompassing all religions and embracing all cultures.

⁷⁸⁸ Kasl, Elizabeth and Elias, Dean. 2000. ‘Creating New Habits of Mind in Small Groups’. In Mezirow, Jack and Associates. *Learning as Transformation: Critical Perspectives on a Theory in Progress*. San Francisco: Jossey Bass, p233.

⁷⁸⁹ Ibid, p233.

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Appendices

Appendix One Research Design or Protocol

Appendix Two Research Tools

Appendix Three Ethics Review Approval

Appendix Four Photo Authorisation

Appendix One: Research Design or Protocol

Fieldwork Phase 1: Exhibit Analysis and Staff Interviews	
1. Researcher's in-depth exhibition analysis	
Description	Analysis of the exhibition content, presentation and discourse as well as obvious communicational and educational objectives at both participating host institutions (ROM and NHM) as well as of original AMNH content and presentation through photographs provided and available online documents. Identification of: 'prime message vectors', culture-specific content, site-specific adaptations as well as possible issues (content, design, implementation etc.)
Method of inquiry	Recording of researcher's analysis of content and presentation by researcher in the form of research notes.
Participants/respondents	Researcher

2. Interviews of museum professionals	
Description	Face-to-face semi-structured interviews, target time duration 30 minutes
Method of inquiry	Voice recording (with a digital voice recorder) and note taking during semi-structured interviews of museum staff members of the participating “host institutions”.
Participants/respondents	The participants were chosen according to their role of decision-maker on the exhibition project such as: team leader in the creation of the exhibition, content creators, designers and scenography creators. Thus participants range from the museum director, the exhibition curator, staff in charge of travelling exhibitions, to the museum educators and interpretation planners.
Number of participants	Overall 8 museum staff members: <ul style="list-style-type: none"> • 4 ROM staff participants • 4 NHM staff participants
Research Tools	<ul style="list-style-type: none"> • Participant Information Sheet for Museum Professionals • Participant Consent Form for Museum Professionals • Questionnaire for Museum Professionals French Translations: <ul style="list-style-type: none"> • Fiche d'information pour participants à l'entretien de professionnels de musée • Fiche de consentement de participation pour les professionnels de musée
Consent	All participants signed a written consent form including the option of using names of interviewees. All respondents were adults.

Fieldwork Phase 2: Audience Research

1. Group A Visitor Survey: Pre-visit interviews, visitor observation and post-visit interviews

Description	<p>Thirty respondents (at each venue) were interviewed before their visit (minimum time of 15 min.) in a face-to-face, structured interview in order to identify whether preliminary research or reading was performed beforehand, to analyse learning in the exhibit and to establish personal points of view related to the exhibition theme: Darwin, the man and the scientist and the theory of evolution by natural selection.</p> <p>The same respondents were observed during their visit using tracking and timing methods in the sections identified as prime message vectors by means of non-intrusive direct observation (with “thinking out loud” encouraged).</p> <p>The same thirty respondents interviewed pre-visit and tracked through the main exhibit sections were interviewed post-visit with an in-depth (minimum time required 15-30 min.), face-to-face, semi-structured interview. The objective is an evaluation of visitor experience and knowledge acquisition during the visit, thus analysing the effectiveness of the communicative strategies and methods. In order for results to be comparable, it was essential to respect and follow an interview guideline while remaining flexible during the interview process.</p>
Method of inquiry	Voice recording (with a digital voice recorder) and note-taking (by researcher) during interviews. Note-taking during visitor tracking and timing (form filled out by researcher during visitor observation).
Participants/respondents	The respondents were randomly recruited at the Darwin exhibit entrance and asked to first answer short questions for a mini survey on visitor demographics which served to identify visitor criteria for inclusion in my research. Criteria for inclusion consisted of age, place of residence, travel-time and length of time at place of residence. The study only includes local adult audiences (as oppose to tourists), participants 18 years of age and more, those living within a geographical radius allowing for a maximum of one-hour travel time to the museum and living in their current place of residence for approximately one year.

Number of participants	<p>Overall 60 museum visitors:</p> <ul style="list-style-type: none"> • 30 ROM museum visitors • 30 NHM museum visitors
Research Tools	<ul style="list-style-type: none"> • Participant Information Sheet for Visitor Study • Participant Consent Form (Visitor Study) • Visitor Information Sheet • Visitor Survey Before Visiting the Exhibition • Tracking and Timing Form • Visitor Exit Survey <p>French Translations:</p> <ul style="list-style-type: none"> • Fiche d'information pour participants à l'enquête auprès des visiteurs • Fiche de consentement de participation (à l'enquête auprès des visiteurs et à l'entretien de « focus group »)
Consent	<p>All participants signed a written consent form and all were adults.</p>

2. Group B Control Group: Visitor observation (without interviews)

Description	Twenty visitors (at each venue) were used to further study visitor behaviour, intentionally focusing on visitors not participating in the interview process (visitor survey) in order to confirm whether the researcher's presence served to bias findings. Visitor observation was non-intrusive and direct. A sign was posted at the entrance of exhibition informing visitors that research in the exhibit was in progress.
Method of inquiry	Note-taking during visitor tracking and timing (form filled out by researcher during observation).
Participants/respondents	The respondents were randomly recruited at the Darwin exhibit entrance however selected according to approximate, hypothesized age (over the age of 18) and gender (50% female and 50% male). Non-intrusive observation techniques were applied in order to remain as discreet as possible in an attempt to not influence visit behaviour.
Number of participants	Overall 40 museum visitors: <ul style="list-style-type: none">• 20 ROM museum visitors• 20 NHM museum visitors
Research Tools	Tracking and Timing Form

Questionnaire for museum professionals

Your position and role:

- 1) What is your position and what are your responsibilities in the institution?
- 2) What was your role in this specific project?
- 3) Did you contribute the exhibition content in any way? If so, how?

Institutional objectives:

- 1) What are the institutional objectives of this exhibition?
(Possible financial objectives, institutional relationship building, image...)
- 2) What is/are the main institutional message(s) of this exhibition? What perception of this exhibition project do you hope the general public (and possibly corporate sponsors) will have?
- 3) Do you think that the ROM's/NHM's public will notice that this is a jointly produced exhibition or will they perceive it as an exhibition produced solely by the ROM/NHM?

Target audience:

- 1) Who is your target audience for this exhibition?
- 2) Is your target audience included in your objectives? If so, how?

Education and communication objectives:

- 1) What are the educational/communicational objectives of the exhibition? What specific visitor outcomes are intended?
- 2) Of the main themes or sections in the exhibition, I have selected four core sections to test in my visitor study:
 - Section 4: **Voyage of the Beagle** (portion on Galapagos Islands with the models, live animals and panels: Evidence for Evolution)
 - Section 6: **London** (evolutionary tree - Darwin's evidence (fossils, structures, embryos, family resemblance, Infinite variety, kindred spirits, Men and apes, Adding it up.)
 - Section 7: **Down House** (Like confessing a murder –Social reactions to Darwin)

- Section 8: **Evolution and Natural Selection** (Evolution today - Movie – The Theory of Evolution by Natural Selection - Human Evolution)

Do you think that the educational/communicational objectives can be fulfilled through these sections?

- 3) Do you think there are any possible cultural issues to fulfilling the exhibition's educational/communicational objectives (directly related to the exhibition content)?
- 4) How have these issues been taken into account or planned for within the exhibition?

Modifications of content and scenography:

- 1) What adaptations were made especially for the presentation in Toronto at the ROM/in London at the NHM? For what reason?
- 2) Would you have wanted other adaptations/modifications to have been made? Less adaptations to have been made? Why?
- 3) Do you think that the original or core message of the exhibition has been modified for your venue?

Exhibition production process:

- 1) Can you briefly explain the exhibition production process as far as museums and professionals implicated as well as roles?
- 2) Were there any specific problems and/or challenges in the creation of this exhibition as a collaborative project between five museums?
- 3) Were there any direct benefits from the collaborative exhibition production process?

Visitor Studies:

- 1) Were any front end, summative and/or formative studies performed for this exhibition? Will there be any visitor studies performed in the future?
- 2) May I have access to these studies as well as any visitor demographic studies you have performed within your institution?

Travelling exhibition programme:

- 1) Were there any specific problems and/or challenges having this exhibition travel from one venue to another?

Participant Information Sheet for Museum Professionals

You are being invited to take part in an audience research study on communication and visitor experience in travelling exhibitions. Firstly, I would like to thank you for your support and interest without which this project would not be possible. Before providing consent, please take the time to read over the following information and ask any questions you may have.

Research project title: Travelling Exhibitions as an International Communicative Medium: An analysis of theory and practice of the communicative strategies used in travelling exhibitions and an evaluation of their efficiency and impact.

Researcher: Afshan Heuer, PhD student in Museum Studies at the University of Leicester.

Afshan Heuer
177 Brunswick Avenue
Toronto, ON
M5S 2M4
Canada
Telephone: + 416 413 1363
Email: afshanheuer@hotmail.com

Research supervisor: Dr. Vivien Golding, University of Leicester
vmg4@leicester.ac.uk

Purpose of research:

The purpose of this study is to better understand the visitor experience in travelling exhibitions, taking advantage of the fact that the same exhibition is shown to a multitude of audiences.

My objective is twofold: firstly, to fill in gaps of knowledge in the field of visitor studies in travelling exhibitions as very little information is available and little research in this specific area of focus has been performed, and secondly; to increase understanding and knowledge of the theoretical implications of effective communication and learning through travelling exhibitions.

This project **aims** to:

- Analyse the theory and practice of communicative methods used in a significant number of travelling exhibition projects on an international level.
- Evaluate the efficiency of these methods and their impact according to communication goals and educational objectives.
- Gain insight into and a better understanding of the visitor experience in international travelling exhibitions.
- Determine which communication methods are more “globally effective” for an international audience.

Your participation/role includes:

- **An interview on the specific goals and objectives of the exhibition (either face-to-face or by telephone)**
(researcher will ask questions and use a voice recording instrument to limit note-taking and make the interview process quicker.)

Objectives of the interview: identification of institutional goals as well as the specific educational and communicational objectives in order to clearly define the desired message.

The duration of your participation depends on the amount of time you wish to spend in discussion but the minimum amount of time is approximately 30 minutes.

Participant selection:

You were selected due to your role in the exhibition project.

Confidentiality:

If you choose not to provide the researcher permission to use your name, your participation will be kept confidential. Participant identities will be strictly anonymous in all reports or publications. Your name or identity will be replaced by a code number by the researcher (Afshan Heuer) and in no way will be communicated to any third party. Your identity and responses will be securely stored and only the researcher (Afshan Heuer) will have access to this information.

If you wish to provide consent to use your name in this study, please check the allocated box next to the statement “in checking this box, I give permission to the researcher (Afshan Heuer) to use my name in any reports and/or publications produced in relation to this research project” (found on the **Participant Consent Form for Museum Professionals**).

Questions:

For questions you may have regarding the research itself as well as your participation, please contact me directly and I would be glad to answer your requests. My contact information is in the portion on the researcher: Afshan Heuer.

Potential risks and benefits:

Your participation in the study will provide the institutional goals as well as the specific educational and communicational objectives to be tested in the visitor survey portion of my fieldwork. Once again, your participation is vital as it will provide the information necessary for a valid evaluation of your current exhibition. The benefit will be a report of the visitor experience within the exhibition and a cross-comparison with other venues (provided that other venues presenting the exhibition are also participating in the study).

As far as we can determine, there are no risks involved in or as a result of your participation in this study.

Informed consent:

Your participation in this research study is entirely voluntary. Please be aware that you are free to refuse participation as well as withdraw from this study or discontinue your participation at any time.

THANK YOU FOR YOUR PARTICIPATION AND SUPPORT IN THIS STUDY.

Participant Consent Form for Museum Professionals

After having read the **Participant Information Sheet**, I am giving informed consent to participate in the research project "**Travelling Exhibitions as an International Communicative Medium: An analysis of theory and practice of the communicative strategies used in travelling exhibitions and an evaluation of their efficiency and impact.**"

All of my questions regarding the Participant Information Form, the Participant Consent Form or this study have been answered to complete satisfaction. I agree to participate in this research.

I understand that by writing my name in the area provided below, and by signing this form, I am providing informed consent for this study.

I also fully understand that my participation is voluntary and I may refuse to participate, or may discontinue it at any time.

In checking this box, I give permission to the researcher (Afshan Heuer) to use my name in any reports and/or publications produced in relation to this research project.

Name (PRINT) _____

Signature _____

Date _____

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Any further requests can be addressed directly to the researcher:

Afshan Heuer (PhD student in Museum Studies at the University of
Leicester)
177 Brunswick Avenue
Toronto, ON
M5S 2M4
Canada

Telephone: + 416 413 1363
Email: afshanheuer@hotmail.com

Research supervisor:

Dr. Vivien Golding, University of Leicester
Email: vmg4@leicester.ac.uk

Visitor Information Sheet (ROM)

1. Where do you currently live?

- Greater Toronto Area (GTA)

Please specify: _____

- Ontario but outside of the Greater Toronto Area

Please specify: _____

- Canada

Please specify: _____

- Country other than Canada

Please specify: _____

2. How long have you lived in this location?

- Less than one year

- One to two years

- Two to five years

- Over five years - Please specify: _____

3. Are you...?

- Female Male

4. What is your age?

- Under 18

- 18 – 24

- 25 – 29

- 30 – 34

- 35 – 39

- 40 – 44

- 45 – 49

- 50 – 54

- 55 – 64

- 65 and older

5. Level of studies

- Less than High School - Please specify: _____

- High School - Please specify: _____

- Certificate or Diploma - Please specify: _____

- University Degree - Please specify: _____

- Graduate Diploma - Please specify: _____

- Postgraduate Degree - Please specify: _____

6. Profession

- A professional (doctor, lawyer, etc.) Please specify: _____

- An executive / corporate employee - Please specify: _____

- An academic - Please specify: _____

- A skilled worker - Please specify: _____

- A trade worker - Please specify: _____

- Self-employed - Please specify: _____

- Student - Please specify: _____

- Retired - Please specify: _____

- Other occupation: _____

7. How often do you come to the ROM?

- Less than once a year

- Once to twice a year

- Three to five times a year

- More than five times a year

8. Are you a ROM member?

- Yes No

Visitor Information Sheet (NHM)

1. Where do you currently live?

- In London

Please specify: _____

- Outside of London

Please specify: _____

2. How long have you lived in this location?

- Less than one year

- One to two years

- Two to five years

- Over five years - Please specify: _____

3. Are you...?

- Female Male

4. What is your age?

- Under 18

- 18 – 24

- 25 – 29

- 30 – 34

- 35 – 39

- 40 – 44

- 45 – 49

- 50 – 54

- 55 – 64

- 65 and older

5. Level of studies

- Less than High School - Please specify: _____

- High School - Please specify: _____

- Certificate or Diploma - Please specify: _____

- University Degree - Please specify: _____

- Graduate Diploma - Please specify: _____

- Postgraduate Degree - Please specify: _____

6. Profession

- A professional (doctor, lawyer, etc.) Please specify: _____

- An executive / corporate employee - Please specify: _____

- An academic - Please specify: _____

- A skilled worker - Please specify: _____

- A trade worker - Please specify: _____

- Self-employed - Please specify: _____

- Student - Please specify: _____

- Retired - Please specify: _____

- Other occupation: _____

7. How often do you come to the Natural History Museum of London?

- Less than once a year

- Once to twice a year

- Three to five times a year

- More than five times a year

8. Are you a Natural History Museum of London member?

- Yes No

Visitor Survey Before Visiting the Exhibition

1. Can you describe who Darwin is to you and what he represents?

2. What would you say your image of Darwin is based on?

3. How would you estimate your knowledge and understanding of the life of Darwin, the man and the scientist?

1 – No knowledge 2 – Little knowledge 3 – Average knowledge 4 – Strong knowledge 5 – Expert knowledge

4. How would you estimate your knowledge and understanding of the theory of evolution and natural selection?

1 – No knowledge 2 – Little knowledge 3 – Average knowledge 4 – Strong knowledge 5 – Expert knowledge

5. Do you feel the theory of evolution and natural selection are relevant today? Why?

6. How would you describe your world view? How do you feel about science and truth?

7. What brought you into the exhibition today? What were your motivations for coming?

How do you feel about the museum (ROM or NHM) presenting the exhibition *Darwin: The Evolution Revolution*? Do you feel it is important or significant? Why?

Visitor Exit Survey

1. May I ask you to enlighten me on certain observations I made during your visit?

For example, you spent a fair amount of time in a specific section, can you tell me why? You did not spend time in a specific area, can you tell me why? You seemed to have an opinion on a specific area, would you mind sharing your opinion with me? Etc...

2. How would you describe your experience in the exhibition in your own words?

3. Did any of the content particularly interest you or surprise you in any way?

4. Do you believe your knowledge and understanding of the life of Darwin, the man and the scientist, has been reinforced, enhanced or changed in any way? Please explain.

5. How would you estimate your knowledge and understanding of the life of Darwin, the man and the scientist, now that you have visited the exhibition?

Before the exhibition:

1 – No knowledge 2 – Little knowledge 3 – Average knowledge 4 – Strong knowledge 5 – Expert knowledge

After the exhibition:

1 – No knowledge 2 – Little knowledge 3 – Average knowledge 4 – Strong knowledge 5 – Expert knowledge

6. Do you believe your knowledge and understanding of the theory of evolution and natural selection has been reinforced, enhanced or changed in any way? Please explain.

7. How would you estimate your knowledge and understanding of the theory of evolution and natural selection now that you have visited the exhibition?

Before the exhibition:

1 – No knowledge 2 – Little knowledge 3 – Average knowledge 4 – Strong knowledge 5 – Expert knowledge

After the exhibition:

1 – No knowledge 2 – Little knowledge 3 – Average knowledge 4 – Strong knowledge 5 – Expert knowledge

8. Do you feel your image of Darwin has been reinforced, enhanced or changed in any way? Please explain.

9. How do you feel now about the relevance of the theory of evolution and natural selection? Why?

10. What do you feel the main message of the exhibition is?

11. What, in your opinion, is the museum's stance in evolutionary theory and debate (ROM/NHM)?

12. At any time during your visit, did you become aware of your position or stance on the evolutionary debate in relation to other positions or beliefs? Did you feel "challenged" or "supported" at any point? Please explain.

13. How do you feel about the exhibition's use of the words "evidence" and "theory" in relation to the theory of evolution and natural selection?

14. How would you describe your world view now and your feelings about science and truth?

15. Were your motivations for coming fulfilled? Explain.

16. How do you feel about the museum (ROM/NHM) presenting the exhibition *Darwin: The Evolution Revolution*? Do you feel it is important or significant? Why?

17. Which institution(s) made this exhibition or contributed to its production?

18. The last question pertains to your heritage and origins and you are in no way obligated to answer. What is your personal heritage or origin and what language(s) do you speak in the home?

Thank you for your time today! Please be aware that on the participant information sheet you have my contact information and you may contact me at any time for any questions or requests that you may have. Your participation is greatly appreciated!

Participant Information Sheet for Visitor Study

You are being invited to take part in an audience research study on communication and visitor experience in travelling exhibitions. Firstly, I would like to thank you for your support and interest without which this project would not be possible. Before providing consent, please take the time to read over the following information and ask any questions you may have.

Research project title: Travelling Exhibitions as an International Communicative Medium: An analysis of theory and practice of the communicative strategies used in travelling exhibitions and an evaluation of their efficiency and impact.

Researcher: Afshan Heuer, PhD student in Museum Studies at the University of Leicester.

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Telephone: + 416 413 1363
Email: afshanheuer@hotmail.com

Research supervisor: Dr. Vivien Golding, University of Leicester
vmg4@leicester.ac.uk

Purpose of research:

The purpose of this study is to better understand the visitor experience in travelling exhibitions, taking advantage of the fact that the same exhibition is shown to a multitude of audiences.

Your participation/role includes:

- **An interview before the visit of the exhibition**
(researcher will ask questions and use a voice recording instrument to limit note-taking and make the interview process quicker.)
- **Researcher makes observations of your interaction during your visit of the exhibition** (researcher will NOT intrude in your visit in any way and will only take notes following from a distance in order to observe which portions of the exhibition you find engaging.)
- **An interview after the visit of the exhibition**
(researcher will ask questions and use a voice recording instrument to limit note-taking and make the interview process quicker.)

The duration of your participation depends on the amount of time you wish to spend in the exhibition plus the time for the before and after interviews (approximately 15 minutes each).

PLEASE NOTE: There are no right or wrong answers, there are no better or worse ways in engaging in the exhibition. The aim is that you visit the exhibition as you would normally do in any way you feel appropriate.

Participant selection:

You were selected as you are from the museum's "local audience" and you are 18 years of age or older.

Confidentiality:

Your participation will be kept confidential. Participant identities will be strictly anonymous in all reports or publications. Your name or identity will be replaced by a code number by the researcher (Afshan Heuer) and in no way will be communicated to any third party. Your identity and responses will be securely stored and only the researcher (Afshan Heuer) will have access to this information.

Questions:

For questions you may have regarding the research itself as well as your participation, please contact me directly and I would be glad to answer your requests. My contact information is in the portion on the researcher: Afshan Heuer.

Potential risks and benefits:

Your participation in the study will help the museum institution better understand your particular visitor experience in this exhibition. By participating you are helping a PhD student contribute to existing research on visitor experience in traveling exhibitions.

As far as we can determine, there are no risks involved in or as a result of your participation in this study.

Informed consent:

Your participation in this research study is entirely voluntary. Please be aware that you are free to refuse participation as well as withdraw from this study or discontinue your participation at any time.

THANK YOU FOR YOUR PARTICIPATION AND SUPPORT IN THIS STUDY.

Participant Consent Form

After having read the **Participant Information Sheet**, I am giving informed consent to participate in the research project "**Travelling Exhibitions as an International Communicative Medium: An analysis of theory and practice of the communicative strategies used in travelling exhibitions and an evaluation of their efficiency and impact.**"

All of my questions regarding the Participant Information Form, the Participant Consent Form or this study have been answered to complete satisfaction. I agree to participate in this research.

I understand that by writing my name in the area provided below, and by signing this form, I am providing informed consent for this study.

I also fully understand that my participation is voluntary and I may refuse to participate, or may discontinue it at any time.

Name (PRINT) _____

Signature _____

Date _____

----- ✂

Any further requests can be addressed directly to the researcher:

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Research supervisor:

Dr. Vivien Golding, University of Leicester
Email: vmg4@leicester.ac.uk

Appendix Three: Ethics Review Approval

Note: Ethics Review form submitted with questionnaires and consent forms.

RESEARCH ETHICS REVIEW

MUSEUM STUDIES

This checklist should be completed for every research project that involves human participants. **It must be completed before potential participants are approached to take part in any research.** It will be used by the module tutor or supervisor and Research Ethics Officer to identify whether a fuller application for ethics approval needs to be submitted or whether the research can proceed without this.

Section I: Project Details

1. Project title:	Travelling Exhibitions as an International Communicative Medium: An analysis of theory and practice of the communicative strategies used in travelling exhibitions and an evaluation of their efficiency and impact.
Statement of Research Purpose:	The scope of the proposed research is a study of learning in travelling exhibitions through both qualitative and quantitative research in visitor studies which includes an analysis of the effectiveness of specific communicative strategies and methods in exhibitions produced for and shown to a multitude of audiences on an international level. The purpose of my research is twofold: first to fill in gaps of knowledge in the field of visitor studies in travelling exhibitions as very little information is available and little research in this specific area of focus has been performed, and secondly; to increase understanding and knowledge of the theoretical implications of effective communication and learning through travelling exhibitions.

<p>Project Aims/ Research questions:</p>	<p>This project aims to:</p> <ul style="list-style-type: none"> • Analyse the theory and practice of communicative methods used in a significant number of travelling exhibition projects on an international level. • Evaluate the efficiency of these methods and their impact according to communication goals and educational objectives. • Gain insight into and a better understanding of the visitor experience in international travelling exhibitions. • Determine which communication methods are better suited for an international audience. <p>As the institutions creating the participating travelling exhibitions must try to communicate a message and transfer knowledge to audiences in numerous cultures, my research questions are:</p> <ul style="list-style-type: none"> • What happens to the effectiveness of educational theory and methods used in exhibitions when they are transferred from one culture to another? • Do truly international communication strategies and methods for the museum exhibition exist? • Aside from the obvious question of the translation of texts, do certain changes and adaptations need to be made in order to ensure that the chosen communication strategy stays effective across cultures? • What happens to the effectiveness of educational theory and methods used in exhibitions when they are transferred from one culture to another? • Is visitor meaning making in museums international, thus allowing the travelling exhibition to communicate effectively in any number of countries? • Is a truly international travelling exhibition possible?
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<p>Proposed methods:</p>	<p>General:</p> <p>As I plan to include two separate travelling exhibitions in my study which are to be analysed with two distinct audiences (at different cultural institutions), this research plan is to be carried out twice per participating exhibition, giving a total of four times in all.</p> <p>I will use a mixed method of audience research that combines both qualitative and quantitative measures as this would be beneficial and aid in attaining a better understanding of my research questions by obtaining a more detailed, holistic “picture” of the research setting. The fieldwork portion of my research is split into two distinct phases. The first phase is an in-depth analysis of the exhibition and the second phase is a visitor study.</p> <p>PHASE 1 – IN-DEPTH ANALYSIS OF THE EXHIBITION</p> <p>The fieldwork portion of my research is split into two distinct phases. The first phase is an in-depth analysis of the exhibition and the second phase is a visitor study.</p> <p>Within phase 1, the exact number of participants is still to be determined although I expect a minimum of 2-4 participants per participating institution making the ideally 8-16 participants overall. For all participants in this phase of my research, I will request written and signed consent for utilisation of research data (research consent form). During phase 1, I will carry out the following research:</p> <p>A. Researcher’s exhibition analysis of “original travelling exhibition” as constructed by the “organising institution” - I must familiarise myself with the travelling exhibition content and visit the exhibition in order to analyse the exhibition discourse, the communicational and educational objectives, the strong and weak points in the exhibition as well as identify any content or presentation issues that may pose “communication problems” for the public (possible non-effective portions). I will identify six “prime message vectors” as the strongest conveyors of the exhibition’s message.</p>
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Method of inquiry: Recording of researcher's analysis of content and presentation by researcher in the form of research notes.

Participants/respondents: Researcher.

- B. **Identification of goals and objectives of the “organising institution”** – I will perform **semi-structured interviews of museum staff members of the “organising institution”** in order to identify institutional goals as well as the specific educational and communicational objectives in order to clearly define the desired message. Using a combination of the information provided in the interviews and my own in-depth analysis of the exhibition, the educational goals to be assessed in the study, including the six “prime message vectors” to be tested, will be discussed with the “organizing institution”.

Method of inquiry: Voice recording (with a digital voice recorder) and note taking during **semi-structured interviews**.

Participants/respondents: Essentially the participants will be chosen according to their role of decision-maker on the exhibition project such as: team leader in the creation of the exhibition, content creators, designers and scenography creators. Thus participants will range from the museum director, the exhibition curator, staff in charge of travelling exhibitions, to the museum educators and possibly even members of the design team. The number of participants will range according to the specific exhibition project and the institutional method for including staff members on a given project. **Exact number to be determined** although I am advised that 2 at each institution will suffice the demands of my research design. **All participants will be adults.**

- C. **Researcher's exhibition analysis of “modified travelling exhibition” as presented by the “hosting institution”** - I must identify any significant adaptations to content and presentation, analysing any

affects to the exhibition discourse as well as the communicational and educational objectives. I will also confirm the presence of the six “prime message vectors” to be included in the study and note whether they remain equally important in light of any modifications made. Once again, I will identify any content or presentation issues that may pose “communication problems” for the public (possible non-effective portions).

Method of inquiry: Recording of researcher’s analysis of content and presentation by researcher in the form of research notes.

Participants/respondents: Researcher.

D. Identification of goals and objectives of the “hosting institution” – I will perform **semi-structured interviews of museum staff members of the “hosting institution”** in order to identify institutional goals as well as a verification of the specific educational and communicational objectives established with the “organising institution”. The aim is to establish whether the objectives remain the same and whether new objectives have been added. Using a combination of the information provided in the interviews and my in-depth analysis of the exhibition, the educational goals to be assessed in the study will once again be agreed upon. The intention is to test the same objectives at each site as the exhibition should essentially remain identical in message.

Method of inquiry: Voice recording (with a digital voice recorder) and note taking during **semi-structured interviews**.

Participants/respondents: Essentially the participants will be chosen according to their role of decision-maker on the exhibition project such as: team leader in the creation of the exhibition, content creators, designers and scenography creators. Thus participants will range from the museum director, the exhibition curator, staff in charge of travelling exhibitions, to the museum educators and possibly even members of the design team. The number of participants will

range according to the specific exhibition project and the institutional method for including staff members on a given project. **Exact number to be determined** although I am advised that 2 at each institution will suffice the demands of my research design. **All participants will be adults.**

PHASE 2 – VISITOR SURVEY

The second phase of the **fieldwork portion** is a **visitor survey**. Within phase 2, three separate groups of visitors will be studied:

- **Group A** consists of **30 respondents** who will be interviewed and observed (with written and signed consent forms) before, during and after the visit of the exhibition;
- **Group B** can be considered a “control group” of **approximately 20 visitors** that will only be observed by the researcher with no form of image or voice recording (a sign will be posted at the entrance of exhibition clearly informing visitors that they may be observed during their visit of the exhibition) and;
- **Group C** consists of **approximately 10 visitors** that will participate in a focus group session (with written and signed consent).

During phase 2, the following audience research will be performed:

- A. **Visitor demographics mini survey** – Specific questions such as age and where visitor origin (where visitors live) will be asked and recorded by staff at the museum’s ticket desk (by ticket sellers).

Method of inquiry: Data recording (filling out a mini questionnaire by hand) to be performed by museum staff while selling tickets. This consists of a screening method for participants in the visitor survey.

Participants/respondents: All ticket buyers.

- B. **Interviews before the visit** - a short questionnaire will be filled out directly with the visitor in a **face-to-face, structured interview** in order to analyse the depth of their

knowledge on the exhibition theme and to identify whether they performed any preliminary research or reading before the visit to the exhibition.

Method of inquiry: Digital voice recording and note taking during interview.

Participants/respondents: Participants of Group A will be filtered and screened according to their answers to the mini survey at the ticket desk. The ages to be focused on are from age 25-55 years of age. Participants will also be selected according to their origin (as determined in the mini survey): my research aims to study visitors from the same culture as the hosting institution (thus international tourists will not be interviewed). Males and females will be asked to participate. The aim is to obtain **30 respondents**.

Note: For those who accept to perform the visitor study, the information from the visitor demographics mini survey will be included in the interview data.

C. **Visitor observation during the visit** – Firstly, those who participated in the pre-visit interview will be observed using **non-intrusive direct observation with “thinking out loud” encouraged**. The aim is to identify which portions of the exhibition “attract” visitors (and which do not), which didactic supports are read or used, if there are any elements that cause strong reactions, purposefully skipped or seem to be misunderstood etc. These participants belong to Group A.

Secondly, **non-intrusive direct visitor observation** will be used to study visitor behaviour of those not participating in the interview process in order to confirm that the researcher’s presence does not bias the findings (a sign will be posted at the entrance of exhibition clearly informing visitors that they may be observed during their visit of the exhibition). These participants make up Group B.

	<p>Method of inquiry: Note taking during observation using visitor “tracking and timing” techniques. No video or voice recording devices will be used for the purpose of this portion of the study.</p> <p>Participants/respondents:</p> <ul style="list-style-type: none"> • Participants in the non-intrusive direct observation with “thinking out loud” encouraged (Group A) are the same participants from previous portion (Interviews before the visit). • Participants in the non-intrusive direct visitor observation (Group B) will be separate visitors, other than those participating in the interview process. This “control group” will consist of approximately 20 visitors who will also be “tracked and timed”. <p>D. Interviews after the visit – in-depth, face-to-face, semi-structured interviews with the visitors will be performed to evaluate the visitor experience and the knowledge acquired during the visit, thus analysing the effectiveness of the communicative strategies and methods. Participants are those in Group A. The semi-structured interview is important in this stage of the research as after having observed specific behaviour in the exhibition space, personalised questions probing for reasons for personal behaviour will be asked. However, in order for results to be comparable, it is important that an interview guideline be respected and followed while remaining flexible in the interview process.</p> <p>Method of inquiry: Digital voice recording and note taking during interview.</p> <p>Participants/respondents: Participants in the in-depth, face-to-face, semi-structured interviews are the same participants from the interviews before the visit and the non-intrusive direct observation with “thinking out loud” encouraged. They are participants from Group A.</p>
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Focus group interview – after the interview and observation research is completed, one **focus group session**, with approximately 10 visitors, will be held in order to further explore visitors' knowledge and experiences and to better understand what people think about the exhibition. This session will use the data obtained in the empirical research and aims to help to clarify the underlying reasons for specific thoughts about the exhibition and actions observed. A specific guideline will be used at each exhibition site for this portion, however, it is necessary that the session also remain flexible and “open” to the direction and initiatives proposed by participants.

Method of inquiry: Digital voice recording and note taking during focus group session.

Participants/respondents: Participants of this group (Group C) will consist of approximately 10 visitors that are separate visitors from those in Groups A and B.

Overall, in phase 2, at each exhibition site: 30 people will be asked to participate in an in-depth, three-part survey consisting of interviews and observation, 20 visitors will be simply observed during their visits and 10 visitors will participate in the focus group. The number of participants per site therefore consists of approximately 60 visitors. As the aim is to perform this same research at four sites, the total number of participants at the end of phase 2 (the visitor study) is 240 visitors in total.

<p>Method of recruiting research participants</p>	<p>PHASE 1 – IN-DEPTH ANALYSIS OF THE EXHIBITION</p> <p>For both the Identification of goals and objectives of the “organising institution” and the “hosting institution” the method of recruiting participants for the semi-structured interviews will be through direct contact within the institution, with the staff working on the project.</p> <p>As mentioned previously, essentially the participants will be chosen according to their role* of decision-maker on the exhibition project such as: team leader in the creation of the exhibition, content creators, design and scenography creators. Thus participants will range from the museum director, the exhibition curator, staff in charge of travelling exhibitions, to the museum educators and possibly even members of the design team. The number of participants will range according to the specific exhibition project and the institutional method for including staff members on a given project. The exact number is to be determined accordingly.</p> <p>PHASE 2 – VISITOR SURVEY</p> <ul style="list-style-type: none"> • Group A: 30 respondents to be interviewed and observed (with written and signed consent forms) before, during and after the visit of the exhibition will be recruited at the ticket desk when answering questions for the mini survey on visitor demographics; • Group B can be considered a “control group” of approximately 20 visitors that will only be observed during their visit of the exhibition will be selected by the researcher on-site within the exhibition according to specific, pre-determined criteria. This group will be observed in a public place, in the museum exhibition; • Group C: approximately 10 visitors that will participate in a focus group session (with written and signed consent) will be selected when answering questions for the mini survey on visitor demographics.
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<p>Criteria for selecting research participants</p>	<p>PHASE 1 – IN-DEPTH ANALYSIS OF THE EXHIBITION</p> <p>As mentioned previously, essentially the participants will be chosen according to their role on the exhibition project. They will be asked to sign the research participation consent form.</p> <p>PHASE 2 – VISITOR SURVEY</p> <ul style="list-style-type: none"> • Visitor demographics mini survey – All ticket buyers will be asked to respond to the mini survey questions. • Group A Interviews and observation before, during and after visit - the 30 respondents will be filtered and screened according to their answers to the mini survey at the ticket desk. The ages to be focused on are 18 years of age or more. Participants will also be selected according to their origin (as determined in the mini survey): my research aims to study visitors from the same culture as the hosting institution (thus international tourists will not be interviewed). Both males and females will be asked to participate. Only those who sign the consent form will be considered. • Group B Non-intrusive direct visitor observation - approximately 20 visitors will be considered as a “control group” and will be selected according to the criteria set up for Group A and through the screening process at the ticket counter (via the mini visitor survey) if possible. This must be done discreetly as these visitors are not to know they are being observed so as not to influence their behaviour. If this is not possible, they will be selected by the same criteria, but according to gender and approximate age as perceived by the researcher. • Group C Focus group interview - approximately 10 visitors will participate in a focus group session and must be willing to sign the research participation consent form. They must all fulfil the same criteria as Group A (and consequently Group B). Only those who sign the consent form will be considered.
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Section II: Applicant Details

2. Name of researchers (applicant):	Afshan HEUER
3. Status:	PhD distance learning student
4. Email addresses:	a) afshanheuer@hotmail.com b) ah186@leicester.ac.uk
5a. Contact addresses:	a) 177 Brunswick Ave., Toronto ON, M5S 2M4, Canada
5b. Telephone numbers	a) + 1 416 413 1363 b) + 1 416 930 4508

Section III: For Students Only

6. Module name and number, MA or PhD course and department:	PhD, Department of Museum Studies
7. PhD Supervisor's name:	Dr Vivien Golding
8. Email address:	vmg4@leicester.ac.uk
9. Contact address:	Department of Museum Studies University of Leicester 105 Princess Road East Leicester UK LE1 7LG

Section IV: Module Tutors/Dissertation Supervisors Only

Please tick the appropriate boxes. The study should not begin until all boxes are ticked:

- The topic merits further research
- The student has the skills to carry out the research
- The participant information sheet or leaflet is appropriate
- The procedures for recruitment and obtaining informed consent are appropriate

Comments from module tutor/ supervisor:

I fully support Afshan's research proposal
 & recommend she proceed with data collection

Section V: All Research Applicants

Please outline below whether or not your research raises any particular ethical issues and how you plan to address these issues.

I feel that my research in no way raises any particular ethical issues as the participants/respondents will all be adults and my research will be overt (meaning permission to use data will be obtained by use of a signed participant consent form).

As mentioned within phase 2 of my fieldwork, I will, however, perform **non-intrusive direct visitor observation** within the exhibition space, a public place, in order to create a "control group" of approximately 20 visitors. A sign will be posted at the entrance of exhibition clearly informing visitors that they may be observed during their visit of the exhibition. During the direct observation, I will record specific behaviours only in writing (using tracking and timing methods and forms). Visitors will remain anonymous, no interviews will be performed and no videos or voice recording will be used. This portion of my research is necessary in order to identify possible biases of the research data through the presence of significant divergencies or inconsistencies in visitor behaviour due to the participation in the interview process.

How many research participants do you intend to involve? **Approximately 240 – 260 participants in total are to participate.**

Is this figure: **FIXED?** **APPROX.?**

Are you using a Participant Information and Informed Consent Form?
YES **NO**

If YES, please paste copy form at the end of this application.

Have you submitted a Risk Assessment Form YES NO

Now proceed to the Research Ethics Checklist:

Section VI: Research Ethics Checklist

Please answer each question by ticking the appropriate box:

	YES	NO
1. Does the study involve participants who are particularly vulnerable or unable to give informed consent? (e.g. children, people with learning disabilities, your own students)	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2. Will the study require the co-operation of a gatekeeper for initial access to the groups or individuals to be recruited? (e.g. students at school, members of self-help group, residents of nursing home)	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3. Will it be necessary for participants to take part in the study without their knowledge and consent at the time? (e.g. covert observation of people in non-public places)	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4. Will the study involve discussion of sensitive topics (e.g. sexual activity, drug use)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
5. Are drugs, placebos or other substances (e.g. food substances, vitamins) to be administered to the study participants or will the study involve invasive, intrusive or potentially harmful procedures of any kind?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
6. Will blood or tissue samples be obtained from participants?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
7. Is pain or more than mild discomfort likely to result from the study?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
8. Could the study induce psychological stress or anxiety or cause harm or negative consequences beyond the risks encountered in normal life?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
9. Will the study involve prolonged or repetitive testing?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
10. Will financial inducements (other than reasonable expenses and compensation for time) be offered to participants?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
11. Will the study involve recruitment of patients or staff through the NHS?	<input type="checkbox"/>	<input checked="" type="checkbox"/>

If you have answered 'no' to all questions, paste copy of any Participant Information/Informed Consent Form at end of this document and then sign and date the form overleaf and then submit form to your module tutor/ supervisor. You should also all retain a copy of the form.

If you have answered 'yes' to any of the questions in Section VI, please return to Section V and ensure that you have described in detail how you plan to deal with the ethical issues

raised by your research. Answering yes to questions does not mean that you cannot do the research only that your proposal raises significant ethical issues which will need careful consideration and formal approval by the module tutor/ supervisor and the Department's Research Ethics Officer **prior to you commencing your research**. If you answered 'yes' to question 11, you will also have to submit an application to the appropriate external health authority ethics committee. Any significant change in the question, design or conduct over the course of the research should be notified to the module tutor/ supervisor may require a new application for ethics approval.

Signatures:	Date:
Students:
(all students involved in research must sign) *	A. F. HAN H. S. E. R. A. Han H. S. E. R.	07.05.08

Supervisor/module tutor:	U. G. L.	7.5.8
Research ethics officer:	[Signature]	08/05/08

Please paste copies of information/informed consent forms in here before submitting to Supervisor/Module Tutor:

Appendix Four: Photo Authorisation

11/4/13

Outlook Print Message

RE: Photo authorization in Darwin at ROM

From: [REDACTED]
Sent: Wednesday, July 30, 2008 4:12:28 PM
To: 'Afshan Heuer' [REDACTED]
Cc: [REDACTED]

Dear Afshan,

Yes, we authorize you to take photos of the Darwin installation at ROM in the context of use for your PhD. Please note that these photos cannot be used for any other purpose or distributed to 3rd parties.

Best,

Jan

[REDACTED]
Assistant Director, Traveling Programs

American Museum of Natural History

Central Park West at 79th Street

New York, NY 10024

[REDACTED]
Fax: +1-212-769-5255

RE: Photo authorization in Darwin at ROM

From: [REDACTED]

Sent: Thursday, January 15, 2009 3:34:40 PM

To: afshan heuer [REDACTED]

Cc: [REDACTED]
[REDACTED]

Dear Afshan,

Yes that's fine go ahead.

As with the ROM agreement the images cannot be used for any other purpose or distributed to 3rd parties.

It may be better to go just before 10am say 9.50 so you make sure the public are not going to be present-this also makes it easier for us as it will confuse them to see someone taking images when they are not allowed to!

Regards

[REDACTED]

From: afshan heuer [REDACTED]

Sent: 15 January 2009 10:42

To: [REDACTED]

Subject: FW: Photo authorization in Darwin at ROM

Dear [REDACTED]

Firstly thank you for the great interview yesterday. It will definitely help.

I wanted to ask if I could take general pictures of the displays for my comparison of the presentation at the NHM with the ROM. I have attached the authorization email from Jan English I had gotten at the ROM if this helps. I would like to take pictures when the public is not present either at 10 sharp in the morning or once the public leaves in the evening (if possible).

Thanks so much for your help

Sincerely

Afshan

From: [REDACTED]

To: [REDACTED]

CC: [REDACTED]

Subject: RE: Photo authorization in Darwin at ROM

Date: Wed, 30 Jul 2008 12:12:22 -0400

Dear Afshan,

Yes, we authorize you to take photos of the Darwin installation at ROM in the context of use for your PhD. Please note that these photos cannot be used for any other purpose or distributed to 3rd parties.

Best,

[REDACTED]

[REDACTED]

Assistant Director, Traveling Programs

American Museum of Natural History

Central Park West at 79th Street

New York, NY 10024

[REDACTED]

Fax: +1-212-769-5255