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GREETINGS FROM THE PLANET OF EARTH: ACCOUNTS OF ARCHITECTURE FOR AN INTERSTELLAR AUDIENCE ON THE VOYAGER GOLDEN RECORD

In 1977 the Voyager I and Voyager II twin probes were launched into deep space on a fact-finding grand tour of the cosmos. The unmanned space probes were to make close observations of major planets including Jupiter and Saturn and their various moons. Each of the Voyager probes carried a copy of what is known as the Golden Record - a twelve-inch phonograph record made from gold-plated copper - that was conceived as a cosmic greeting card intended to introduce and educate alien life to the ways of planet Earth.

The compilation, overseen by scientist Carl Sagan, included a carefully curated collection of music including, among others, work by Bach, Mozart, Louis Armstrong and Chuck Berry. A selection of 'the sounds of Earth' were also represented through whale songs as well as the sound of thunder, crickets and Morse code. Greetings and well wishes were recorded in fifty-five languages, and included messages of peace and friendship from countries such as Greece, Israel, Brazil and Syria as well and more idiosyncratic messages, such as that from Sweden, whose message was a greeting 'from a computer programmer in the little university town of Ithaca on the Planet of Earth'. The Golden Record was tantamount to a compilation of civilisation's greatest hits.

In addition to these sound recordings, the Golden Record was encoded with 118 images that were chosen to represent the richness and diversity of life on Earth. Among these were a number of images of the built environment and specific works of architecture ranging from images of vernacular buildings in Africa through to views of towns, cities and highways. It also included a series of images of landmark buildings and structures, including the Great Wall of China, the Golden Gate Bridge, the United Nations Building, and the Sydney Opera House. The Golden Record, in effect established the first canon of human architecture and endeavour intended for the unknown residents of the universe. This paper will chronicle and critically consider the architectural content of the Golden Record.

In 1978, the American astronomer and astrobiologist Carl Sagan noted that the same impulses that had seen humans try to communicate with future civilisations - evidenced, for example, by the time capsule created for the 1939 New York World's Fair that he had seen as a child - had more recently been ignited by the possibilities of the space age.¹ The space age, Sagan suggested, had resulted in a curiosity for the possibility of sending messages to the distant future.² An interest that extended beyond the readers of science fiction, through to particular factions of scientists, and most interestingly, America's own national space agency.

During the 1970s, America's National Aeronautics and Space Administration (NASA), commissioned and endorsed a number of projects to accompany official missions that involved dispatching messages expressly intended to be read by any extra-terrestrial beings that might encounter the spacecraft. Each of these projects, which largely comprised engraved plaques attached to satellites and unmanned spacecraft, were overseen by Carl Sagan - who was well known to the American public through his popular television appearances.³ By far the most elaborate of these messages was the *Voyager Interstellar Record*, which was launched with the Voyager twin probes in 1977. The *Voyager Interstellar Record*, this paper argues, was tantamount to a textbook on the history of Earth and its civilisations - expressed through an anthology of sounds and images of Earth. The content of this record largely focused on music, however also included non-musical recordings, greetings and an elaborate pictorial essay. While the musical content has received considerable popular and scholarly attention, little consideration has been given to the pictorial content of the record - and there has been no recognition or discussion of the modest selection of images that can be regarded as 'architectural content'.⁴ This paper will firstly offer an historical account of the project, before chronicling and critically considering the architectural content of the *Voyager Interstellar Record*, which it argues is effectively the first architectural history text targeted at an extra-terrestrial audience.

Voyager Missions

In August and September 1977 the Voyager 1 and Voyager 2 twin probes were launched into deep space on what was touted as a fact-finding, grand tour of the cosmos. Between them, the unmanned space probes were to make close observations of, among other major planets, Jupiter and Saturn and their various moons. The mission was scheduled to last from 1979 until 1986, before the probes would eventually leave the solar system, and continue their journey indefinitely through interstellar space - from where they continue to transmit information today.

Affixed to the exterior of both Voyager probes was a copy of what was officially named the *Voyager Interstellar Record*, however is more commonly known as the "Golden Record". (Figure 1) This was a twelve-inch phonograph record made from gold-plated copper, accompanied by a phonograph needle and cartridge. The record was encased in an aluminium cover that included etched imagery describing those who had sent the record and their location in both time and space, as well as some imagery that served as visual instructions for how to play the record.⁵ Protected in its aluminium casing, it was estimated the record might last a billion years.⁶ However, it was also anticipated that the trajectory of the probes was such that they would be unlikely to intersect with a planetary system within ten billion years. Thus it was assumed that if the record was to be discovered, it would most likely be found by a civilisation significantly more advanced than the one that sent it, and one capable of space travel itself.⁷ As such, the creators always envisaged two audiences for the project. The first was an extra-terrestrial audience that was assumed to be of superior intelligence to ours.⁸ For this audience, the Golden Record was conceived as part cosmic greeting card (as termed by Sagan himself) - intended to introduce and educate alien life to ways of planet Earth, and part time-capsule. The second was a human audience on Earth, whereby the record was seen as a way of engaging public interest in the space program.⁹ As such the copies of the record were always intended to be made commercially available, although due to a frustratingly complicated permissions process, this was never achieved.¹⁰



FIGURE 1 *Voyager Interstellar Record* being fixed to the Voyager 1 space probe prior to its launch in 1977. (Image Source: NASA: <https://solarsystem.nasa.gov/galleries/voyager-1-gold-plated-record/>.)

The Golden Record

The compilation was overseen by Carl Sagan, who worked in collaboration with Frank Drake, Ann Druyan, Timothy Ferris, Jon Lomberg and Sagan's wife, Linda Salzman Sagan. A group of consultants also provided specific advice on various aspects of the project. Both Drake and Salzman Sagan had previously collaborated with Sagan on the 'Pioneer Plaque', which conveyed a message from Earth that was attached to the Pioneer 10 and 11 space probes launched five years earlier (the first man-made objects to leave the solar system).

The decision to send a phonograph record proved a radical departure from Sagan's earlier attempts at interstellar communications for NASA. In a 1977 letter sent to Alan Lomax, an ethnomusicologist who consulted on the project, Sagan explained: "it soon became clear that much more information could be conveyed in the same space on a metal mother of a phonograph record than on a plaque of the same size." Sagan then added, "Since this is the 100th anniversary of Edison's invention of the phonograph, a record seems particularly apt."¹¹ Following the logic of Marshall McLuhan, for the Golden Record, the medium was thus an integral part of the message.¹²

The Golden Record comprised four parts. The first included a carefully curated collection of ninety minutes of music from composers such as Bach, Mozart, performers such as Louis Armstrong and Chuck Berry, and ranging through to an Indigenous Australian Horn and Totem Song. The second section included what Ann Druyan labelled, "a 12 minute sound essay", that included a selection of "the sounds of Earth".¹³ While these were predominantly natural sounds including whale songs, thunder, and crickets, it also included man-made sounds such as Morse code and various forms of transportation, such as ships, cars, and tractors.¹⁴ Thirdly, greetings and well wishes were recorded in fifty-five languages, and included messages from, for example, Greece who declared "we come in friendship", Israel, Brazil and Syria who each wished "peace", and a more idiosyncratic message from Sweden, whose message was a greeting "from a computer programmer in the little university town of Ithaca on the Planet of Earth".



FIGURE 2 *Voyager Interstellar Record*, 'Sounds of Earth' Phonographic Record and Cover, and illustration showing the position where the Record is installed on the Voyager Probes. (Image Source: NASA/JPL-Caltech, NASA Image Library. http://www.nasa.gov/mission_pages/voyager/multimedia/pia14113.jpg.html.)

Finally, in addition to these sound recordings, the record was encoded with a series of images, including a small number with architectural content, each chosen to represent the diversity of life on Earth. The selection of the images was largely overseen by Jon Lomberg, a scientific illustrator who began working with Sagan in 1972 on his book *The Cosmic Connection*, and continued to collaborate with him on numerous television and book projects until Sagan's death in 1996.¹⁵

The Pictures of Earth

The inclusion of images on the record represented the most technically complicated of the processes involved with its production. Frank Drake recalled that the idea the record might include images, came from his realisation that:

A Phonograph Record is an engraved plaque that can carry sounds. But a television picture is just a collection of signals at various frequencies, just as sound is. If we could translate those picture frequencies to ones that could successfully be recorded to a phonograph record, then we could record pictures too. We could have sound and pictures, and in fact combine them to increase greatly the information content of the 'plaque.'¹⁶

The investigation of how to include images on the record led to the involvement of Colorado Video Inc. who had developed a commercially available video convertor capable of taking "a normal television picture and ... [reducing] the bandwidth to the point that it could be recorded on a conventional long-playing record".¹⁷ This technology represented an early method for transmitting images, which prior to the internet had been difficult to undertake.¹⁸

While early plans extended to the inclusion of only six images, the final selection included 118 images, twenty of which were in colour and ninety-eight in black and white. With the entire record needing to be compiled, manufactured and installed on the Voyagers in the space of six weeks, Jon Lomberg recalled in *Murmurs from Earth*, they only had around a month to select images, secure permissions from copyright holders, commission new photographs and illustrations, seek approval from NASA, and then convert the images to a format suitable for encoding, as well as finding the technology to do this.¹⁹

The image sequence began with engravings that appeared on the record's exterior casing, the first doubled as a calibration image. From there, the sequence was akin to a reversed (and more informally structured) version of the Eames' film *Powers of Ten*, released that same year.²⁰ Beginning with a solar location map, the sequence then moved to images of the sun, Mercury, Mars and Jupiter, then Earth before jumping to an aerial image of the Nile that –like many other images, featured a textual overlay of scientific information.²¹ Interspersed among this sequence were a number of scientific, textual and numeric keys. The image of the Nile was immediately followed by diagrams of DNA structures, an image of cell division, illustrations of human anatomy, and then diagrams and images that explained human reproduction, child rearing, family and human social relationships. Next were diagrams explaining continental drift and the structure of earth, followed by various images of oceans, rivers and deserts - many of the former were selected to illustrate the dominance of water on the Earth's surface.²² Focus then shifted to depictions of foliage and vegetation, animals, and humans undertaking various activities such as hunting, learning, eating and dancing, as well as working and playing sports. These were followed by a series of images that show buildings and cities in various forms. The final image sets show forms of transport, polar exploration, then observation and communication devices that could be used to observe or communicate with the inhabitants of space. These were followed by images associated with space exploration. The final two images are of a string quartet, playing music, and the musical score for Beethoven's String Quartet No.13 – the final musical piece on the album- spliced with an image of a violin.

Building Types	No	Image Title & Architectural Description	Reason for inclusion (Source: Lomborg)	View
DOMESTIC ARCHITECTURE				
House	36	'Family Portrait': Family in interior of a house	Demonstration of family	Interior
	42	'Seashore': House and lighthouse on distant horizon.	Demonstrates relationship to bodies of water	Exterior
	67	'Elephant': includes views of houses on horizon	Shows Animals, relates to Image 66	Interior
	81	'Chinese Dinner Party': Dining room/restaurant	Demonstrates eating (social aspects)	Interior
	84	'Construction Scene (African)': Shows construction of a wall outside (presumably) a house in Africa	Demonstrates construction & typical building, shows complete and incomplete structures	Exterior
	86	House (Hut): rural house in Ethiopian village	Demonstrates typical human dwelling	Exterior
	87	House (New England Frame): Typical North American dwelling	Demonstrates Typical Human Dwelling	Exterior
	88	'House (Modern)': Typical modern dwelling, Cloudcroft, New Mexico	Demonstrates Typical Human Dwelling	Exterior
	89	'House Interior': Shows fireplace and landscape paintings.	Demonstrates atmosphere can support fire, shows furniture, sitting, painting, art	Interior
	Barn	85	'Construction Scene (Amish)': Barn raising	Demonstrates construction, working in groups
EDUCATION BUILDINGS				
School	35	'Group of Children': UN International School, New York	Shows multiculturalism, groups of people children sitting in 'archetypal arrangements'	Interior?
	73	'Japanese Schoolroom':	Demonstrates a child learning to write, group education	Interior
	74	'Children with Globe': Children circling a globe at the UN International School, New York	Shows how earth looks from space, globe shows earth's political/territorial boundaries, children in circles	Interior
EMPLOYMENT & COMMERCIAL				
Grocery Store	77	'Supermarket': Woman eating grape in supermarket, Produce Section	Demonstration of eating, in context of where we get our food	Interior
Office Buildings	92	'Boston from the Charles River': Office Towers in City Skyline	Shows various human cities	Exterior
	93, 94	'UN Building, by Day and by Night'	Electricity, day and night, how cities are lit	Exterior
Factory/Workshop	65	'Thai Craftsman': Woodworking Workshop	Shows tools (in use), shows symbolic representation (wooden elephant)	Interior
	95	'Artisan with Drill'	Demonstrate machinery and labour	Interior
	97	'Factory Interior'	Demonstrate machinery and labour	Interior
	33	'Birth': Hospital Interior	Part of birth and child development series	Interior
Hospital	99	'X-Ray of Hand': Tomkins County Hospital	Illustrates human hand, medical technology	Interior
	Laboratory	100	'Woman With Microscope'	Shows scientific instruments in use (like those found on Voyager), demonstrates vision
Cultural Spaces & Institutions				
Museum	98	'Museum': Showing bones in foreground, people and an animal themed mural in background	Illustrates bones and symbolic representations of animals.	Interior
Opera House	95	'Sydney Opera House': During late construction	Construction, Example of modern architecture	Exterior
Music Room	115	'String Quartet': Performance Space (unknown type)	Shows musical instruments in use	Interior
Mausoleum	90	'Taj Mahal'	Monument, dedicated to love, an example of a beautiful/impressive building	Exterior
Observation & Defence etc				
Fortification	83	'Great Wall of China'	Engineering /Achievements, Scale, product of an old and important culture	Exterior
Lighthouse	42	'Sea Shore': Distant View of a Lighthouse	Demonstrates relationship to bodies of water	Exterior
Observatory/ Transmitters	110	'Arecibo Observatory': Largest telescope in world, site of a previous interstellar communication attempt	Shows Earth is capable of receiving messages from civilisations that use radio telescopes	Exterior
	109	'Radio Telescopes (Westerbork Interferometer)'	Form Follows function, Shows Cyclists, recognisable to alien radio astronomers	Exterior
Infrastructure				
Cities	91	'English City (Oxford)'	Illustrate different kinds of cities	Exterior
	92	'Boston from the Charles River'	Illustrate different kinds of cities, shows skyline of a modern city, relationship to water	Exterior
	93/4	'UN Building, by Day and by Night': New York City shown as context in background.	Lighting of Cities, day and night, building that is symbolic of spirit of Golden Record's	Exterior
	101/2	'Street Scene (Pakistan)'; 'Street Scene (India)'	Shows streets, transport, uneven development of technology	Exterior
Street	101	'Street Scene (Pakistan)'	Various forms of transport, crowding	Exterior
	102	'Street Scene (India)'	Rush Hour, directional traffic	Exterior
	103	'Highway': Route 13 in Ithaca.	Rural street scene, long range movement	Exterior
Bridge	104	'Golden Gate Bridge from Baker's Beach'	Suspension bridge, form follows function, laws of physics, photo by Ansel Adams	Exterior
	105	'Train': Showing Train and Railway	Tracks/Trains as opposed to cars/roads	Exterior
Airport	106	'Airplane in flight': Airport runway (Syracuse)	Airplane in Flight	Exterior
	107	'Airport': Toronto International Airport	Various Plane types, terminals	Exterior

FIGURE 3 Table indicating architecture images in 'Pictures of Earth' on Golden Record - sorted by building type. Note some images appear under multiple headings. (Source: Table by author. Figures, Information and Captions correspond to those assigned in *Murros of Earth* pp. 78-121).

The guiding principal in the selection of images was, Sagan suggested, primarily, to “send any possible extra-terrestrial auditors information about earth and its inhabitants that they are unlikely otherwise to find themselves in possession of.”²³ The priority was thus to send images of things that were unique to Earth. As he assumed they would have an advanced knowledge of science, mathematics and astronomy, this was largely excluded from the content.²⁴ Additionally, the selection panel imposed a number of other limitations early in the process. Negative subjects, and those that would present humankind in an unflattering light were to be avoided. This saw the exclusion of imagery related to, among other things, War, politics, and poverty.²⁵ Conscious effort was also made to ensure imagery would not be perceived as threatening.²⁶ Art and religion were also deliberately avoided.

The final selection was greatly influenced by what images the team working on the picture section were able to source and obtain permissions for during the short preparation period. Images were sourced from a number of collections: books were obtained from the general library collection of Cornell University - where Sagan and other members of the selection committee were employed - as well as public libraries.²⁷ The majority were sourced from the National Geographic Society, with others from the United Nations Picture Library, *World Book Encyclopaedia*, *Sports Illustrated*, and the collections of NASA.²⁸ A small number were specifically commissioned for the project. The nature and sources of these inadvertently resulted in this section having a text-book like quality. Whereas the music section was like an anthology of art and culture (or as many have labelled it - a compilation of Earth's 'Greatest Hits'), the 'Pictures of Earth' resembled a pictorial encyclopedia entry, illustratively explaining Earth and its inhabitants.

Lomberg noted that images needed “to contain as much information [and be] ... as understandable as possible”. He continued: “*some* pictures [were included] with very little information, primarily to help the recipients understand how to see pictures. So the first two pictures of the sequence are objects elsewhere on the Voyager – two of the engravings on the records cover”.²⁹ To achieve continuity, they attempted to use repeated motifs, and a number of the images correspond to the music and ‘Sounds of Earth’ sections.³⁰ Such crossovers were largely limited, and other potential links were not explored. For example, there was no representation of Baroque architecture or art, to accompany the Baroque music on the record. While opportunities for more coherently integrating the sounds and pictures were most likely not explored due to the limited timeframe for selection and production of the record (and the division of labour among the various sections), the composition of the picture selection committee inevitably bore a significant impact. Whereas the musical section was carefully curated by an expert panel, opinions solicited in the selection of images were largely from scientists, who generally lacked discipline-specific expertise in the non-scientific aspects to be represented on the record. Similarly, the painstaking efforts at representing various time periods, cultures and language groups that went into the Greetings, Music selection and Sounds of Earth sections, were not matched in the image selection. Overall, the selection of images was given considerably less consideration than the other components of the record.

Art on the Golden Record

One of the areas where the influence of the short production schedule, professional biases, and non-specialised panel can be most readily seen is in the representation (or lack thereof) of art and architecture on the record.³¹ While much of the Golden Record was dedicated to showing the cultural aspects of human civilisation (through music), the representation of cultural and creative endeavour in the Pictures of Earth component, was limited. Art and craft only feature incidentally in three images. Of these only one showed art *per se* (Image 89), which depicted a man painting in a room of a house where a number of paintings are hung on the background wall – an image that Lomberg noted, was included largely because it demonstrated the use of furniture, and included a fireplace, (which thus demonstrated that our atmosphere was capable of supporting fire). While he notes the viewer might make an association between what the man was doing (painting) and what was on the wall (art), this was largely a secondary concern.³² A second image (Image 66) showed a craftsman using woodworking tools to carve an elephant –included primarily to show tools and, as a secondary concern, to explain that humans are capable of symbolic representation (the adjacent image was of an elephant).³³ Finally, an image showing the interior of a natural history museum (Image 98) incidentally shows a mural in the background that speculates the form of the animals whose bones are in the foreground (thus again demonstrating symbolic representation). Aside from these instances there are no other references to visual art or non-musical creative practice on the record. Interestingly, as a result, art and creation are shown to be actions rather than objects.

Lomberg stated that they had deliberately avoided the inclusion of artwork, as they “didn’t feel competent to decide what art should be sent.” Justifying this omission, he wrote:

A great deal of human art is shown in music, which comprises the bulk of the record, but there was enough time to gather a panel of musicological experts to advise on balance and selection. We were so rushed in putting together the picture message that we couldn't assemble experts in all the various visual arts and have them agree.³⁴

Rather tellingly, he also added “And we thought extra-terrestrials would have enough trouble interpreting photographs of reality or simple diagrams, without our including a photograph or a painting which is itself a representation of reality.”³⁵ While this view of art is not entirely unsurprising from a scientist, both Lomberg and Salzman Sagan are identified as artists (although scientific illustrators is probably a more accurate term) and thus the exclusion entirely of the visual arts from the record is frustrating. Amusingly, while they felt unqualified to make a selection of artworks to include on the record, the committee felt quite at ease making the selection of the architectural content. As a result, the architectural canon sent for alien consumption, has a decidedly scientific twist to it, that is wildly at odds with conventional canons of architectural history.

A New Canon of Architecture

Among the last groupings of images, were as stated, a number of the built environment and specific works of architecture. These ranged from images of vernacular buildings in Africa and North America, though to generic views of towns, cities and highways, as well as images of specific buildings and structures.³⁶ Additionally the sequence included a small number of iconic works of architecture and engineering, being, the Taj Mahal, the Great Wall of China, the Golden Gate Bridge, the United Nations Building in New York, and the Sydney Opera House. This small collection of buildings, in effect, established a new canon of human architecture and endeavour for the record’s interstellar audience. – one that made an attempt at a global history of architecture, yet one that largely ignored the history of the discipline and the conventional contents of the architectural canon. For example, works from Ancient Greece, Rome, or Egypt - which have dominated the historical canons established by, for example, Diderot and D’Alembert, Fergusson or more recently, Watkin - were all omitted from the alien canon. The Golden Record’s presentation of architecture was not structured by time, epoch or style, and thus there is no Gothic, no Baroque, no Renaissance, no Art Nouveau - although the Modern fared somewhat better in their account. By far the most represented “style” on the Golden Record was that of the vernacular, and in particular housing.

Lomberg notes that Images 84-88 (see Figure 3), which illustrated various houses and some domestic-scaled construction scenes, were selected as representations of ‘typical buildings’ – by which he evidently meant domestic architecture. Each of these images were largely included to illustrate the diversity of human housing. However, he noted that they also wanted to include “more impressive architecture, and the variety of buildings we build”. He continued, “Out of a host of possibilities –the Eiffel Tower, a Gothic cathedral, a Mayan pyramid – we chose the Taj Mahal... A monument not to religion but to love... It is also generally regarded as one of the world’s most beautiful buildings.”³⁷

Lomberg’s justification was telling. Firstly, while they were able to dedicate five images to showing the diversity of vernacular housing, in addition to a number of interior views of residences, they saw fit to only include one example of what they identified as “impressive architecture” selected on the basis of its beauty, and an emotion-based reading of its purpose. Most importantly, was that this choice responded to their declared aim to avoid references to religion. As scientists this avoidance was unsurprising.³⁸ Their justification, as was the case with the omission of art, was on the grounds that they were unable to devote the space to representing the diversity of human religions. Lomberg stated “if we’d included a picture of a cathedral, we felt we would also have to include one of a mosque, a synagogue ... and so forth. Since there was no way of explaining each religion, inclusion of all faiths would merely be a political sop to people on Earth viewing our work”³⁹

One of the real consequence of these decisions - being to avoid religion, resist chronology and highlight diversity - were in fact that the architectural inclusions were largely unrepresentative of a true and recognizable history of both Western and Non-Western Architecture. In fact, their selections generally opposed conventional constructions of the architectural canon at that time. The result was a twisting of the focus from ‘high architecture’ (as evidenced

in cathedrals, temples, or even private houses for wealthy patrons) that has historically been representative of the architectural canon, to the vernacular. The typical triumphed over the extraordinary and the contemporary largely superseded the historic – the opposite to the approach taken with the musical selection. Interestingly, these actions were not out of step with the approach increasingly being taken towards constructing and questioning architectural canons at the time. While there is no evidence to suggest the selection panel were aware of this, the inclusion of the vernacular and the global content were in keeping with the growing movement towards diversification of the architectural canon that Spiro Kostof had already begun in the 1970s, but came to fruition with his publication of *A History of Architecture: Settings and Rituals* in 1985, as well as the recognition of the vernacular in Bernard Rudofsky's *Architecture Without Architects* first published in 1964.⁴⁰

The selection throughout the Golden Record consistently emphasized diversity rather than chronology, or a sense of evolution or progress. This is particularly evident in the architectural selection, specifically the representations of cities and non-western vernacular architecture. Closer investigation surrounding the images used, reveals, for example that many of the images of vernacular and 'traditional' housing, were in fact contemporary rather than historic constructions, for the most part the photographs were also reasonably contemporary.⁴¹ The African and American construction scenes, were for example, relatively recent photographs of contemporary construction, and thus were not part of a consciously constructed historical timeline. The intention of demonstrating diversity was also cited by Lomborg as having influenced the decision to include the Sydney Opera House and the selection of cities, particularly the inclusion of Boston and Oxford.

In terms of the presentation of 'high architecture', for the most part, pragmatics again prevailed.

The inclusion of the Great Wall of China (Image 84), was justified by Lomborg, as being due to being one of the most significant engineering feats of humankind.⁴² It was, he also noted the product of a one of the most important human cultures. Paradoxically, the wall itself was constructed as a fortification to protect citizens from invasion – a fact that seems to explicitly contravene the intention to avoid references to war and negative human behaviour.⁴³ Lomborg also notes that the photograph, sourced from *National Geographic*, was chosen as it illustrated a close-up view of the walkway as well as a view in the distance, thus eluding to the scale of the structure. The image also included humans traversing the walkway, thus associating the wall with human activity. Its inclusion, while not mentioned by Lomborg, may also have been of interest as the wall has long been thought to be the only man made structure visible from space – a theory that predates space exploration, and was eventually disproved when humans visited the moon.⁴⁴ As with the Taj Mahal, an added attraction to the Great Wall of China is likely to be its location on the Asian Continent - thus increasing the global representations on the record.

The Sydney Opera House was also one of the few project selected for inclusion based on its architectural merit. Even in this circumstance, a secondary meaning was required. While the Opera House had been inaugurated four years before the Voyagers launched, the image chosen was one taken while it was being built (albeit in an advanced stage of construction) rather than when it was completed. As a result, the image also contributed to the narrative of building construction demonstrated in a number of the other images in the architectural sequence.

Of the other iconic (or canonical) works of architecture and engineering, The Golden Gate Bridge was included (complete with measurements) as an illustration of a suspension bridge, and an example of something with a form "determined entirely by the laws of physics".⁴⁵ As a secondary function, this photograph was taken by Ansel Adams, thus arguably fulfilling the "art quotient" for the record.⁴⁶ The United Nations Building in New York, which might have been selected on the grounds of architectural merit, as well as being a building that represented a peaceful function (as supported by the nature of many of the Greetings, and a message from the UN Secretary General that was included on the Record) was in fact included on technical grounds. Specifically, two images were included to illustrate day and night and as a demonstration of the way buildings and cities can be artificially lit.⁴⁷

Building Types

The selection of building types chosen for representation was just as selective as the other aspects of the record. In addition to churches, also missing are libraries, prisons, parliaments, cemeteries, theatres, swimming pools, petrol stations and multitudes of other building types. An interior view of a museum was included – largely because the image contained bones. As shown in the table in Figure 3, the largest representation of the building types went to

residential buildings. However, despite efforts to convey the cultural diversity of housing, representations are limited to various forms of detached residences. There are also no hotels, no apartment buildings, no caravans, tents or igloos. Following housing, the next most represented building type is the 'elementary school' – educational facilities for older children, and adults (including universities) are overlooked.

While there are some representations of work and workplaces (including factories) evidence of capitalism and commerce also seem underrepresented – confined to one interior view of a supermarket that was included as a demonstration of how we source food, and as incidental buildings in a number of city images. Even the images of cities themselves are seemingly idiosyncratic - with Oxford and Boston being included to illustrate the concept of the city.

Further, the selection of buildings and building types was frequently self-referential, and representative of their own interests. The UN, for example, was effectively a partner in the project, and thus received significant representation in the pictorial selection (also in part because they made use of their image library). Similarly, the observatory is the one used by Sagan and Drake as part of an early attempt at interstellar communication via radio transmission in Arecibo, Puerto Rico. The Modern House is that of a fellow scientist. The only image of a book, is open to an illustration by Isaac Newton, explaining how to project objects into orbit, while there is no illustration (other than the Japanese School Room) of people reading, and no other illustration of a book or library.

Conclusion

What is evident from the analysis thus far, and in particular figure 3, is that Lomborg and the selection committee, utilised architecture as a means to demonstrate human endeavour and production, much more so than using it to illustrate the creative capacity of human beings. As with the emphasis on making in the representation of the visual arts, the emphasis in the depictions of architecture was for the most part in making and using. The examples of 'high architecture' were the only exceptions – although even the Sydney Opera House was used to show construction in progress. As such, architecture was seen as a record of human history and actions, but largely used to illustrate the contemporary condition rather than processes of development and evolution that led to that present.

What began as a 'greeting card' became a visual textbook of human civilisation, that effectively offered an anti-canon of architectural history. Although, despite obvious criticisms, Lomborg's canon, skewed towards scientific interest, is undoubtedly no more biased than that of Fergusson or Watkin. The Golden Record, in its global, vernacular and seemingly 'democratised' overview of architecture and civilization, was perhaps creating a McLuhan-esque 'global village' for its interstellar audience.⁴⁸

When expressing his intention to make the Golden Record commercially available on Earth, Carl Sagan stated that he hoped by doing so, that it would "stimulate listeners to examine our civilisation and culture and consider how we wish to be represented to the cosmos."⁴⁹ What these scientists presented in the form of an overview of global architecture, is certainly likely to incite this question from architect and architectural historians, although unlikely to produce the same answer.

Endnotes

- 1 Sagan offers an account of visiting the New York World's Fair and a fascination with the time capsule in Carl Sagan, "For Future Times and Beings," in *Murmurs of Earth: The Voyager Interstellar Record*, ed. Carl Sagan (London: Hodder and Stoughton, 1978), 3.
- 2 The first of these accompanied the Pioneer 10 and 11 space probes, which in 1983 became the first man-made objects to leave the solar system. Each probe included a small plaque that, in the words of Sagan, offered "some indication of the locale, epoch and nature of its builders." Similarly, the Lageos mission of 1976, also included a plaque that contained representations of historic, current and predictive geology in an attempt to locate the satellite in time and space. This plaque was intended as much to communicate a message for the future inhabitants of *Earth* as it was for extra-terrestrial beings. See Sagan, "For Future Times and Beings", 4.
- 3 Carl Sagan, "A Message from Earth," *Science* 175 (25 February 1972): 881.

- 4 See for example, Stephanie Nelson and Larry Polansky, "The music of the Voyager Interstellar Record," *Journal of Applied Communication Research*, 21, no. 4 (1993): 358-76. An account of the genesis of this project, edited by Sagan and featuring chapters from the project's key contributors was published under the title *Murmurs of Earth* in 1978. This account, as well as discussion of the musical and greeting components in the popular media – helped to capture the public imagination - the record has also been often referenced in popular culture, including numerous science fiction films, and upon its launch was even parodied in a skit on *Saturday Night Live*.
- 5 A source of Uranium 238, measuring 2 centimetres in diameter was also electroplated into the cover to serve as a timepiece for the object. See Sagan, "For Future Times and Beings", 37.
- 6 Letter from Carl Sagan to Alan Lomax, June 6, 1977. Box 1247, Folder 2, Page 2, Seth MacFarlane Collection of the Carl Sagan and Druyan Archive, Manuscript Division, Library of Congress, Washington, D.C.
- 7 Sagan, "For Future Times and Beings", 33.
- 8 Sagan, "For Future Times and Beings", 33.
- 9 Linda Sagan noted that "During the entire Voyager Project, all decisions were based on the assumption that there were two audiences for whom this message was being prepared – those of us who inhabit Earth, and those who exist on the planets of the distant stars" See Linda Salzman Sagan, "A Voyager's Greetings," in Sagan, *Murmurs of Earth*, 125, 132.
- 10 In July 2015 NASA made the Sounds of Earth Section of the record and the Greetings available via Soundcloud. See: <https://soundcloud.com/nasa/sets/golden-record-sounds-of-greetings-to-the>. Due to copyright restrictions on the material – and extreme difficulties encountered by Sagan and his team in securing releases for commercial production - the music section has never been made fully available. Similarly, due to restrictions on the images the only reproduction of these (with one exception, as they were unable to secure the rights to reproduce one of the images here) was in the book *Murmurs of Earth*. A full list of images and music used is available in this book. Some of the Musical pieces and almost all of the images are now available via a website established by NASA <http://goldenrecord.org/>.
- 11 Letter from Carl Sagan to Alan Lomax, June 6, 1977. Box 1247, Folder 2, page 1, Seth MacFarlane Collection of the Carl Sagan and Druyan Archive, Manuscript Division, Library of Congress, Washington, D.C.. As noted in this source, at this time the record was intended to be a double album, with three sides of music, and one featuring greetings, "non-musical" and "non vocal sounds". Upon completion, the most notable departure from this proposal, was firstly, that by halving the playing speed, they were able to condense this to a single record and secondly, the inclusion of pictorial content. See F.D. Drake, "The Foundations of the Voyager Record," in Sagan, *Murmurs of Earth*, 67, 68.
- 12 My thanks to the anonymous SAHANZ paper referees for pointing this out.
- 13 Ann Druyan, "The Sounds of Earth," in Sagan, *Murmurs of Earth*, 150.
- 14 Intriguingly the first sound in this section, named *Music of the Spheres*, was an interpretation of a seventeenth century mathematical text by Johannes Kepler that considered harmonic proportions in both mathematics and music, performed by Laurie Spiegel - an early pioneer of experimental electronic music. Oddly this appears in the 'Sounds of Earth' section rather than the musical section, despite being clearly an artistic, musical, interpretation rather than purely digital sound. For a discussion of Spiegel's piece, see Ann Druyan, "The Sounds of Earth", 154, and Simon Reynolds, "Resident Visitor: Laurie Spiegel's Machine Music," *Pitchfork* (7 December 2012). <http://pitchfork.com/features/article/9002-laurie-spiegel/>, accessed 1 April 2016.
- 15 Lomberg offers an account of the selection of these images in *Murmurs of Earth*, as well as a list of the images and a brief justification for their inclusion. See Jon Lomberg, "Pictures of Earth," in Sagan, *Murmurs of Earth*, 71-121.
- 16 Drake, "The Foundations of the Voyager Record", 67.
- 17 The process for how this was undertaken is described by Glen Southworth, and published in David W. Swift, *Voyager Tales: Personal Views of the Grand Tour* (Reston, Virginia: American Institute of Aeronautics and Astronautics, Inc., 1997), 257-60. See page 258 for this quotation.
- 18 Laura Snider, "Boulder company helped create Voyager's greeting for aliens: Colorado Video Inc. transformed photos into audio tones for golden records," *Daily Camera* (website), 11 February, 2012, accessed 11 March 2016. http://www.dailycamera.com/ci_19939938.
- 19 Lomberg, "Pictures of Earth", 73.
- 20 The Eames film was based on an earlier one produced in 1968, and was also an adaptation of Kees Boeke's 1957 book titled *Cosmic View*. See: <http://www.eamesoffice.com/education/powers-of-ten-2/>. Although it is unlikely that Sagan was responsible for the ordering of the image sequence this was a tool that was also used in other Sagan projects. For example, Jon Lomberg, who worked on the Golden Record as well as serving as the chief artist for the *Cosmos* television series, refers to "a sequence we called the "cosmic zoom", which seems like a reference to the Eames film and/or Boeke's book. See Jon Lomberg, "The Visual Presentation of Science" in *Carl Sagan's Universe*, eds. Yervant Terzian and Elizabeth Bilson (Cambridge: Cambridge University Press, 1997): 194.
- 21 In this case the overlay indicated the chemical composition of the atmosphere.
- 22 Lomberg, "Pictures of Earth", 96.
- 23 Sagan, "For Future Times and Beings", 33.

- 24 Although illustrations were chosen that offered information of various branches of science, including what he identified as “geochemistry, geophysics, molecular biology, human anatomy and physiology”. Sagan, ‘For Future Times and Beings’, 33.
- 25 Lomberg, “Pictures of Earth”, 75-6.
- 26 Lomberg, “Pictures of Earth”, 76.
- 27 Lomberg, “Pictures of Earth”, 75.
- 28 Lomberg, “Pictures of Earth”, 76-7. In addition to these, Lomberg identifies the following books as sources consulted for the record: *The History of Toys*, *Birds of North America*; *The Family of Man*; *Plant-Devouring Insects* and *The Age of Steam* (see page 75). No books with significant architectural content were identified. Glen Southworth, of Colorado Video Inc., who handled the technological aspects of encoding the pictures, recalled that many of the slides brought for encoding were from the collection of the National Geographic Society. Southworth speculated that “the intent was possibly for *National Geographic* to do a feature article on this, but this never happened.” See Southworth, in *Voyager Tales*, 259.
- 29 Lomberg, “Pictures of Earth”, 77.
- 30 Lomberg notes, for example, that elephants appeared across a number of images, and humans were often shown gathered in circles. See Lomberg, “Pictures of Earth”, 78. Other crossovers include, as noted earlier, the final image is of a violin and a musical score for the final musical piece on the record.
- 31 This is by no means the only area where their influence can be seen, for example there is no real representation of literature or literary culture on the record.
- 32 Lomberg, “Pictures from Earth”, 112.
- 33 Lomberg, “Pictures from Earth”, 105.
- 34 Lomberg, “Pictures from Earth”, 76.
- 35 Lomberg, “Pictures from Earth”, 76. This reasoning, combined with their scientific predispositions, was also likely the reason the excerpt of Laurie Siegel’s *Music of the Spheres*, was relegated to the Sounds of Earth rather than the musical section.
- 36 In addition to these overt images of the built environment, architecture featured incidentally in a number of images, for examples as backgrounds in images of humans at work and at leisure. Most of these are included in the table in Figure 3.
- 37 Lomberg, “Pictures of Earth”, 112.
- 38 Although there is no direct reference to evolution, other than in the positioning of the positioning of Image 60, ‘Scientists and Chimpanzees’. This was an image featuring Jane Goodall which was located between the end of the animal sequence and at the beginning of the human sequence.
- 39 Lomberg, “Pictures of Earth”, 76.
- 40 My thanks to the SAHANZ paper referees for pointing this out.
- 41 For example, the traditional Ethiopian hut depicted in Image 86 on the Golden Record, was in fact a photograph taken the previous year. This image can be found online in the United Nations Picture library, at: <http://www.unmultimedia.org/s/photo/detail/106/0106557.html>. Accessed 1 April 2016. Similarly, although it has not yet been possible to determine the exact date of this photograph, Image 84 shows the contemporary construction of traditional African buildings.
- 42 Lomberg, “Pictures of Earth”, 100.
- 43 My thanks to the SAHANZ paper referees for pointing out this contradiction.
- 44 A notation on the NASA website states that theory has been disproved on two counts. Firstly, it states that the Great Wall of China it is not actually visible to the naked eye from space, and secondly, that other human-made objects are actually visible from space, most notably city lights. See “China’s Wall Less Great in View from Space”, NASA Website, Article published, 5 September 2005, accessed 26 March 2016. http://www.nasa.gov/vision/space/workinginspace/great_wall.html.
- 45 Lomberg, “Pictures of Earth”, 116.
- 46 Lomberg states in his justification for excluding art from the record, that they in fact had a number of works of “great art” represented in the pictures, naming the works by Ansel Adams. See Lomberg, “Pictures of Earth”, 76.
- 47 Lomberg, “Pictures of Earth”, 113.
- 48 My thanks to the SAHANZ paper referees for suggesting this association.
- 49 Letter from Carl Sagan to Alan Lomax, June 6, 1977. Box 1247, Folder 2, page 2. Seth MacFarlane Collection of the Carl Sagan and Druyan Archive, Manuscript Division, Library of Congress, Washington, D.C.