

TECHNONATIONALISM AND TELEMATIC ART IN CANADA

VERA FRENKEL'S *STRING GAMES* (1974)

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Abstract: This article considers *String Games: Improvisations for Inter-City Video (Montreal–Toronto)* (1974), a groundbreaking telematic artwork by the Canadian artist Vera Frenkel, in which participants in Toronto and Montreal played a remote version of *cat's cradle* over Bell Canada's early digital video conferencing network. Situating the work within the context of Canadian telecommunications infrastructure and cultural policy, the article argues that *String Games* subtly subverted the technonationalist ideals embedded in Canada's drive to unify its vast geography through networked media.

Keywords: art and technology, Canadian art, media art, network culture, technonationalism, telematic art

1 Introduction

Canada: such a cold, cold country. In the plane I saw below me the blue moon's light on white snow; towers, poles, and lights and blinkings; a wide land that must be shouted across with electrons.

– Douglas Coupland¹

In the autumn of 1974, Canadian artist Vera Frenkel (b. 1938) staged the artwork *String Games: Improvisations for Inter-City Video (Montreal–Toronto)*. Two groups of participants – five each in Canada's two largest cities, symbolically representing the fingers of two hands – engaged in a teleconference version of the classic string game *cat's cradle* on the Bell Canada Conference TV, an early telematic network. Through three live, closed-circuit transmissions, the group collectively improvised a nine-hour performance. Today, the artwork represents an early articulation of the shift from the machine age to the new era of network culture.

This essay situates *String Games* within a broader constellation of social and technological forces in the history of telecommunications in Canada. It argues that *String Games* emerged as a subtle intervention into Canada's technonationalist project – the belief that settler-colonial technologies like telegraphy and television could bind the country's vast geography into a unified identity through systems of command and control.² From the CPR (railway) to the CBC (radio), Canada has asserted its nationhood through the notion that technologies would unify a national identity.

The country's vast geography (evoked in the national anthem: *far and wide, oh Canada*) has driven rapid communications infrastructures.³ By transforming Bell Canada's advanced infrastructure into a medium of play and improvisation, Frenkel enacted an alternative vision of connection that emphasised play and ephemerality over command and control.

While Frenkel is among Canada's most celebrated artists, *String Games* has nonetheless been largely overlooked within mainstream media art discourse.⁴ Utilising a computational telecommunications network, *String Games* is arguably the first telematic artwork.⁵ The piece allows us to think through the formation of these discussions surrounding early digital communication networks, particularly in relation to the role of technoculture in the Canadian nation-state [Figure 1].



Figure 1. Vera Frenkel, documentation of *String Games* inside the Montreal Bell Canada Conference TV studio, 1974. Vera Frenkel fonds, Queen's University Archives (Kingston, ON).

2 String Games

Three distinct but interdependent stages make up the artwork: the rehearsal, the event and the exhibition.

2.1 The Rehearsal

A series of black and white photographs from the early 1970s displays a group of young people engaged in a co-operative game [Figure 2]. The first of these shows pairs of them making *cat's cradles* – looping and pulling lengths of string between their hands as a game. Then, as if magnifying each finger to the scale of a human body, the participants use rope in place of string to realise a collaborative *cat's cradle* as a full-body choreography.



Figure 2. Vera Frenkel, *String Games* rehearsal documentation, 1974 Toronto. Vera Frenkel fonds, Queen's University Archives (Kingston, ON).

These are artists, students, and friends of Frenkel's. The group stands on the road of a treeless street lined with brick buildings. Under a bright Ontario sky, the bohemian artists – longhaired and denim-clad – engage in conversation, improvisation and intentional action, in order to move collectively. Together with Frenkel, the group had been enlisted to participate in an upcoming experiment to bring the intimate movements of *cat's cradle* to an even greater scale.

The photographs document a rehearsal in which these players move through a series of improvisations to realise eight different possible formations of string figures. These images record the extension of the game from fingers to bodies before being played, yet greater still in new telecommunications media. The rehearsal fostered insights into how digits, plucking and dropping strings, could extend into the then-brand-new teleconferencing technologies. First, the group exercised hand-to-hand with string; then, with fifty yards of rope, they replaced fingers with full bodies. Each participant acted as a single finger from a pair of hands. 'I wanted them to experience not only the figures,'

Frenkel recalled, 'but the movement from figure to figure, in their bodies.'⁶ This scaled-up version required the participants to work together – to walk in unison and observe a shared choreography of movement.

By translating a tactile childhood game into choreographed group movement, the rehearsal presaged the ways *String Games* would later challenge the individualistic logic of telecom infrastructures. What began as a physical game of proximity became a metaphor for synchronised participation across mediated distance – a core tension in Canada's technonationalist embrace of telecommunication.

2.2 The Event

In two cities on the morning of October 30, 1974, two groups of people arrived for the first of three telematic transmissions at the newly built Toronto and Montreal Bell Canada Conference TV Studios. Having rehearsed on the streets of Toronto, each person would now play the role of a designated finger in a remote game of cat's cradle, resulting 'in an electronic re-enactment of the familiar eight figures' of the game.⁷ The Toronto 'hand' included Stephen Schofield (as the 'little finger'), Ellen Maidman ('ring'), Thomas Stiffler ('middle'), Julia Grant ('index') and Bill Dwyer as the 'thumb.' In Montreal, the 'hand' was comprised of Lawrence Adams (as the 'little finger'), Miriam Adams ('middle'), Linda Kelly ('index'), and Tom Graham as the 'thumb.' Together with the Montreal group, Frenkel herself acted as 'ring finger,' and also as the ringmaster of the event. Toronto's 'index finger' Julia Grant, Frenkel's then-undergraduate student at York University, remembered: 'we were a pretty ragtag group' [Figure 3].⁸



Figure 3. Vera Frenkel, documentation of *String Games* inside the Montreal Bell Canada Conference TV studio, 1974. Vera Frenkel fonds, Queen's University Archives (Kingston, ON).

'We had to make our way through a lot of concrete and glass,' Frenkel remembers, before finding themselves in a room enwreathed in sound-absorbing curtains and with a semicircular structure in the middle: a table containing the tech control panels and a wall of black-and-white video monitors on which the players could see both themselves and the group in the twinned city.⁹ Here, the players of each 'hand' faced each other – through the fixed cameras and video monitors – each wearing tee-shirts with an emblazoned 'X'.¹⁰

Frenkel described the event's choreography: 'each player would learn the movements of a particular finger in all the figures, and could contribute to the improvisation in the same order as that finger would manipulate the string.'¹¹ Corresponding to how fingers would move to achieve the eight stages that form the cat's cradle, every participant would embody the role of a specified digit. But instead of plucking strings from fingers, this telematic version had each player perform from a set of components they each chose beforehand. Each 'finger' would choose nine components – one each for nine categories set by Frenkel: a number, a letter, a word, a name, a sentence, a fragment of a poem, a visual image, a gesture, and a sound. Entering the exchange primed with these components, the ten participants brought the elements to be used for the eight *cat's cradle* movements, for a vast range of possible combinations. It was a formalised co-operative structure, 'somewhere between a square-dance, sound poetry and prayer,' Frenkel described.¹²

These contributions of elements from the players would replace the physical movement of fingers for a string game, such that the embodied interaction would realize the 'movements' that created each 'figure'. During the event, Frenkel called out first the name of the string figure to be formed – numbered one through eight – then the sequence of the movement to be realised through each player. For instance, if Frenkel called out 'one word,' those 'fingers' corresponding with the first movement of the hands to create the first string figure would stand and share the word they had decided upon beforehand. From this, each sequence would produce an aleatoric stream of gestures. For example, called upon to share her chosen gesture, Toronto index finger Julia Grant would scratch her head. Then, as the next finger in the sequence, Miriam Adams (Montreal's middle finger) would make a kissing sound. And when called upon, Toronto middle finger Tom Stiffler would share his chosen image – a Plexiglas bracelet. And when passed back to the ring finger in Montreal, Frenkel might share her chosen sentence, and proclaim: 'The moving finger writes.'

Through live black and white video transmissions and with a playful demeanour, the players charted a handful of the thousands of possible permutations of these elements. Orchestrating the event, Frenkel called out each move before the players would perform their gesture, as she also shared a diagram of the choreography on one of the telematic screens. During the play, each participant could see both their own group's image and the image of the participants in the connected city. For some modes of play, the players would turn away from the fixed cameras to face the actual direction of the other city, some 500 kilometres away. Thus, they would look away from the televisual image of the other 'hand' to 'face the position where their counterparts in the other city [were] actually located, rather than facing the monitors, with their illusion of confrontation,' as Frenkel put it.¹³

The project transpired over three transmissions in the autumn of 1974: the first of these, on October 30, was essentially a test of the studio equipment; November 6 had the players performing in the space; and on November 13 the other players met in Toronto while Frenkel, in Montreal, produced on-screen drawings. As the event took place on three separate occasions, and produced three separate transmissions each three hours in length, the video documentation recorded nine hours of real-time footage over multiple channels.

2.3 The Exhibition

For the month of November 1974, four monitors in the Montreal gallery Espace 5 displayed real-time video recordings of the nine-hour-long live telematic transmissions of *String Games* [Figure 4].¹⁴ After each of the original performances, the tapes recorded from the Toronto end of the transmission were whisked to Montreal overnight, and the gallery exhibited these videos on the subsequent day.

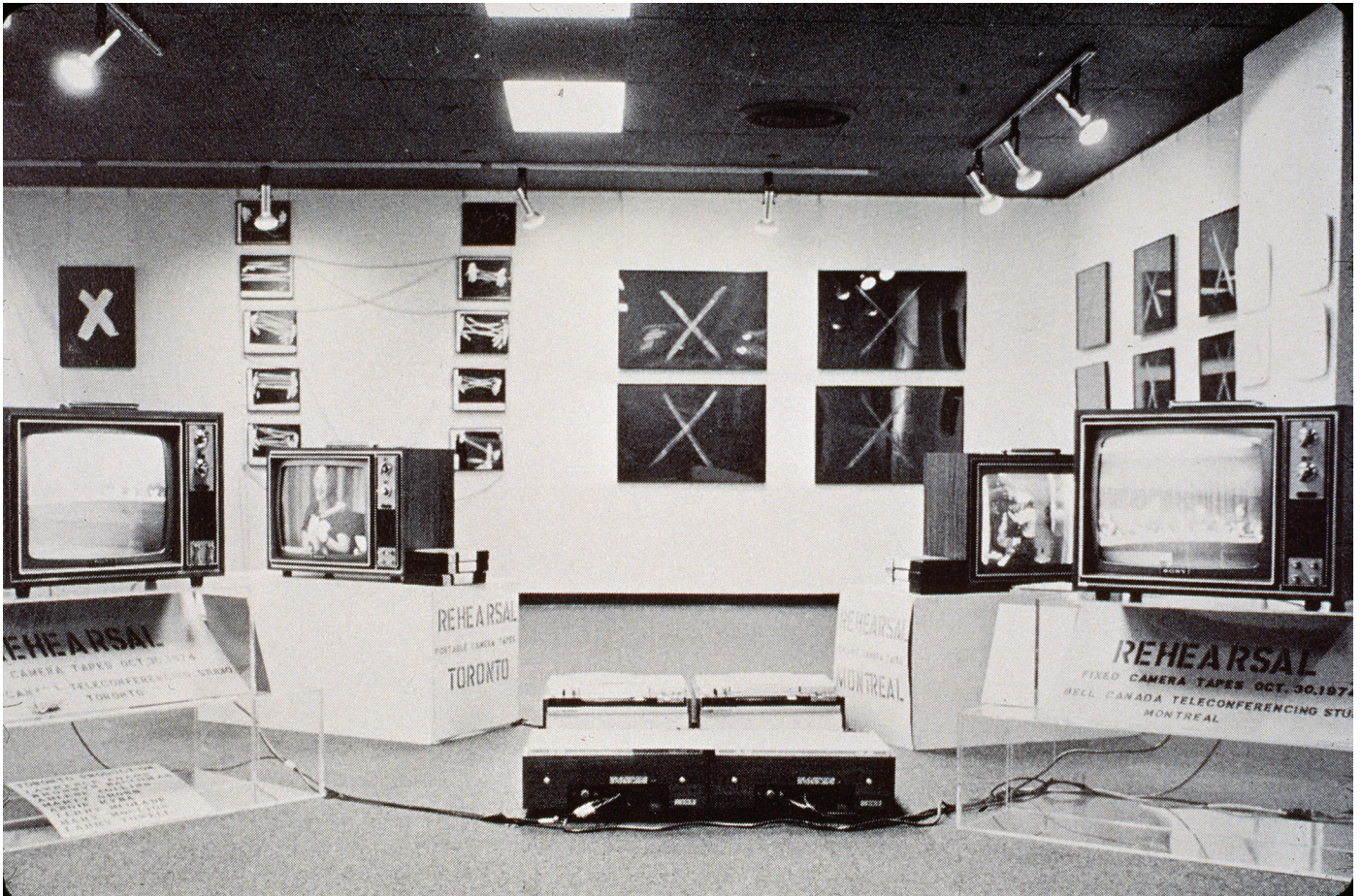


Figure 4. Vera Frenkel, *String Games: Improvisations for Inter-City Video* (Montreal–Toronto, 1974), 1974 installation at Espace 5, Montreal. Vera Frenkel fonds, Queen's University Archives (Kingston, ON).

Seeing the recorded video in its original exhibition context, a viewer could plausibly (mis)understand the documentation as a live broadcast. It is simple, rather grainy, black-and-white footage. For its initial showings, this footage was unedited, and so the event – replete with errors and setbacks – unfolded in real time. ‘These fragments form a fleeting memento to a low density electronic signal,’ art historian Dot Tuer deduces. ‘Once touching, almost tangibly, the frontier of simulation, the gestures of the participants now rebound with the pathos of the past.’¹⁵

Frenkel described the exhibition display as ‘informal’ and ‘improvised...The work evolved in the process of making it.’¹⁶ Alongside the video recordings, the exhibition displayed ephemera and documentation: sketches, photographs of the rehearsal, and choreographic notes, arranged on surfaces and the walls. Frenkel notes: ‘the exhibition began with empty frames that were then filled with collages built of the debris from the recycled materials from the actual transmissions.’¹⁷ Just as the live, transmitted event was responsive to her collaborators, the exhibition was again an aleatoric production: variable and improvisatory, it was an ad hoc configuration only partially premeditated.

These spontaneous performances and their exhibition, orchestrated through Bell Canada’s cutting-edge infrastructure, illuminate a compelling contradiction. Though built for business, governance, and technological control, the network was here co-opted into a playful and unscripted human exchange. In this way, *String Games* complicates Canada’s technonationalist narrative: while the state invested in telecommunications as tools of centralisation and cohesion, Frenkel repurposed those very tools to foreground ambiguity, spontaneity, and collective creativity. Her work suggests that national infrastructures may carry unintended possibilities – ones that resist their instrumental logic.

3 Telecommunications and Technonationalism in Canada



Figure 5. Newspaper advertisement for the Trans-Canada Skyway, *The Ottawa Citizen*, July 5, 1958, page 76.

String Games emerged at a watershed moment of network culture [Figure 5]. It took place at a historical juncture that saw broad, shifting views of technology and its social functions. The decade surrounding *String Games* marked a pivotal moment in digital media history, characterised by the rise of consumer video and the early development of Internet technologies that would eventually lead to the World Wide Web. This period also anticipated a cultural shift driven by the exchange of information and nascent experiments in image transmission. Videotelephony, long imagined by inventors and communications firms, reached a technical and conceptual high point in the mid-1970s, even as the dream of live, interactive visual exchange had been pursued for more than a century [Figures 6 and 7].¹⁸



Figures 6 and 7. Expo 67 Postcard, 1963. Pavillon du téléphone / Telephone Pavilion. Montréal : Compagnie canadienne de l'Exposition universelle de 1967; Olympic Ceremonies Postage Stamp, 1976. Peter Swan and Raymond Bellemare for Canada Post.

At the time of *String Games*, the Expo 67 World Fair was in recent memory, staged in Montreal on the centenary of the nation's Confederation, and devised to promote a unified, progressive Canada.¹⁹ The Expo 67 Telephone Pavilion was sponsored by Bell Canada, together with eight provincial telephone companies.²⁰ The main attraction of the pavilion was an immersive film called *Canada 67*. Shown in the Walt Disney-produced Circle-Vision 360° movie theatre in the round, the film presented Canadian landscapes and typical Canadian cultural icons, including hockey, the Royal Canadian Mounted Police and the Calgary Stampede.²¹ The pavilion also boasted a version of the AT&T Picturephone, allowing visitors to interface with others in Chicago, Philadelphia and Toronto.²²

Expo 67 actively promoted an image of Canada as both technologically and socially progressive – a widespread nationalist campaign that would continue throughout the century. For example, the torch flame of the 1976 Olympic Games, also in Montreal, was ignited remotely via satellite from Athens, Greece. There, at the ancient Panathenaic Stadium, a sensor captured the original torch's flame, transforming the electrons into digital signals, which were then relayed by satellite to Ottawa. In the Canadian capital, a parabolic mirror focused a laser beam triggered by these impulses from Greece, which ignited the flame.²³ The torch was then carried to Montreal, where the lighting of the Olympic cauldron was for the first time accomplished by two people instead of one: the teenagers Sandra Henderson from Toronto and Stephane Préfontaine from Montreal, underscoring both the bicultural and technological imperatives of the nation.²⁴

When Frenkel and her collaborators utilised the Bell Canada Conference TV, Canada had already positioned itself at the vanguard of telecommunications development. 1969 saw the inauguration of the landmark Telecommission, produced by the Canadian Department of Communications. Through a series of over 40 studies in the form of seminars, the Telecommission asked: 'Who is to decide what society wants?'²⁵ One such study took place in the spring of 1970. Toronto's York University hosted an interdisciplinary conference entitled *Telecommunications and the Arts*, sponsored by the Canadian Department of Communications, the Secretary of State of Canada and the Canada Council for the Arts. Its eighty participants included artists, technologists, commercial industry executives, and government bureaucrats, who joined together to express shared priorities and develop policy recommendations. Artists had a significant role in the research developed for the Telecommission at this time. The Nisei-Saskatchewanian architect Kiyoshi Izumi envisioned a "wired city": 'in a wired city,' he imagined, 'each home would have information services available through a variety of transmitters and receivers for multi-dimensional projection.'²⁶

Ultimately, the Telecommission had limited political traction,²⁷ and Canadian art histories likewise have scarcely attended to the intersection of art and technology from this time.²⁸ While prominent media art historical scholarship has described a similar history within the American context, about which many studies of artist-engineer collaborations

at Bell Telephone Laboratories have been published, much more work needs to be done to account for these Canadian art histories [Figure 8].²⁹



Figure 8. Vera Frenkel, documentation of *String Games* inside the Toronto Bell Canada Conference TV studio, 1974. Vera Frenkel fonds, Queen's University Archives (Kingston, ON).

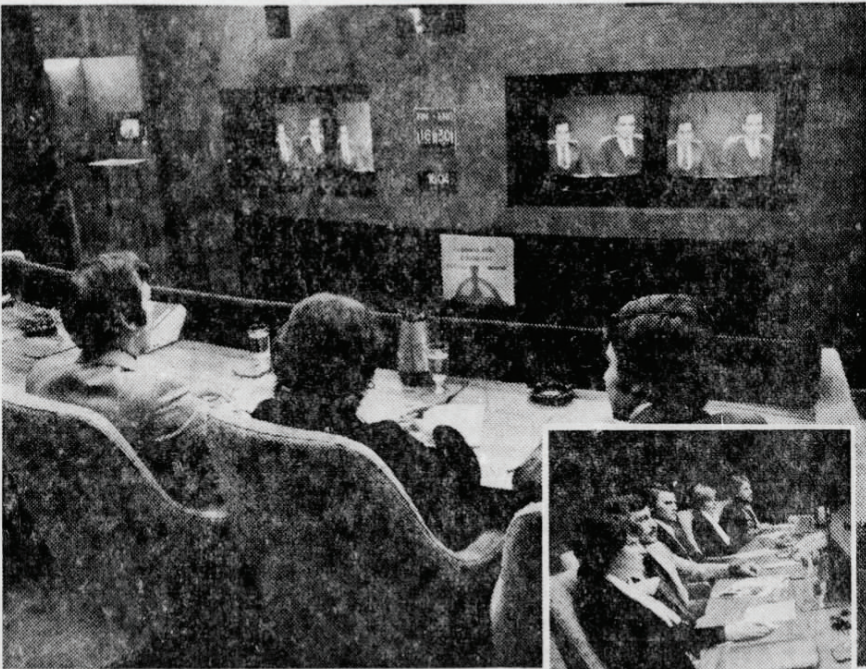
4 CanCon and the Bell Canada Conference TV

Exactly a century before *String Games*, Alexander Graham Bell famously patented the telephone in 1874 from his parents' homestead in Brantford, Ontario. His namesake company led early efforts in experimental Canadian telecommunications infrastructure with the Bell Canada Conference TV system, erected in the early 1970s, in which Frenkel's *String Games* was an early participant.³⁰

Since its inception in the early 1880s, the Bell Telephone Company of Canada has advanced telecommunications through its research and development wing, Northern Electric, which produced the first telephones in the country. From its Montreal factories, Northern Electric was instrumental in developing new media technologies in Canada and abroad. In its first fifty years, the company produced gramophones, radios, phonographs, police call boxes, and amplifiers for movie theatres. Large military contracts empowered the company to accelerate tech development; it produced telegraphic switchboards for the Great War and early wireless transceivers for World War Two. Having then implemented these technologies domestically, by the end of the War, Canadians were communicating by telephone more than citizens of any other country.³¹ In the 1950s, Northern Electric would undertake the construction of the Trans-Canada Skyway, a massively ambitious microwave system built to carry signals from coast to coast. In its day,

the Skyway was the largest, most powerful transmission network in the world, and allowed for the relay of telephone and television signals from one coast to another in just 1/50th of a second.³² Throughout the 1960s, the company produced the first Precision Satellite Tracking Antenna and developed early experiments with fibre optic cables. By 1971, only three years prior to *String Games*, Northern Electric and Bell Canada merged their research and development departments to form Bell-Northern Research, notably producing the *Pulse*, the first software-based telephone system in 1972.³³ In '73, the company became public. By the middle of the decade, Northern Electric was a billion-dollar corporation, and Bell Canada was the fifth-largest company in the country.³⁴ Bell-Northern Research would go on to develop tools central to the Internet revolution, including packet switching, cellular networks, fibre optic cable technologies, and, notably, one of the world's first teleconferencing networks [Figure 9].

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Figure 9. Newspaper advertisement for Bell Canada Conference TV, *The Montreal Gazette*, April 3, 1979, page 35.

In April of 1972, Bell Canada launched its two-way video teleconferencing facilities in Toronto and Montreal, expanding by 1974 to include facilities in Ottawa and Quebec City. At the time of *String Games*, Bell Canada's Conference TV

System was one of only four organisations worldwide offering remote conferencing technology that integrated computers with telecommunications networks.³⁵ The project, however, proved prohibitively expensive and faced limited demand, ultimately failing to last the decade. During its operation, however, the system facilitated technical research, scientific studies, and, with Frenkel's *String Games*, at least one artwork. Routing audio and video separately, the system used both the Trans-Canada Skyway microwave link and a dedicated long-distance broadband coaxial telephone switch. In other words, live picture and sound were carried simultaneously via both microwave radio relay and copper wire connections between multiple Bell Canada facilities. This represented an enormous volume of digital information to transmit in the early 1970s – well before the widespread adoption of optical fibres and broadband computer networks. Moreover, because communications were fed through a designated channel, Bell Canada's videoconferences experienced a minimal network delay. That is, the lag between someone speaking on one end of the line and someone receiving this at the other end was negligible – even in comparison to teleconferencing today.

Participants of the Bell Canada Conference TV System sessions were seated in a horseshoe-configured row of seats, 12 feet away from two 23-inch monitors. These screens displayed both the transmitted image of themselves in the room and the incoming video from the connected city or cities. The two monitors proved too small, so another two were added and brought closer, and then, by 1975, the full space was altered with the addition of large (5'×7') rear projection screens.³⁶ The facilities were equipped with four cameras and five directional microphones, built with a sophisticated voice-switch system that automatically displayed video of the loudest speaker.³⁷ If no one spoke for four seconds, the system defaulted to an overhead camera capturing the entire group. Additionally, a table-mounted camera allowed participants to transmit images, and the rooms were further networked with fax machines [Figure 10].

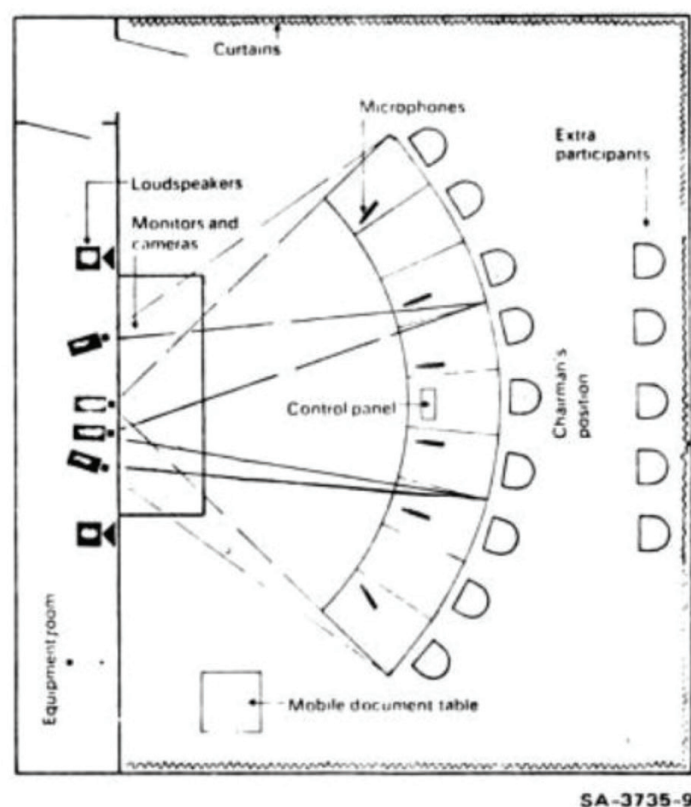


FIGURE 1 BELL CANADA STUDIO, MONTREAL

Figure 10. Diagram of Bell Canada Studio, Montreal, from R. W. Hough and R. Panko, *Teleconferencing Systems: A State-of-the-Art Survey and Preliminary Analysis* (Menlo Park, California: Stanford Research Institute, 1977), 9.

A newspaper article from January of 1974 indicates that Bell aimed to research 'what demand there might be for such a service, and what customers think of the way it works.'³⁸ So, between 1973 and 1975, Bell offered the facilities free of charge if users agreed to complete a lengthy questionnaire. For Bell, this research incurred high costs: among other expenses, they leased a 6-megahertz channel that cost \$300 per hour. In comparison to the cadres of businessmen and government groups who made use of the system at this time, the group of *String Games* participants stood out as offbeat.

Just as Bell Canada was soliciting test-drivers for this new system, Frenkel was simultaneously invited to create two exhibitions in Montreal by the artist-run centre Véhicule and the commercial gallery Espace 5. Frenkel developed a plan to make a televisual link between the two spaces and sought out telecommunications engineers to do the job. When Bell Canada representatives revealed that the project would be prohibitively expensive to produce, Frenkel pivoted her plans: 'in the course of the conversation with the Bell Canada engineers ... when I explained what I wanted to do, [they] said that I might be interested in their new teleconferencing facilities. They [had] just finished developing it and it turned out that they were interested in testing it.'³⁹

Having thus entered the Bell studios by way of the corporation's research and development imperatives, Frenkel recalled: 'I didn't think of Bell or Sony [who had donated hard disks for the artwork] as my collaborators: I saw them as my sponsors. And I also saw myself as giving them fair exchange, because in fact they had learned a lot from what we did.'⁴⁰ The art historian Caroline Seck Langill has identified that Frenkel's partnership with Bell came 'long before artists were compelled to look for corporate sponsorship' in the Canadian context.⁴¹ Truly, one of Frenkel's skills is 'persuading people to let [her] play.'⁴² While artists in the American context had already been collaborating with scientists and engineers from the tech industries,⁴³ *String Games* was among the first to manifest this in the context of communications technologies in Canada.

While the Bell Canada Conference TV system was not a general-purpose computing system, it included embedded computational components, such as automated and voice-operated switching systems that performed conditional logic on audio signals, real-time video signal composition, and routing decisions. Thus, the system is an early example of soft automation in media infrastructure, where logic and control systems replaced or augmented human operators, anticipating later trends in digital telepresence, video conferencing, and networked media. Predating the coinage of the term *telematic* by several years,⁴⁴ *String Games* set the precedent for later telematic artworks before the Web by artists Roy Ascott, Kit Galloway and Sherrie Rabinowitz. In the Canadian context, it anticipated the works of Bill Bartlett, Norman White, Hank Bull, Robert Adrian X, Nell Tenhaaf, and N. E. Thing Co. – the duo formed by Iain and Ingrid Baxter.

A 1975 internal report from Bell Canada acknowledged the limitations of the Conference TV at the time. 'The system worked satisfactorily,' the report summarises, 'but it was recognised that a new communications medium like video conferencing would create behavioural traits and resistance to change some long-engrained habits.'⁴⁵ As a result of these findings, Bell Canada partnered with leading researchers from both the Communications Studies Group of University College in London, England and from the then newly-formed and now non-operational Canadian Department of Communications, which oversaw the culture, industry, and science of telecommunications in Canada between 1969 and 1993. Together with these researchers, Bell Canada commissioned an evaluative study of behaviour in geographically dispersed communications. The research of Bell Canada Conference TV completed at this time laid the groundwork for studies of teleconference communication, and produced some of the earliest insights into the social and psychological aspects of networked group interaction.⁴⁶ Bell Canada researchers studied the rate of information exchange transmitted over teleconferencing versus face-to-face interaction. Where the field of cybernetics had laid a foundation for understanding the flow of information across technical systems, these early telecommunications researchers advanced an interdisciplinary field bridging studies of media and technology with research of language and translation, business negotiation studies and psychology research. They found measurable outcomes to the constraints in a system, such that

variables in communication, like the restriction of nonverbal cues, resulted in the removal of 'socio-emotional information.'⁴⁷ They also found that social encounters using the Conference TV system were less likely to be 'friendlier' and more likely to be 'serious,' and could also become aggressive. Although, unlike the contemporaneous British counterpart system Confravision, on the Bell Canada Conference TV 'one gets a good 'feel' for people at the other end.'⁴⁸

This ground-breaking research came decades before studies alerted us to the cognitive overload of Zoom fatigue,⁴⁹ the effects of 'continuous partial attention,'⁵⁰ and to the importance of non-verbal, bodily signals in digital communication.⁵¹ This early research into the field of networked media – half a century ago – was part of a wave of enthusiasm in Canada for new modes of remote communications, in which *String Games* enthusiastically partook.

String Games came just three years after the implementation of Canadian content broadcast industry standards in the form of the 'MAPL' System, stimulating Canadian-produced *Music, Artists, Performance and Lyrics*.⁵² This government-regulated system assured that a percentage of television and radio airplay was allocated to Canadian content, or CanCon, marking a difference from the previous decade's overabundance of British and American representation on Canadian TV and broadcast radio.⁵³ Frenkel and her collaborators occupied the new communications channels just as broadcast content in the wider media culture was being nationalised [Figure 11].



Figure 11. Vera Frenkel, documentation of *String Games* inside the Montreal Bell Canada Conference TV studio, 1974. Vera Frenkel fonds, Queen's University Archives (Kingston, ON).

5 Conclusion

It was significant that the ‘hands’ of *String Games* were arranged such that the ‘left’ hand was in Montreal and the ‘right’ in Toronto: the telematic ‘body’ had its back against the Great White North. Perhaps *String Games*, then, can be read as a quiet defiance of the nationalist narrative, even as it operated within its infrastructure. The project transformed state-of-the-art telecommunications into a scene of improvisation and play, repurposing tools originally designed for bureaucratic command-and-control – central to Canada’s technonationalist media infrastructure – as mediums of aesthetic expression. Turning their back on the country, the players used the very technologies envisioned by Canada’s technonationalist agenda to consolidate a national identity through centralized media. Langill has pointed out the impertinence of the gesture of ‘using monuments of technological nationalism as a vehicle for a cat’s cradle.’⁵⁴ Certainly, Frenkel’s impulse was not to sing the national anthem, but rather to play a more universal game. It was an act that spanned the nation’s largest cities, crossing provincial boundaries and a linguistic divide.

String Games offers a subtle intervention into Canada’s technonationalist project, transforming a system designed for corporate efficiency and state cohesion into a site of improvisation, play, and collective expression. By appropriating Bell Canada’s cutting-edge digital infrastructure for ephemeral, participatory art, Frenkel and her collaborators repurposed tools of national unification – sidestepping grand narratives of Canadian identity in favour of spontaneity and play. She quietly disrupted the logic of control embedded in national infrastructure. In doing so, *String Games* reimagines a network not as a tool of unification through control, but as a participatory space where meaning is improvised, distributed, and co-authored – resisting the very ideological foundations upon which Canada’s telecommunication systems were built. As questions of technological inclusion and digital sovereignty grow more urgent, *String Games* invites us to consider how networks – like cat’s cradles – are shaped by the hands that hold the thread.

Notes

1. Douglas Coupland, *Microserfs* (Toronto: HarperCollins, 1996), 329.
2. Arthur Kroker, *Technology and the Canadian Mind: Innis, McLuhan, Grant* (Montreal: New World Perspectives, 1984).
3. Harold Adams Innis, *Empire and Communications* (Oxford: Oxford University Press, 1950), 215.
4. Edward Shanken included a passing entry on *String Games* in his 2009 tome *Art and Electronic Media* (London; New York: Phaidon Press). And more recently, Michael Century gave attention to the artwork in his 2022 *Northern Sparks: Innovation, Technology Policy, and the Arts in Canada from Expo 67 to the Internet Age* (Cambridge, MA: The MIT Press). For more comprehensive studies of *String Games*, see Dot Tuer, “Beyond the New Media Frame: The Poetics of Absence in Vera Frenkel’s *String Games*”, in Vera Frenkel, ed. Sigrid Schade (Ostfildern, DE: Hatje Cantz, 2013), 39–62; and Caroline Seck Langill, “Vera Frenkel’s *String Games* and the Germination of New Media Art in Canada”, in *Ensemble Ailleurs – Together Elsewhere*, eds. Louise Poissant and Pierre Tremblay (Québec: Presses de l’Université du Québec, 2010), 373–85.
5. Mikhel Proulx, “Vera Frenkel’s *String Games: Improvisations for Inter-City Video* (1974)”, *RE:SOURCE: The 10th International Conference on the Histories of Media Art, Science and Technology*, Venice Centre for Digital & Public Humanities, Ca’ Foscari University, Venice, Italy (Sep 14).
6. Vera Frenkel, interview by author, Telephone, June 29, 2020.
7. Vera Frenkel et al., *String Games: Vera Frenkel and Guests, Improvisations for Inter-City Video* (Montreal, 1974), 4.
8. Qtd. in Simon Lewsen, “String Games”, *Canadian Art*, Winter 2017, 82.
9. Frenkel, interview by author.
10. The ‘X’ motif appears in later artworks of Frenkel’s, including *Big Book* (1976) and *the Secret Life of Cornelia Lumsden* (1979).
11. *Lies & Truths by Vera Frenkel: An Exhibition of Mixed Format Installations* (Vancouver: Vancouver Art Gallery, 1978), 13.
12. Ibid.
13. Frenkel et al., *String Games: Vera Frenkel and Guests, Improvisations for Inter-City Video*, 13.
14. Espace 5 was an experimental commercial gallery at 1115 Sherbrooke West and was run by the French gallerist Marta Landsman. Along with Edward Landsman, she also owned Galerie Martal, which was across the street.
15. Dot Tuer, “Perspectives of the Body in Canadian Video Art”, *C Magazine*, no. 36 (January 1993): 30.

16. Langill, Caroline, and Vera Frenkel. Interview with Vera Frenkel. Video, August 17, 2006, fondation-langlois.org/html/e/page.php?NumPage=1932.
17. Langill and Frenkel.
18. Doron Galili, *Seeing by Electricity: The Emergence of Television, 1878–1939* (Duke University Press, 2020).
19. See Pierre Berton, *1967, The Last Good Year* (Toronto: Doubleday Canada, 1997); And: Rhona Richman Kenneally and Johanne Sloan, *Expo 67: Not Just a Souvenir* (Toronto: University of Toronto Press, 2010).
20. Monika Kin Gagnon, “Reconstructing Two Immersive Multimedia Pavilions from Expo ‘67: The Christian Pavilion and the Telephone Pavilion” (Montreal: Concordia University, April 25, 2009), 5.
21. Gagnon, 5.
22. *Official Expo 1967 Guide Book* (Maclean-Hunter Publishing Co. Ltd, 1967), 178.
23. “Torches and Torch Relays of the Olympic Summer Games from Berlin 1936 to Rio 2016” (The Olympic Studies Centre, May 22, 2017), 46.
24. Ibid., 47.
25. Canada, Department of Communications, and Telecommission Directing Committee, “Instant World: A Report on Telecommunications in Canada” (Ottawa: Information Canada, 1971), 23.
26. “Arts Evaluation Seminar Subject”, *The Leader-Post*, April 25, 1970.
27. William F. Birdsall, “A Canadian Right to Communicate?”, *Government Information in Canada/Information Gouvernementale Au Canada*, no. 15 (September 1998).
28. The recent exhibition *Computational Arts in Canada 1967–1974*, curated by Adam Lauder and Mark Hayward for the London, Ontario McIntosh Gallery stands out as a scholarly art historical project that attends to the Telecommission and to the 1970 York University conference. Adam Lauder and Mark Hayward, *Computational Arts in Canada, 1967–1974* (London, Ontario: McIntosh Art Gallery, 2020).
29. Caroline Langill has recently addressed such collaborations in her essay “New Media Art and Industry, a Critical Relationship”, in *Variable Conditions: Para-Computational Arts in Canada, 1965–1995*, edited by Adam Lauder, 171–87. Montreal: McGill-Queen’s University Press, 2023. For a recent study of this history in the American context, see Patrick McCray, *Making Art Work: How Cold War Engineers and Artists Forged a New Creative Culture* (Cambridge, MA: The MIT Press, 2020).
30. Information on Bell Canada’s teleconferencing studios is scarce. Anthony J. Patterson, “Bell Experiments with ‘Teleconferencing’”, *The Calgary Herald*, January 19, 1974.
31. CBC Archives, “Canada Says Hello: The First Century of the Telephone”, CBC.ca, March 10, 2012, cbc.ca/archives/topic/canada-says-hello-the-first-century-of-the-telephone.
32. “Microwave Network Improves Telephone and TV Reception”, CBC Archives, September 23, 1956, cbc.ca/archives/entry/trans-canada-telephone-system-micro-wave-of-the-future.
33. The full name of *Pulse* was The Northern Telecom SG-1/SG-1A EPABX (Electronic Private Automatic Branch Exchange). The company described the machine thusly: “Pulse amplitude modulated time division multiplex with resonant energy transfer.”
34. Douglas Hunter, “Nortel”, *The Canadian Encyclopedia*, January 4, 2018, thecanadianencyclopedia.ca/en/article/nortel.
35. The others were: Institute for Defense Analyses, Washington, DC; Johns Hopkins University, Baltimore, Maryland; and Stanford Research Institute, Menlo Park, California.
36. “Teleconferencing Project Report” (Montreal: Bell Canada, 1975), 2.
37. R. W. Hough and R. Panko, *Teleconferencing Systems: A State-of-the-Art Survey and Preliminary Analysis* (Menlo Park, CA: Stanford Research Institute, 1977), 6.
38. Patterson, “Bell Experiments with ‘Teleconferencing’”.
39. Langill and Frenkel.
40. Langill and Frenkel.
41. Langill, Caroline, “Shifting Polarities: Canadian Electronic Media Art and Institutional Space, 1970–1990”, PhD diss., Peterborough: Trent University, 2009, 120.
42. Frenkel, interview by author, Telephone, June 29, 2020.
43. The New-York organization Experiments in Art and Technology (E.A.T.) and the Art and Technology program of the Los Angeles County Museum of Art, for example, both began in the late 1960s.
44. The term was introduced in 1978 with the publication of Simon Nora and Alain Minc’s report *L’informatisation de la société*, commissioned by the French government and translated thereafter as *The Computerization of Society: A Report to the President of France* (Cambridge, MA: MIT Press, 1980).
45. “Teleconferencing Project Report”, 23. Bell Canada archivist Janie Théorêt shared internal documents, though was unable to unearth anything mentioning Frenkel.
46. E. Williams and S. Holloway, “The Evaluation of Teleconferencing: Report of a Questionnaire Study of Users’ Attitudes to the Bell Canada Conference Television System” (London: The Communication Studies Group, 1974).
47. Hough and Panko, 98.
48. Hough and Panko, 146.

49. Libby Sander and Oliver Bauman, "Zoom Fatigue Is Real – Here's Why Video Calls Are so Draining," *Ideas.Ted.Com* (blog), May 19, 2020, ideas.ted.com/zoom-fatigue-is-real-heres-why-video-calls-are-so-draining.
50. D. Alexander Varakin, Daniel Levin, and Roger Fidler, "Unseen and Unaware: Implications of Recent Research on Failures of Visual Awareness for Human-Computer Interface Design", *Human-Computer Interaction* 19, no. 4 (December 1, 2004): 389–422.
51. Friederike Behrens and Mariska E. Kret, "The Interplay Between Face-to-Face Contact and Feedback on Cooperation During Real-Life Interactions", *Journal of Nonverbal Behavior* 43, no. 4 (December 2019): 513–28.
52. Canadian Radio-television and Telecommunications Commission, "The MAPL System," Government of Canada, August 10, 2009, crtc.gc.ca/eng/info_sht/r1.htm.
53. The government measures immediately supported a boom of Canadian folk musicians of Frenkel's generation, including in the anglophone context people like Joni Mitchell, Leonard Cohen and Neil Young, just as the Quebec context saw a rise of Acadian fiddle chansons-influenced, yé-yé folk and prog rock the likes of Harmonium, Michel Pagliaro, and Diane Dufresne. Scott Henderson, "Canadian Content Regulations and the Formation of a National Scene", *Popular Music* 27, no. 2 (2008): 307–15.
54. Langill, "Vera Frenkel's String Games and the Germination of New Media Art in Canada", 381.

Biography

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