Richard Nixon: It's not what he said, it's how he said it

Patrick O'Shea

Figure 1.

At 12:56 pm Australian Standard Time (AEST) on Monday 21 July 1969, Neil Armstrong became the first human on the moon. Six million people, one fifth of the world's population at the time, viewed the telecommunication broadcast between Richard Nixon and the Apollo 11 astronauts. Richard Nixon's telepresence was on the moon, in millions of televisions across the world, and just as important - in the electricity, satellites, antennas, cables, receivers, transmitters, and frequencies in between.

This essay focuses on what the public didn't see or hear during that broadcast, as the title states, it's not what Nixon said but how he said it. The broadcast was not meant, and I will argue, is incapable of relaying traditional communicative semantic information. This was a change in communication, involving telecommunicating over a great distance, being image based, and involving a network across the earth. This broadcast demonstrates the non-verbal power of the United State's reach.

I am interested in understanding how that change in communication took place, through the creation of mechanisms and infrastructure, and how the act of operating in public space blurred the United State's continental boundary. The most significant understanding I hope to shed light on in this essay is how this change in communication via satellite networks and "instantaneous" transmissions reinforced cultural and social attitudes towards the idea of vertical mediation, which will be discussed in details further along. This line of inquiry has been sought after by many artist and writers; the ones that are read through my own attempt to understand are

Douglas Kahn, Eduardo Kac, Kristian Woznicki, Alvin Lucier, Lisa Parks, Mara Mills, Jonathan Sterne, Tung Hui Hun, and Christoph Cox.

One of the most important ideas in this essay is to consider the boundary between art and science.

Telecommunications art on the whole is, perhaps, a culmination of the process of dematerialization of the art object epitomized by Duchamp and pursued by artists associated with the conceptual art movement, such as Joseph Kosuth. If now the object is totally eliminated and the artists are absent as well, the aesthetic debate finds itself beyond action as form, beyond idea as art. It founds itself in the relationships and interactions between members of a network. (Kac, 1993)

This network that Kac refers to, in thinking about the broadcast between Nixon and the astronauts, I consider to be not only the network of citizens, mission command, government, corporation, and scientists during the Space Race, but also the network of artists and scientists that work with the tools and mechanisms of telecommunications still. Douglas Kahn refers to the military surplus that artists were using for their own research, like the anechoic chamber, "enabling artistic men to sense their inner states of their bodies evolved from cold war military exigencies designed, ultimately, to tear bodies apart." (Kahn, 2012) I consider the scientist and people involved in the Apollo 11 mission to be acting in similar methods as artists like Alvin Lucier – investigating space, technology, communication, the list goes on. The boundary that separates the two is intention, and without this contrasting relationship, I am unsure if there would be anything or anyway to communicate at all.

Let's go back to a moment briefly following the launch of the Apollo 11 space shuttle on it's way to the moon:

Back on earth, the world wide communications network, much of it the contribution of bell system companies, long lines, and western electric, links the Apollo astronauts to the earth and the *electronic umbilical reaching through the vacuum of space to the three men in their space craft on the way to the moon*." (AT&T Archival Video Footage)

The broadcast was held in the Oval Office, and I have an immediate curiosity as to why the conversation was held there and why Nixon used the telephone. Without getting too involved in a guessing game, looking at the presidential daily log it seems like such a normal occurrence with an "interplanetary conversation" before bed time (side note: interplanetary is the wrong term).

9:42			The President went to his office.
9:47	9:48	P	The President talked long distance with Ernest Randall at the Space Flight Center, Houston, Texas.
9:57			The President went to the office of his Assistant, H. R. Haldeman.
11:21			The President went to his office.
11:45	11:50	P	The President held an interplanetary conversation with Apollo 11 Astronauts, Neil Armstrong and Edwin Aldrin on the Moon.
11:59			The President went to the Residence accompanied by: Patricia Nixon Julia and David Eisenhower.

Figure 2. Nixon Presidential Log

In that respect, writer Rob McCleary became infamous for being a one hit wonder with his short story, "Nixon in Space." Describing his daughter's birth, the same day as the moon landing, he writes,

"There are men on the moon," said the nurse as she brought Leigh in for her mother to see. She had seen it on television in the doctors' lounge and was repeating her observation. The nurse said it as a simple statement of fact, with the same enthusiasm she might've said "there are men on the roof." Fantastic events like that were pretty common back in the days when the money still held out. First they were making radar, then splitting the atom, then putting guys on the moon. The list goes on and on.

Surprisingly there is little written on the communication between Nixon and Apollo 11. There are large amounts written in the archives of the engineering feats that Bellcom and NASA accomplished, through the missions and beyond. Yet, little on the cultural implications of the technology and infrastructure that was created during the Apollo missions. This is where this essay begins, in the **distance, network, and image** of the telecommunication that made the earth-moon circuit (not an interplanetary circuit: that would be later on in 1997 during the Mars Pathfinder mission).

Distance:

In order for the Nixon/Apollo telecommunication to happen, signals were being received by three main stations simultaneously. They were CSIRO Parkes Radio telescope in Parkes, Australia, the Honey Suckle Creek tracking station outside Canberra, Australia, and NASA's Goldstone station in California. In the first 5 minutes of the broadcast, NASA switched between the Honey Suckle Creek feed and the Goldstone feed until they remained on the Parkes feed for the superior quality they were receiving. They remained on the Parkes feed for the remainder of the 2.5 hour telecast. From Parkes, the signal was sent to Sydney via specially installed microwave links, and the TV signal was split. One signal went to the public Australian broadcast and the other went to Houston to be internationally televised. Australians witnessed the moonwalk 0.3 seconds before the rest of the world, due to the latency time between Sydney and

Houston, which went through the INTELSAT geostationary communication satellite over the Pacific Ocean.

Douglas Kahn (2013) writes, "some long sounds can be heard as having acquired their character through the course of their propagation, acoustically and electromagnetically. In this way, a sound is as much of the intervening space as it is from the source." The term *transperception*, invented by Kahn, "denotes the perception of those characteristics – the influence of objects and artifacts, modulation and media, and the time required by distance – along with source." Simply put, it is an awareness of all the energy that is involved with what has been traversed, and "in terms of naturalization in telecommunications, it is also a perception of what has not been annihilated."

Transperception begins the discussion into this change in communication that I refer to. The change that happened at the moment that the longest distance a telecommunication was ever transmitted and received. This distance covered is one of the three factors that created this change from traditional semantic communication to an image based and network based communication (image and network are the other two factors).

In the book *Earth Sound Earth Signal* Kahn is focused on the naturalness of what is in the signal, such as natural electromagnetic energy, and is adamant that there is an inability to completely annihilate the natural world from telecommunications, which is apparent in reference to Australia's 0.3 second time difference during the broadcast of the moon walk. Kahn goes on to say that this inability to have instantaneous communication, due to geophysical reasons, can be perceived, and is what engineers call *"the problem of latency"* -delay. This concept of *transperception* is important because it reminds us that these communication networks are ever reaching, bifurcating, and earth bound. In an interview, Kahn describes where he began thinking about the concept of *transperception*, starting with Alvin Lucier listening to Whistlers, and how Lucier correctly understood atmospheric whistlers as massive energies of lightning propagated thousands of miles into space and back, and Lucier described his experience as earth bound. The sounds did not shoot off into space, he heard the elements of genesis and propagation in the sound. Kahn recognized that,

Matters need not necessarily breakdown easily into source and channel. Transperception is a comprehension that can transform into an embodied prehension. It is aided by understanding states, fields and transits of a world coursing and configured through energies and not merely populated with objects. (Interview, 2014)

This description of the term *transperception* applies to the discussion of the infrastructure that was created for the Nixon/Apollo broadcast. The communication system that was in place had the goal of efficiency and the least latency possible, and has now developed to the present use of wireless technology. It cannot be broken down easily into source and channel, there are a great deal of nodes and energies involved, in fact too many to cover in this essay alone. This compression of distance that was broadcast to one fifth of the world made the public space in between seem smaller. Our sense of time has changed, we no longer measure distance by miles but rather by time zones and durations. The fact that distance became smaller and measure differently changed our relation to borders and events as well. The network that has become what it is today relies on this instantaneous network that erases this idea of naturalness of distance,

ignoring the geophysical phenomena as well as everything else in between the nodes of the network that connect us.

Network:

Krystian Woznicki's (2019) essay, *Before, After, and Beyond Walls*, discusses the idea of borderless states and encouraging one to be critical of the notion that "ours is a borderless age- or in fact that one ever existed." Which she then goes on to pose the real question on the table of "how has the state border evolved and expanded in power in the post -1989 era, in spite of being romanticized- or demonized- as borderless? What kinds of state borders are there besides walls, fences, and the like?" In her essay, the idea that assemblages of methods, technologies, and institutions become social ordering processes support the concept of vertical mediation, and the infrastructure of globalization. The technologies that track and create contexts of movement are in themselves setting into motion the immaterial and material borders of states.

This means that, unlike with physical walls and fences, new articulations of state power can potentially be found wherever the state chooses to define itself, as well as wherever the state seizes opportunities to refine or expand control, e.g wherever processes of bordering produce or reproduce social divisions. Often subtle or invisible, the mechanisms of state borders can be triggered in the cloud, to which smartphones are connected, or in the database of a social network. They can be set in motion in a satellite orbiting the earth or in the middle of a city, as in the makeshift security architecture of an overcrowded registration office for new arrivals, or at an employment office, or at an airport. State borders can even be activated in a foreign country, e.g in an embassy, in a data center, in fiber-optic cables, in a secret prison, or on a military ship cruising through allied territories.
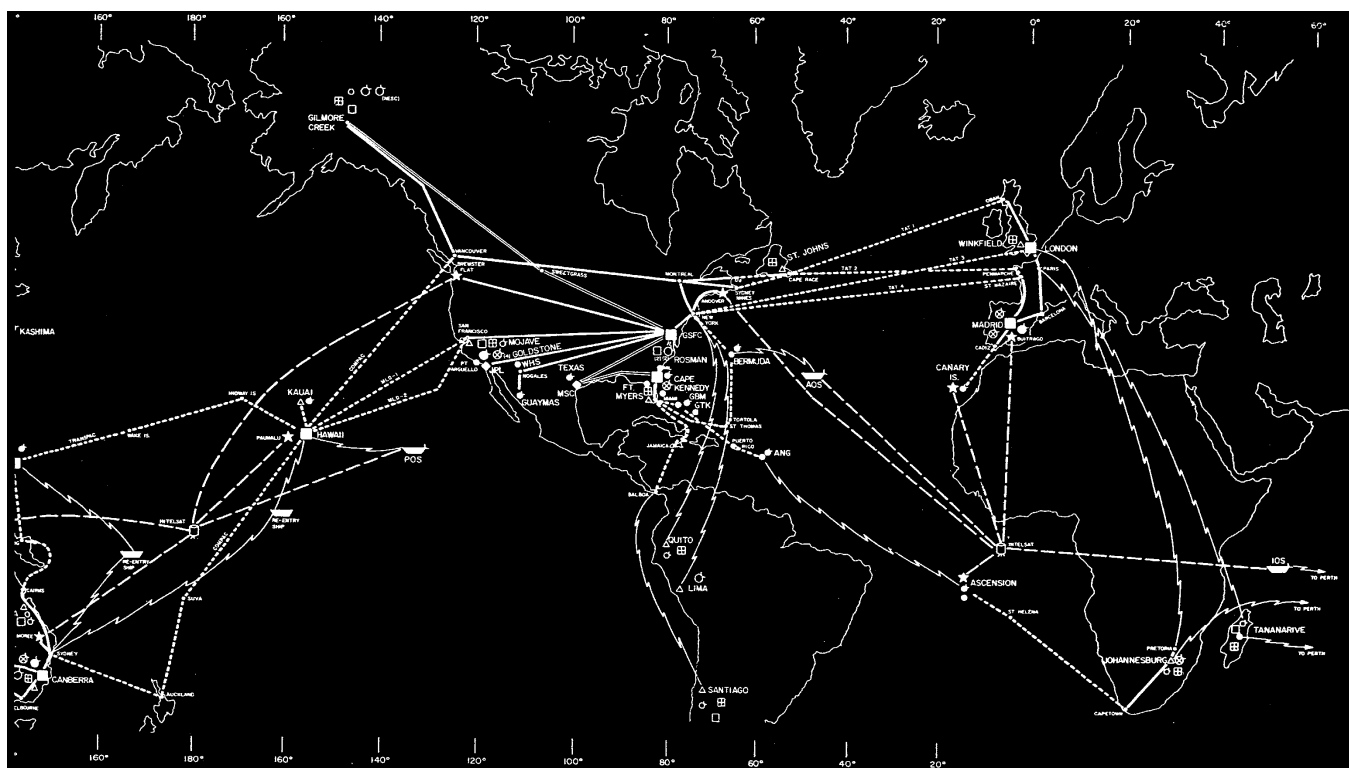
Figure 3. NASCOM network

Figure 4. NASCOM network

Figure 3 and figure 4 are maps of the Apollo Mission Ground Network, also referred to as the Manned Spaceflight Network for Apollo, and we can see the number of countries that supported and were involved in the communication network during the space race. The MSFN, as of the publication of the document in 1968, had fourteen land station and four ships providing telemetry, tracking, commanding, and voice communication with the spacecraft. All of the nodes on the maps are either connected by physical cables, or by frequency bands.

Woznicki's discussion on borderless states, and the notion that operating a device that interacts with the public space above that state is in a way activating a separate territory can be a useful argument for the argument that the US space missions activated many spaces outside of their territory. One of the most significant advancements in network technology then, and remains today is the act of multiplexing frequencies into bands. These bands are what connected the earth network that expanded the US territory.

The Unified S Band system saved size and weight, and simplified operations. It operated in the 2GHz to 4GHz spectrum, the same frequency that Wifi, cellular devices, and so much more operates on in 2019. Figure 5. Shows the system that was used in Apollo 11, utilizing the Unified S-Band.
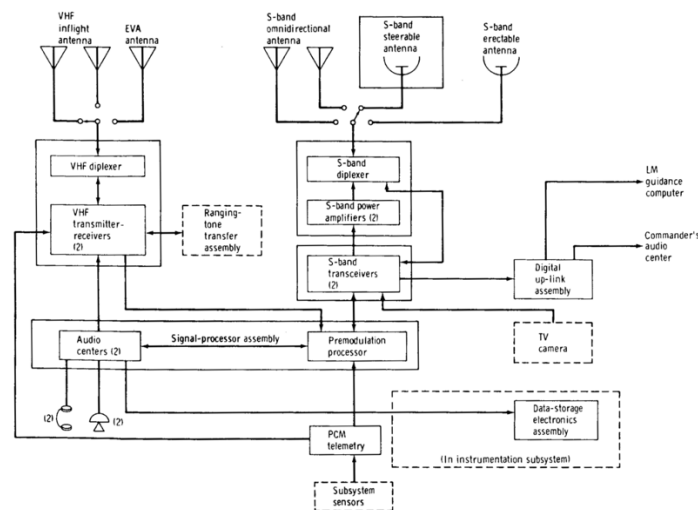

Figure 5. Unified S-Band System

The Unified S-Band frequency is debatably one of the most significant technologies that exists and has developed in the past 50 years since Apollo 11. One of the most industrial yet invisible developments because of the S Band is the technology of Software Defined Radio, SDR for short. SDR is computerized radio signaling that allows digital peripherals the capability to transmit or receive radio signals via a computer. Most public interfaces for this technology are open source and can be used with a USB port, or programmed for stand-alone operation. The operating frequency on a "at home" user peripheral is within 1 MHz to 6 GHz, and can be used for endless operations, including being contracted by the government security defense bureau for systems checks.

This is a brief description from the Apollo mission log regarding the Unified S-Band:

Unified S-Band system combines the functions of acquisition, telemetry, command, voice, and tracking on one radio link. The use of this system increases the data processing task, but reduces the number of required antenna mounts, transmitters; receivers, etc. (Peltzer, 1966)

When we don't know about the communication infrastructures that support our networked society, they tend to remain beyond the limits of public consideration or political engagement. (Starosielski, 2015)

Figure 7. Near Earth Network Map, NASA

If we closely look at the infrastructure of the network of cables made to connect the NASCOM network (Figure 4.), we can also see how this infrastructure has only been increasingly added to over the past 50 years in the Near Earth network map (Figure 7.). In Tung-Hui Hu's recent book, *A Prehistory of the Cloud,* he "tells the story of how the cloud grew out of older networks, such as railroad tracks, sewer lines, and television circuits" as well as satellite and aero-orbit technologies, and the predecessor to the internet- ARPAnet.

Now that the distance, the network, and the technology that was developed for the broadcast between Nixon and Apollo 11 has been discussed, the results of this change in communication needs to be addressed. The resulting reinforcement of cultural and social attitudes towards the idea of vertical mediation then and now are followed by the meatiest part of this essay; this change that I keep bringing up, and what I mean by the change from semantic communication to the act of communicating by image and machine having more power and less accessibility (more control).

Image:

Lisa Parks' concept of vertical mediation (2018) is related to Douglas Kahn's concept of *transperception* in that it is not focused on a linear connection between source and channel. Lisa Parks refers to vertical mediation as –"the use of aero-orbital technologies (satellites, aircraft, transmitters) and spaces (orbit, air, spectrum) to support such activities as the international distribution of audiovisual signals, the patrolling of movements on and beneath the earth's surface, and the physical destruction and reconstruction of life worlds from above."

The cultural and social attitudes of America at the time of the Apollo 11 mission were unidirectional, meaning that the transmission of information was from one point to many points

(Kac, 1993). With the progress that came from the Apollo missions and the territorial reach that I have discussed earlier, it only reinforced this attitude of American policy. Lisa Parks argues:

The political significance of vertical space became known to publics long before the war on terror, for instance, with the rise of telecommunications, airlines, and the space age during the late nineteenth and early twentieth centuries.

She then goes on to discuss the difference between the 9/11 attacks, Pearl Harbor, and Sputnik. "The 9/11 attacks and their aftermath made vertical space intelligible and meaningful in a new way by demonstrating that the commandeering and coordinated use of the vertical field could have disastrous consequences upon civilians in US territory during a time of peace." Parks goes on to consider the comparisons that some have made to Pearl Harbor in which 3000 people died. Rather, Parks considers that 9/11 was more similar to the Soviet Union's launch of Sputnik in 1957, which "shocked the US and dramatically showcased Soviet aero-orbital domination, which created a long-term crisis of control for the US and became known as the cold war." As we will see, vertical mediation involves the entire infrastructure that gets built to go with the satellite antennae, the complete circuit if you will. It is revealing how spread out this circuit was and has become.

I think it is important to clarify that the goal in this discussion is to hope to understand how a specific way of thinking during the Apollo mission leading up to the Nixon/Astronaut broadcast has continued to structure our thinking today. The aspect of the change in communication via the processing and transmission of image is going to be related to the act of gather digitized spatial imagery of territories now, and it further makes my point that the non-semantic communication that happened during the Nixon/Apollo communication enforced this cultural tendency towards vertical mediation.

War circuits are indistinguishable from civilian circuits, because, in a time of emergency, everything will be part of a war circuit. (Tung-Hui Hu, 2016)

Lisa Parks explains that her concept of vertical mediation "combines post-structuralist and feminist critiques of verticality with recent theories of mediation and new materialism." (Parks, p.13) I contend that Douglas Kahn's concept of *transperception* hits that same area that Lisa Parks describes, and the two can be used in conjunction with each other.

The concept of cultural atmospherics highlights the unboundedness of media and communication and their constitutive relation to air and airwaves. Such a relation, of course, precedes the war on terror. As John Durham Peters has shown, the history of the idea of communication is materially contingent upon the air, which serves as a common carrier of everything from speech to broadcast signals. Fred Turner's history of multimedia demonstrates how audiovisual technologies were organized after World War 2 to produce "democratic surrounds." Invoking Marshal McLuhan's idea that media are "extensions of man." Turner explains "the democratic surround was not the only way of organizing images and sounds; it was a way of thinking about organizing society… [it] presented a powerful alternative to mass media and totalitarian society," even as it brought about new forms of control." (Parks, p.14)

When discussing the geospatial image, "The transformation of electromagnetic radiation into data, image, and discourse brings it within the realm of power and enables it to affect and

become part of – to mediate, in a most vital way – human and non-human relations, territories, and actions on and beyond the earth. As Foucault insists, power can move "through progressively finer channels, gaining access to individuals themselves, to their bodies, their gestures and all their daily actions." Like multispectral satellite coverage, power is mobilized across multiple "bandwidths" and generates higher "resolutions." It sets out to make everything and everybody visible… It has the most potential to activate imagining of difference, estrangement, and Otherness. Satellite coverage can be used strategically to expose or illuminate some matter while overlook or covering up others." (Parks, p.118)

Have there been policies and regulations applied to GIS interface companies like DigitalGlobe and Google Earth, as they "turn the planet into a proprietary geospatial archive and digital platform?"

This part of the essay is heavy on quote from different lines of thoughts that Lisa Parks has had in the cited material, but I think it is necessary to insert these into this essay, because this analysis has the most weight in the research that she is currently doing on the effect of telecommunications.

"Unfortunately, given the hegemony of ocularcentrism, the uses to which these satellites have been put frequently fail to consider the perspectives of those being monitored. Remote sensing, for example, typically reduces the understanding of earth's surface to physical processes; it is incapable of incorporating social processes into its images, although there is no inherent reason it cannot be sutured to conceptions of social process, change, and conflict. This line of thought builds on the emerging discipline of critical Geographical Information Systems (GIS). This offshoot of critical cartography views GIS, like maps, as a social product with profoundly social origins and consequences. The same line of thinking can be extended to satellites, producing what might be labeled "critical satellite studies." Such an approach begins by embedding satellites and their images in relations of class, gender, and ethnicity, acknowledging in a Foucauldian sense that satellite imagery is a power/knowledge nexus." (Parks & Schwoch, p.48)

From a feminist perspective, Karen T Liftin maintains that satellites reinforce masculinist and positivist norms of an all-seeing detached observers, and unveils six assumptions that underlie taken-for-granted interpretations about the technology: that satellite remote sensing exhibits the inherent neutrality of science; that the science of satellites always leads to a rational, neutral public policy, that satellite knowledge always reduces uncertainty; that technological solutions always exist for social problems; that the global gaze proffered by satellites is useful, if not necessary, in addressing global predicaments; and that the planet is in dire need of being managed, preferably by these with access to satellite data. (Parks & Schwoch, p.49)

North American Time Capsule 1967

Alvin Lucier's, *North American Time Capsule 1967* begins with a whine and burbles and babble screeches throughout, while waves of modem signal speech flow in and out. The piece is in Christoph Cox's (2018) words, "speech-driven electronic mayhem." It is an exploration of the possibilities and futures of speech and communication technology. The score for the piece tells us it is intended for communication with aliens, but instead of aliens of a far spatial distance,

NATC is more concerned with "alienating communication and with the alien nature of communication," in a time capsule that reaches us temporal aliens.

NATC has received little attention compared to other works of Alvin Lucier's, although it is one of his most well-known early works. Christoph Cox has written about it more than any other writer, and Lucier himself has talked about it briefly in his discussion on some of Lucier's work in the book, *Mainframe Experimentalism* (those texts can also be found in Lucier's book *Reflections*).

Between 1967 to 1979 Lucier was making works that "explore the transformation of the human voice and the materiality of the vocal signifier. Even more profoundly, NATC provides a key to Lucier's worldview – musical and otherwise – and highlights his rigorous naturalism."

Cox's ideas about Lucier's naturalism emphasize that his work continually explore the connections between the separate domains of human, animal, and machine. Whether it is between a performer and an electronic bird, concerning cultural histories, or devices that predict a communication with whales, Lucier lends his work to exploring the full human experience in areas that we cannot even sense, yet.

NATC is among the first musical applications of the Vocoder. The vocoder was invented at Bell labs in the mid to late 1920's and was recognized as being put forward by Homer Dudley, who was a telephone engineer there at the time. There was a major problem as telephone lines spanned greater distance, the bandwidth of the transatlantic telegraph cables only had so much room with a frequency range of only 200Hz. There was a need to compress broadband speech signals that had a frequency range exceeding 3000HZ. The solution was purely electronic, as Cox explains,

Dudley sampled the energy levels of the speech signal at ten different frequency ranges (an eleventh sample registered the fundamental pitch of the voice), encoded these as a series of numbers, and then transmitted this coded description. At the receiving end, a synthesizer read the code and reconstructed the sound using an oscillator to re-create the fundamental frequency and a corresponding set of filters to shape it. (Cox, p.172)

This technology essentially translated speech into code, and when World War 2 came about, with the help of Alan Turing it was turned into a cryptographic system. At the World's Fair in 1964 the technology of the vocoder was generally used in other systems of radio and visual broadcasting units, as well as becoming a staple in electronic music and of popular culture. The relevance of Lucier's use of the vocoder in NATC is not music per say, but rather his investigation into a technology that he had deemed important enough to focus on in an artwork.

"Bell labs work in digital audio descended, at least in important parts, from work in speech synthesis." (Sterne, 2012) They were interested in speech synthesis for a number of reasons, speech recognition (which we use with our smartphones and Alexa now), encoding for security purposes, and as a way to save bandwidth by taking speech apart at the transmission end "and recompiling it at the receiving end, thereby allowing for the transmitted signal to be of much narrower bandwidth than if it were to contain the full spectrum of speech." This is a very

important point in the development of the Unified S Band frequency that NASA implemented on the Apollo missions, and allowed them to combine data inputs into one frequency in the 2.4 GHZ range in the spectrum. The Vocoder did just this with speech, it converted the analog signal which can be thought of as a sinusoidal waveform into bits, the waveform then looks like steps.
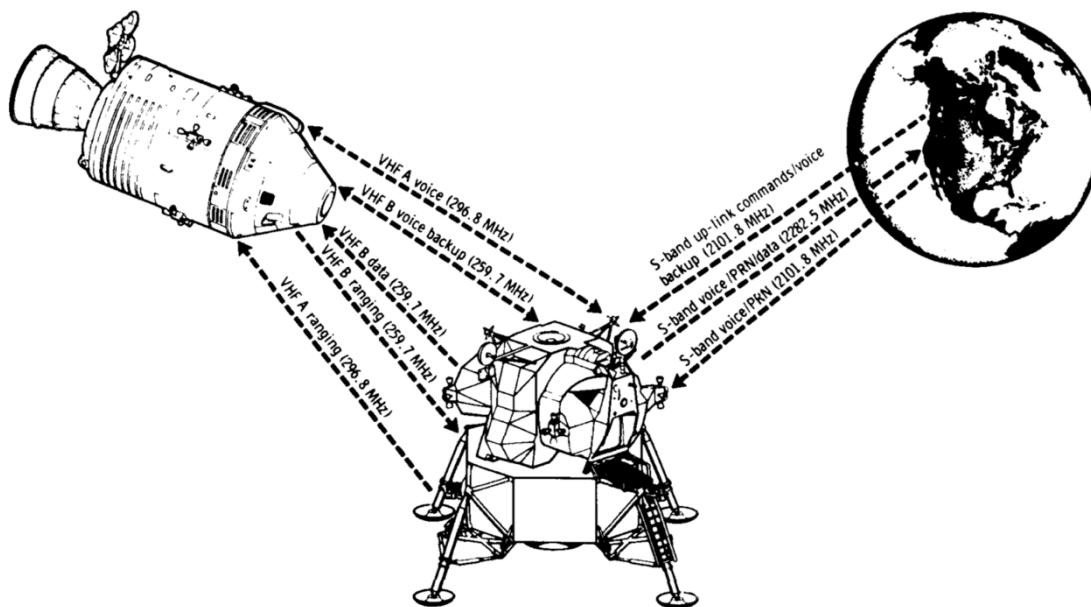

Figure 1. - Lunar module inflight communications links.

4

The vocoder was a piece of technology that would become the main utility to communicate, as well as store information. I argue that NATC is an artwork that can be fully realized now, 50 plus years later. Lucier did not create a written score for this piece, like he did for most of his others. Instead, he suggested to the Brendais University student performers that "they prepare a plan of activity using speech, singing, musical instruments, or any other sound producing means that might describe -to beings far from the earth's environment either in space or time – the physical, social, spiritual, or any other situation in which we find ourselves at the present time." Brandeis students spoke, sung, read, and played music into the receiver while Lucier and Howard flipped switches and manipulated the elements of speech. Over the course of two days Lucier combined 8 recorded track to make his stereo version of the piece.

With the vocoder, human speech becomes a data stream just like all of our contemporary devices today. The vocoder was built to transport messages and information across vast distances and times, by electronic means, but in NATC it fails to do so intact. Christopher Cox refers to the glossolalia or Babelian babble of the audio that actually comes out the other end of the vocoder as glorious electronic sound, no longer signal but noise. Much like the conversation between Nixon and the astronauts on the moon, the difference between signal and noise is not one that belongs in two separate camps. One could even make an argument that what Nixon said could be referred to as the noise of glossolalia or Babelian babble. NATC was ultimately being critical

about the network of the devices, as well as the act of digitizing the human voice, and the fact that it was titled as the North American Time Capsule with the intention for future citizens meant that Lucier had some unsettling thoughts about the technology and its implications for society as he was seeing the technology being incorporated into industry and telecommunications infrastructure. With the relationship that I spoke about at the beginning of this essay, Lucier was balancing the role of science's intentions with his role as artist. After NATC Lucier continued with a few more electronic device works, *Vespers, Quasimodo the Lover, (Hartford) Memory Space,* and *The Duke of York,* but then turned towards more natural environmental sounds and simpler mechanisms.
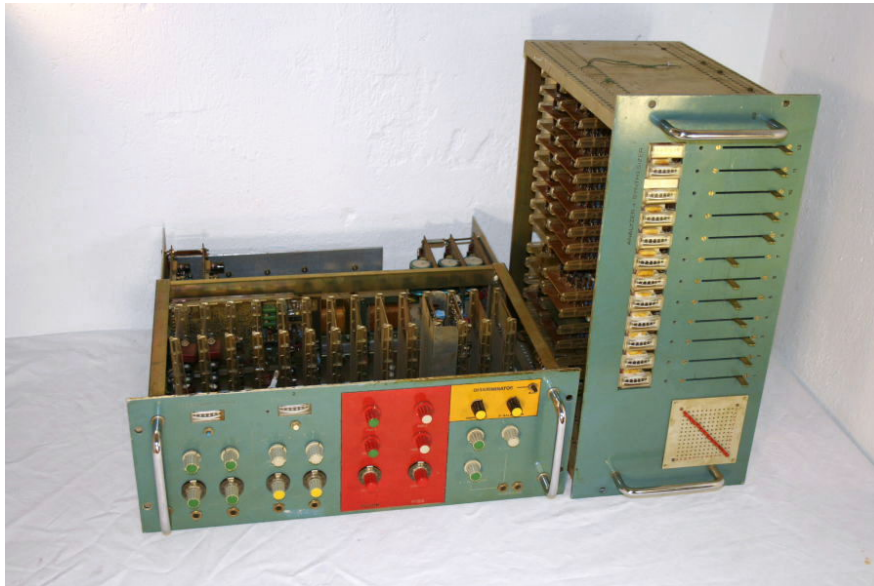

Figure 6. Vocoder

Alvin Lucier's *North American Time Capsule 1967* doesn't go as far as transmitting the electronic signal into space, and maybe because it doesn't is why Douglas Kahn doesn't include it in his book, "*Earth Sound Earth Signal*", but he does include works that deal with the vocoder technology in an open environment in relation to the body– such as James Tenney's *Metabolic Man (*1965). The Nixon/Apollo broadcast and NATC can be critiqued in a similar conceptual framework as Kahn's ideas on *transperception.* The example of NATC helps build that framework with criticality on the actual methods of communication, and less on the importance of language, as I mentioned is a core element that has been discussed throughout this essay.

In line with Lisa Parks' ideas, all of that information is transmitted through the spectrum and received at different geo sites on earth, all under the umbrella of the US government (as well as private companies that are under contract with the US government). Being critical about the visual information is a great place to hold an argument, as Liftin does. What becomes intellectually activated in Alvin Lucier's *NATC* is the process of the input to output system. The semantic information going in and out does not need to carry structured detail about any linguistic relevance, because it points to that fact that the process of analog signal to digital signal to analog signal is not a "natural" one, and is one that needs to be checked on and thought about. There is a machine, and an engineer running the Sylvania vocoder during the

performance. If we think about the vocoder machine during this performance as a network, carrying trillions of waveforms that all carry specific information, then the role of the engineer and composer is crucial in *NATC*. The engineer Calvin Howard is there, and Alvin Lucier is there, and in the final production they layer 8 separate recordings, confusing the potential "clear signal" even further.

The fact that the vocoder in Lucier's NATC multiplexed the audio input and immediately de-multiplexed it is worth mentioning. Unlike some of his other works, like *Whistlers* or *Vespers* the audio is not actually being sent over distances. The audio in NATC is only being sent through the closed circuit. As Cox mentioned, this is not about the act of communicating, but rather the act of communicating with a machine to then communicate at greater "efficiency." Much like the S Band infrastructure was operating in "stateless" spaces, flirting with the stake of a claim on the airspace during this time, the act of digitizing a voice to a codec can be thought of in the same regard. The mechanical voice over of a person's speech is what Mara Mills has done some of the most affective research on this topic. Mills states,

When ideas about bodies are built into digital signals, these signals in turn produce bodily effects. At an extreme, some speech coding now excludes individuals with the very differences that helped engineers map the parameters of speech production (in the case of the artificial larynx), adding another layer of communication disability. (Mills, p. 136)

Mills discussion of the vocoder and the history of signal processing gives a brief history of the vocoder, and one that is reframed against the general history of the vocoder that one might find on Wikipedia. Instead Mills frames the vocoder in the paradigm of efficiency and specifically the "maximization of norms." She describes this history as not being linear any longer, instead a "series of remediations -a double barreled word in the context of disability history."

Mara Mills questions the ethical implications of this mechanical efficiency, and the fact that the developments made for this technology quickly surpassed and completely left behind the application to vulnerable people with auditory disabilities. Alvin Lucier himself deals with a stutter in his speech, and in works like *The Only Talking Machine of it's Kind in the World (*1969), speech is performed so that the speech of anyone who performs becomes undifferentiated over time. This coincides with the last core element to this essay, how this change in communication via satellite networks and "instantaneous" transmissions reinforced cultural and social attitudes towards mediation. Alvin Lucier's NATC shows the mediation of the voice in the scientific intention of efficiency.

As communication between people—and between people and machines—has become increasingly technified, the purview of temporary deafening and the value of instantaneous, uninterrupted, and controlled communication have simultaneously increased. Likewise, despite the commonness of the diagnosis, physiological hearing impairment continues to be described as extraordinary, undesirable, and unacceptable. (Mills, p.136)

Douglas Kahn's discussion (Kahn, 2012, p.250) concerning William Burroughs's test for a conviction he made in 1952, stating that "writing must always remain an attempt" (as one can see by this essay), and that the process always eludes the writer. I agree with Burroughs that the

medium that is suitable for me too I have not yet come up with yet. But, for Burroughs he tried a new method by holding a microphone to his throat, and admittedly failed at trying to convey his interest in the impossibility of silence. "Voices, words, speech were symptoms of infection by languages-as-virus as well as mechanisms of control." This line of thinking correlates with Lucier's manipulation of speech and environmental sounds through the vocoder, the language was not as important as the method used to contain it. The method is what holds the weight of how it is used, and the implications of that mechanism for future listeners and users. Addressing media and digital culture may not be enough to address the root problem. What needs to be addressed is how we imagine information is organized. Lucier addressed this problem in *NATC* by creating a sonic time capsule that did not hold semantic information, it rather held a statement on the use of the vocoder piece of technology and what the implications of the device might be for temporal aliens. He saw that electronic speech devices were quite possibly going to drown out the contextual information that was to be recorded.

"In AT&Ts language, communication annihilated distance; a person could become a whole operation through the use of a network." (Sterne, 2002, p.211). This statement can be flipped on it's head after listening and reading about Lucier's NATC. Although the technology of the telephone and the vocoder offered new possibilities, the utility and cost of that potential were undetermined. The future audience of Lucier's NATC would determine those affordances. It turned out that Lucier's obliteration of memory in NATC would be a good prediction for the obliteration of environmental zones for the construction and installment of infrastructure that would proceed the technology of the vocoder and the Apollo missions to the moon. It is here that maybe the most important emphasis lies- the cultural acceptance and enamor with the broadcast and pure feet of telepresence on the moon was equally weighted as the technological military benefits of furthering the communications infrastructure after 1969.

The investigation into the material infrastructure that made the communication between Richard Nixon and Apollo 11 astronauts possible was conducted through a discussion of the concepts of distance, networks, and images, in relations to the broadcast between Nixon and Apollo 11. Alvin Lucier's artwork *North American Time Capsule* 1967 made correlations between the technology of coded signals multiplexed, processed, and modulated, to travel great distances, and the shift from semantic communication to non-semantic, where the act of communicating came to hold more power as it progressively became more inaccessible. The infrastructure that those signals transmit from as well as receive are crucial in understanding that it is not a linear channel, as seen in some of the figure schematics from NASA archives. The genesis and propagation of electromagnetic communication should be understood as remaining earth bound and materially located in continual infrastructure that is perpetually operating in space that is changing what we regard as immaterial and material state borders, and thus shifting ownership of space. Through key thinkers, such as Lisa Parks and Tung Hui Hu, the broadcast between Nixon and the Apollo 11 should have been a suitable starting point to reframe the communication infrastructure that developed from the implementation of the Unified S Band system during the Apollo missions, and to provide a framework to critically look at the system of satellite networks and infrastructure that have everything to do with the world we live in today.

Works Cited:

AT&T Archives and History, Warren NJ. "What if." 2012.
https://www.youtube.com/watch?v=0alerZ8rt9w

Cox, Christoph. Sonic Flux: Sound, Art, and Metaphysics. University of Chicago Press. 2018

Kac E. "Telepresence Art." *Teleskulptur*. Kulturdata, 1993.
http://www.ekac.org/telepresence.art._94.html. May 2 2019.

Kahn, Douglas. "Let me hear my body talk, my body talk." Relive. Cubitt and Thomas, MIT Press. 2012. p.237

Kahn, Douglas. Earth Sound Earth Signal: Energies and Earth Magnitude in the Arts. University of California Press, 2013. P.162

Kahn, Douglas. "On the Aelectronic and Transperception." William R. Macauley. Journal of Sonic Studies. 2014.

Lucier, Alvin. "North American Time Capsule 1967." Mainframe Experimentalism. Hannah Higgins, Douglas Kahn. University of California Press. 2012. P. 189-192.

McClarey, Rob. "Nixon in Space." https://electricliterature.com/nixon-in-space/

Mills, Mara. "Defeaning: Noise and the Engineering of Communication in the Telephone System," Grey Room 43 (Spring 2011): 118-143

Parks, Lisa. Rethinking Media Coverage: Vertical Mediation and the War on Terror. Routledge, 2018. Pp. 9, 13, 14, 118, 177

Parks & Schwoch. Down to Earth: Satellite Technologies, Industries, and Cultures. Rutgers University Press. 2012. Pp. 48, 49

Peltzer, K. E. Apollo Unified S-Band System. NASA, Goddard Space Flight Center. 1966. P.11

Starosdielski, Nicole. The Undersea Network. Duke University Press. 2015. P.229

Sterne, Jonathan. MP3: The Meaning of a Format. Duke University Press. 2012.

Stern, Jonathan. The Audible Past: Cultural Origins of Sound Reproduction. Duke University Press. 2003. P.211

Tung-Hui Hu. A Prehistory of the Cloud. MIT Press. 2016. P.16

Woods, Bill. "Apollo Television" 2005.

Woznicki, Krystian. " Before, After, and Beyone Walls." State Machines. Yiannis Colakides, Marc Garrett, Inte Gloerich. Institute of Network Cultures. 2019. P.59