Je suis convaincu que nous vivons au milieu d'une période dont découlera bientôt une Architecture encore plus en conflit avec elle-même, encore plus maniérée que l'ont été les rêves les plus étranges de Michelange ou Stanley T.
Au travail, je vois de nouvelles forces et préoccupations qui incorporent trois types d'espaces architecturaux: l'**ESPACE ETABLI**, traditionnel et habituellement urbain; l'**ESPACE MODERNISTE**, propre à notre siècle et principalement de banlieu; et celui, approchant rapidement, créant de radicaux changements: l'ESPACE ELECTRONIQUE-CONCEPTUEL.
Je crois que l'amalgame des ces trois concepts spatiaux constituera une nouvelle vague de **Maniérime-Electronique-une Architecture** (non dissemblable de l'interprétation du travail de Michelange par Wittower) d'énergies extrêment ambigües et en conflit. Cet article traite de l'émergence et de l'enthousiasme propre à cette nouvelle Architecture.

SONY WALKMAN ADORNED TELERIDERS MOVING THROUGH CABLE NETWORKS OF COMPUTERIZED COTTAGE LAND UNDER THE SKIES OF OVERCROWDED ORBITAL SLOTS:

ENJOYING ELECTRONIC MANNERISM

by Larry Richards

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This article by Larry Richards, Director of the Waterloo School of Architecture, was extracted from a paper he presented in Kazimierz-Dolnay, Poland, in April, 1983 as part of a scholarly exchange programme between the University of Warsaw and the University of Waterloo.

Introduction

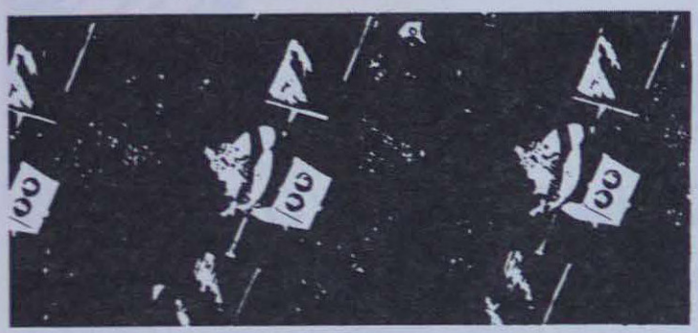
I feel uneasy with most of what has been written or said in the last fifty years about Mannerism as a style of sixteenth century architecture; and I become very impatient with discussions about so-and-so's current work being too mannered. The tone is usually negative, and after a while all the paranoia and wrist slapping over architectural restlessness and contradiction simply becomes boring. Besides, these latter years of the twentieth century seem to indicate that we are all in for *more* restlessness, not less. So why not buckle up your space age seatbelts and enjoy the ride?

A serious exception to my light-hearted put down of pronouncements on Mannerism is Rudolf Wittkower's superb 1934 article, "Michelangelo's Biblioteca Laurenziana" which includes a section called "*The Vestibule and the Problem of Mannerism*".[1] In this section on the library vestibule and stair designed by Michelangelo, Wittkower examines an architecture which he sees as "*perpetually at variance with itself*"[2] and which, through inversion and duality of function, leads one into a world of great contradiction. Wittkower understands and accepts the contradictions; it is an intelligent piece of work on Mannerism and continues to be useful. But Michelangelo's Laurentian Library and the concept of Mannerist ambiguity as set out by

Layout: by Christina Anne Humphreys

Wittkower are not the primary topics here. I mention them only because I see them as forming, together, some kind of base line and important reference for my own struggle to understand, produce and teach architecture in the 1980s. As I hinted at in the first paragraph, I am convinced that we are living in the midst of a period which will soon generate an architecture even more at variance with itself — even more mannered than the wildest dreams of Michelangelo or Stanley T.

I see new forces and preoccupations at work which incorporate three kinds of architectural space: traditional, usually urban,



figured space; twentieth century, now predominantly suburban, *modernist space*; and a rapidly approching, radically transforming, conceptual *electronic space*. Together, I believe the collage of these three spatial ideas will constitute a new wave of Electronic Mannerism — an architecture (not unlike Wittkower's sense of Michelangelo's work) of extremely ambiguous, conflicting energies. This article discusses the emergence and enjoyment of that new architecture.

The Information Age and the Convergence Factor

Increasingly, the environment (and our relation to it) is being tranformed by electronic systems. Whether at the small scale of the individual (pocket computers, head-set radios, etc.), or at the huge scale of an international network (satellite communication, world-wide telephone systems, etc.) these complex and increasingly interrelated systems are changing, in a fundamental way, both the means of production and the objects and spaces created in architecture. There are new possibilities of simultaneously *being* at many places, in various time frames. Conditions of simultaneity are evolving which undermine industrialized societies' senses of architectural time and place.

These new conditions can release architecture and its users from traditional responsibilities and expectations. Perhaps less space is actually required for certain functions and efficiency is improved; on the other hand, conditions of extreme privacy and anti-community are promoted which seem to undermine the social and experimental roles of architecture. Changes are occuring which, in Canada, "*may cause fundamental changes in human thought and action.*"[3]

Architecture must be seen as both a built object and space (product) and as a high-speed, often invisible network of actions (process). Emphasis on the latter leads to *conceptual architecture* which, although seemingly contradictory, is a useful definition in attempting to understand the new fragmentary and complex territories of telecommunic inhabitation of the late twentieth century. Richard Munro, President and Chief Officer of Time, Inc (US) stated in a 1981 Symposisum on "Communications in the Twenty-First Century" that "*... the direct consequences of the new media occur in the realm of the mind.*"[4]

Canada and the world's Information Society are made aware, hourly, through the electronic media, of the changes in *environmental apparatus* which are coming about through technological advancements in such areas as the robotization of industry, the testing of live television broadcast by satellite, and the introduction of Telidon video-text into worker's homes. (The Science Council of Canada's March, 1982, Report No. 33 sets out as one of its 27 recommendations to the federal government that centres of excellence be established to ensure the development of expertise in this area (robotics)...;[5] Japan currently has 75,000 industrial robots in operation.) The lists of electronic systems and activities, as well as the spread of computerized networks, grow weekly. Most overwhelming for us in 1983 is the convergence factor:

The telephone and television, even the computer, were basically single inventions. The age of information, however, is a constellation of inventions that converges in the marriage of computers and telecommunications. That convergence could change our lives as spectacularly as the industrial age changed the age of agriculture before it..."[6] our lives are changed spectacularly, then surely our architecture will change spectacularly also.

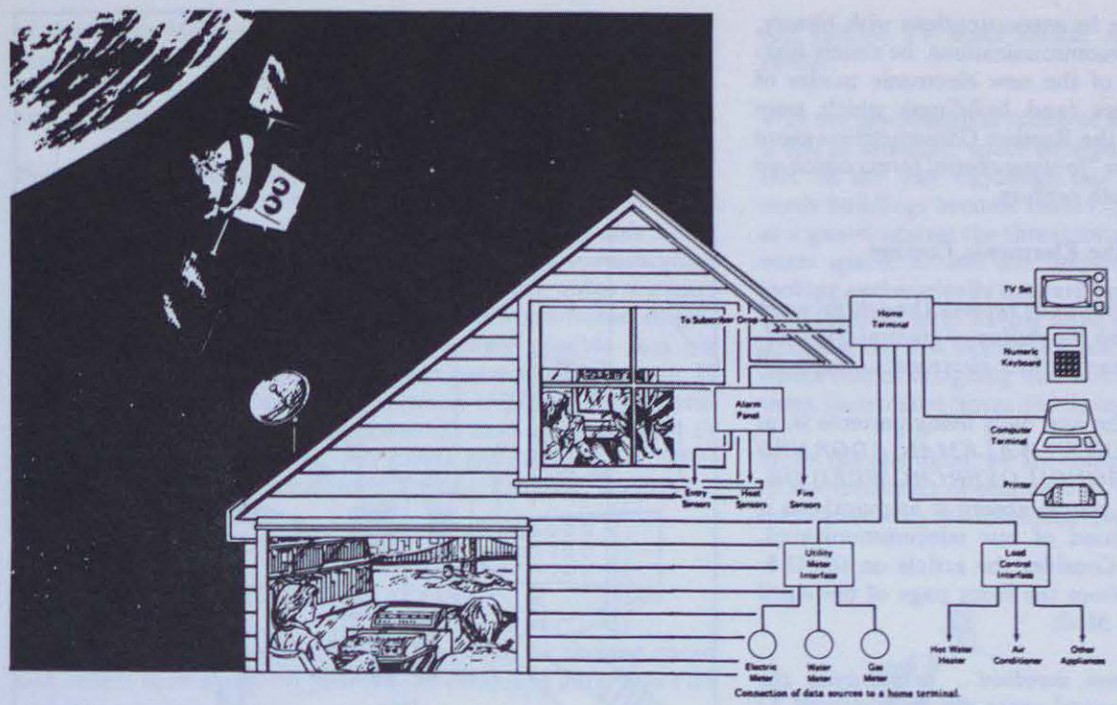
ARCHITECTURAL PRACTICE, BUILDING PRODUCTION, AND PUBLIC COMMUNICATION

Combining electronic systems and computers with architecture suggests, for most people, *application* in architectural practice. They think of computer-aided design (CAD); computer analyses of comparative building costs, energy savings, and life-cycle costing; thermographic building diagnosis and, perhaps, community interaction through television. However, these are only the tools of the new architecture — the hardware tips of the *conceptual iceberg*. But in the current situation they are the most talked-about and useful examples of the new technology for architects and deserve attention.

The opportunities offered through two-dimensional computer planning, three-dimensional computer design and simulation etc. confront us with new methods and visualizing processes which could hardly have been imagined twenty years ago. By pushing buttons to manipulate the *Management Menu*, lines representing walls can be *snapped* into place from two plotted points, floor plan areas can be calculated accurately and speedily, and complete furniture components can be selected and put into place from memory bank catalogues. A sophisticated system, such as the Intergraph Architectural System, "*enables the user to literally 'move' this true-to-scale component (the furniture) in dynamic motion across the screen, rotate the component oreintation and place it precisely in the desired location.*"[7]

Also, it is possible to colour (including light effects of shading and reflection) three-dimensional architectural models and, using View Commands walk-through rooms and streets: "*the designer can now walk his client through the 'hallways' of the screen model while the scale remains consistent and perspective changes according to the viewer*".[8] The client can, for the first time, begin to penetrate a realistically represented space *and* see the architecture and the objects in it from many points of view. Are the visions of the early twentieth-century, cubist painters being realized? Can we imagine that, in a manner similar to an airline pilot's experience of landing a plane in bad weather with a simulated, more accurate and visible airport runway superimposed electronically on the real one, that a client might soon be *wired up* to move through and experience, as secondary reality, a proposed room or sequence of architectural spaces?

This all seems provocative; but before allowing ourselves to be too easily seduced by this electronic magic, we must ask what might be sacrificed as computers and various electronic systems inhabit more and more of the territory of architectural practice



1. "Home of the future". collage drawing by Larry Richards using pieces from *Cable Communications* (1983).

— what might be the negative influences on architectural production? Just as the popularization and *rule* of the automobile changed industrialized societies in unpredictable and profound ways — many of them undesirable (huge numbers of deaths from automobile accidents, pollution, isolation), computers and electronic systems have the potential to generate even more extreme and negative conditions within the process of architectural production. Some examples of the types of negative scenarios which might evolve:

1. If actual visits to a prospective building site and real meetings with clients are no longer necessary because of increased flexibility in electronically simulating and transmitting, what will be sacrifices within the zone between the primary reality of the place and the simulated, secondary reality of the electronic information and image? For example, using video teleconferencing, would we really know and feel more about Whitehorse and its people in Canada's Yukon and thus be able to design more carefully and meaningfully for that particular region and place? Or will we produce buildings that are "images of images of images"?

2. Will the computer and electronic systems themselves because of their powerful character as *INTERNATIONALIZED, RATIONALIZED, NEUTRALIZED,* all-space pervading capacities overwhelm more traditional means of figuring space and thereby lead, as tools of architectural production, to *nowhere everywhere*? Will the late 1960s prophecy of the Florentine Architectural Group, Superstudio, be realized?

There will be no further need for cities or castles. There will be no further reason for roads or squares. Every point will be the same as any other (excluding a few deserts or mountains which are in no wise (sic) inhabitable). So, having chosen a random point on the map, we'll be able to say my house will be here for three days two months or ten years. And we'll set off that way (let's call it B)...[8]

3. With small computers as the new architectural apprentices, it is easy to imagine fewer and fewer architects and architectural apprentices actually being needed; i.e. not only is there "*no further need for cities or castles*" but also no further need for architects and apprentices. (Especially with the possibility of robotization moving from industry to office?)

But these scenarios on future architectural practice should not be seen as primarily negative, in tone; there are clearly positive, exciting possibilities ahead. Architects can become more and more efficient: design with altogether new ingredients; maintain better records; and store and access huge quantities of information. Architects will be capable of designing buildings which are, in relation to 1983, faster to build, better constructed, more energy efficient, more easily maintained, and most importantly, safer for the people who inhabit them. Although in some ways more aligned with building science and engineering than with architecture, the actual building production process — which architects must *generally* understand and be able to supervise and monitor — is being radically transformed in the 1980s through the increasingly sophisticated use of various electronic systems. Existing buildings can be analyzed for building fabric deficiencies using the process of thermography through which such things as air leakage can be accurately detected and rationally solved. Structural members and connections in buildings under construction can be electronically "*penetrated*" and tested, with the information transmitted instantly to the architect's or engineer's office (which eliminates, to a great extent, the traditional need for supervision offices on the job site). The coordination of flows of materials and workers, and connections to the servicing networks of cities — previously a very complex and error-prone process on large-scale projects, is being simplified and rationalized through the intervention of computer and other electronic systems.

As discussed earlier, computer-aided design and graphics — particularly colour graphics — are important new tools for architects; and they influence the construction process and the built product. Rather than drawing sheet after sheet of black ink or pencil on white paper or mylar sheets during the construction documents phase, architects *draw* (and think?) more in colour with the new system. This colour thinking and coding is highly influential in a cyclical manner and is transferred to expectations for the pieces of steel, glass, masonry, plastic, etc. *and* for the sequential processes of the *putting together* on site.

Manufacturers and suppliers reinforce the cycle of colour expectation and articulation, making new polychromed materials available. One might predict and support the emergence of a

new architecture which will, in its preoccupations with history, fragmentation, colour, and telecommunications, be closely linked with the powerful images of the new electronic modes of building production — images (and buildings) which were predicted by Tchernykov and the Russian Constructivists more than fifty years ago. Tchernykov *"foresaw spatial forms which we may yet arrive at in the twentieth century."*[9]

Networks, Community, and the Electornic Cottage

"alternative work stations will gradually replace the central work site, and employers must develop the skills and technology needed to manage employees dispersed to their electronic cottages."[10]

The language used to discuss the new daily living patterns is, at first, strange sounding: *SONY WALKMAN-ADORNED TELERIDERS MOVING THROUGH OVERCROWDED ORBITAL SLOTS*. But ordinary people absorb it as quickly as it appears in the morning addition of our telecommunicated, computer-printed newspaper. Consider the article on the U.S. Challenger Space Laboratory from the front page of the April 7th, 1983, *Toronto Globe and Mail*:

The astronaut's practice session involved... pressurizing the airlock... Whether both astronauts' space-age helmets will be working at capacity was not known. Each helmet has four batteries to power a sophisticated headlight and T.V. camera... the pair (astronauts) are to test the suits and tools and techniques for servicing and repairing satellites on future shuttle missions.

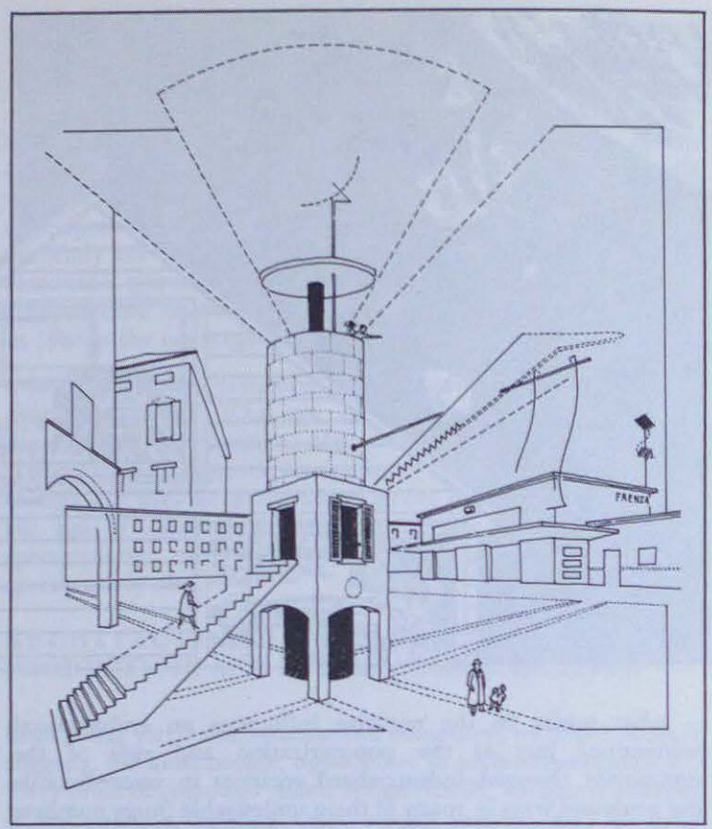
Meanwhile, back on earth, what are the influences of computerized transit networks, cablevision regions and home computers on architecture?

Just as regional highway systems, overlaid on the physical landscape in the 1940s, 50s, and 60s, changed the relationship and demarcation of political, social and economic areas producing the *SUB*-urb and the *SUB*-urban house type, now we are faced with even more complex overlays of electronic systems which are creating new spatial relationships and new architectural conditions.

The Metropolitan Region of Toronto, the city in Canada with the largest population, has five cable television operations each with several areas (systems). The largest of the five companies is Rogers with a 360,000 — home grid — the world's largest single system. In some cases in the Toronto Metro area, *cable communities* do not directly correspond to the physical boundaries of the boroughs. So it is possible to live in one communtiy but be wired into another. And this is further complicated by the many variables between systems. For example, some cable territories have English and French-language channels while others have only English. The importance of physical boundaries must be reconsidered.

Many architects have focused on the importance of context, regional responsiveness, local *character*, etc. in the past two decades. There has been a strong sense that buildings should continue in the manner of the traditions and look of the place. How does an architect respond to and design for overlapping real *and* electronic territories? Will we soon identify ourselves as being from *MacleanHunter Cableville* as easily as being from Etobicoke? What might a building in the manner of *MacLean-Hunter Cable* look like?

Similar questions can be raised at a smaller scale. The small, twin cities of Kitchener-Waterloo, in Ontario, recently activated a computerized transit system called Telerider. By dialing 888 and the local, four-digit bus stop number, the prospective rider is informed, by a computer voice, exactly (to the minute) when the next bus is due. As well, the system announces any delay or



2. "Ceramic Communication Tower". drawing form Richards/Santon/Urban Faenza competition entry (1983).

other service interruptions. So students, workers, the elderly — anyone taking the bus — no longer have to walk to a bus station or wait in the snow or rain for long periods. It is quick and efficient; but it also reduces the probability of social encounter, of *rubbing shoulders* with the crowd, of meeting new friends and talking during the wait for the bus. It individualizes and works against the messy, unpredictable nature of group interaction.

The same thing can be said about the new national and international networks of electronic banking systems — banking by machine whenever you want it. There are no more long lines to wait in; banking and bill paying can be done in the darkness and quiet of 4 a.m.; grand banking halls are no longer needed.

If bus station waiting rooms and banking halls are no longer needed, if these and other institutions disappear, what will constitute our sense of community? What kind of architectural experience can be had in the quick-in, quick-out minimal enclosure needed for *personal touch* banking machines?

Next we can expect even less need to go to the banking machine with the home computer (home banking, home shopping, home entertainment, etc.), videotext and other devices linking us with the world outdside. Interactive features will allow people *"to buy airline or theatre tickets without leaving their homes or to order merchandise from the Sears Roebuck Catalogue or groceries to be picked up later."*[11] Flat *TV walls* will be standard components of houses, apartments and communal dwellings. At a lecture in Toronto on February 2nd, 1983, Alvin Toffler communicated his positive vision of late-twentieth century, third-wave life in the Electronic Cottage. Toffler believes that society will be *"demassified"*; that diversity will increase; that we will customize more and more of our objects and processes. We will *"reconceptualize (our notion of) job"*; most importantly there will be *"new attitudes towards time and space"*.

Will these new attitudes towards time and space significantly change people's attitudes towards and expectation for their place

of dwelling? Modernists have been committed to that vision throughout this century; but most of what has been built in the residential domain has been traditional, conservative, nostalgic, and, in terms of style and function, quite non-electronic.

People have not wanted their houses to be like or look like their automobiles or their typewriter or the airplane they fly away on during their vacation. An illustration in the book *Cable Communication* shows this quite plainly. The home communication systems of the future-satellite dishes, interactive video systems, computers, etc. — are all shown in or near a wood-frame, single-family bungalow. It is, regretfully, entirely possible that his retrograde vision of residential support systems will continue. If it does, the *container* and the *contained* will grow further and further apart. The desire to return to the cave and the fire — to primacy — is ever with us, *SITTING IN FRONT OF THE WARM, GLOWING FIRE WITH ELECTRONIC REMOTE CONTROL IN HAND.*

OUTER SPACE AND INNER SPACE

"Despite delays, five space shuttles may soon be moving cargo and people back and forth between the earth and outer space on a weekly schedule."[12]

"... the direct consequences of the new media occur in the realm of the mind."[13]

Preoccupations with outer and inner space are not new to mankind. Man has always enjoyed and feared his inner feelings and has looked to the heavens — looked outwards — to understand these feelings. Carl Jung wrote a book in the 1950s on flying saucers and, in it, referred to a Nurnberg Broadsheet of April 14th, 1561, which shows strange, satellite-like objects showering the earth. Seperated by nearly 400 years, Jung and the author of the Nurnberg Broadsheet reveal the primacy of our wonderment about those mysteries *out there* which are, simultaneously *in here*, that is, in the realm of the mind. Nothing much has changed.

On the other hand, things *have* changed radically. By 1980, there were 64 communications satellites in orbit around Earth; over-crowding of available satellite space has become a real problem. Bold ideas for outer space manufacturing and space cities are on the drawing boards, as the feasibility of large scale, integrated activities in outer space increases. In *The Third Wave*, Toffler tells us that *"According to Jesco von Puttkamer, chief of space industrialization studies for NASA (the U.S. National Aeronautics and Space Administration), it (Urokinase, a blood clot dissolver which now costs $2,500 (U.S) per dozen) could be manufactured in space for less than one fifth that amount."*[14] The uses of outer space for national defense are less inviting to contemplate, given the destructive capacity of the new systems.

At the everyday, local level, satellite communications are changing our environment. Our world — our space — is being expanded. Bargain basement satellite-dishes made of aluminium or fiber-glass are available in small cities and towns in Canada for $3,500. As one satellite-dish salesman said, *"There might... be situations where a group of six or seven owners of cottages on a lake will get together and buy a dish"*; thus the per-person or per-family cost could come down to a few hundred dollars.

Although much of the sending and receiving apparatus of telecommunications is becoming miniaturized — and the 'lines' of transmission are mostly invisible — a case can still be made for imagining that architecture will have to simultaneously accomodate and express its outer-space-oriented electronic gear. The tops of houses and apartment buildings, back yards and front yards will be decorated with satellite-dishes; and exteriors will exhibit *TV walls* similar to the interior ones mentioned earlier.

Will the psychological factor of *knowing and feeling* that the sky is full of satellites, space shuttles and space stations have an affect on the way we design our terrestrial buildings? Will our earth buildings become more closed-in, defensive and hermetic as a guard against the threatening new power of flying objects in outer space; or will our buildings become more transparent, looking optimistically outward and upward? As one NASA scientist suggested after having some doubts about the sterile *interior design* of the first Skylab project, maybe architects should have a direct role in designing the interior of the labs in order to make them (ironically) 'more like home.'

If, on the one hand, we are confronting the inhabitation and use of the territories of outer space, how do we, on the other hand, mesh that with the mindscapes of inner space?

... the direct consequences of the new media occur in the realm of the mind. The steam engine, like the printing press, replaced physical effort; the industrial age was built largely on substitutes for muscle. Today's computer-telecommunications media are, or can be the servants of analysis and thought — highly trained professional servants, if you will, rather than the domestic ones of the industrial age.[15]

The philosopher-futurologist Arthur Clarke says we don't need to worry about where this third wave is taking us, saying it's enough to ride the wave. But Martin Pawley, in his 1974 book, *The Private Future* suggested that we are trapped in an unreconcilable state between primary reality and the techno-construct of secondary reality; he set out a pessimistic scenario, predicting that internalization and the self-ness of inner space would lead to the radical erosion of the public realm.

It is difficult to determine whether or not this is, in fact, happening. Some cities in North America have actually had a revived interest in intensive rebuilding of their public realms since the 1960s. But most average and small-size cities and towns have retreated from support of their traditional public realm. Downtown — the shops, the streets, the institutions — are sadly de-energized, while suburban shopping malls and the highway strip continue to be reasonably healthy. Even more revealing of the retreat to the private realm and inner space is the proliferation of electronified, block-out-the world, individual-focused systems such as the Sony Walkman, telephone Dial-a-Fantasy and video games. (Is a video game *parlour* a public, collective place? Or, because of its dominating, otherworld screen orientation, is it the beginning of the Japanese experience of the Pachinko Parlour where row after row of people play with and relate to their *borrowed* machine, totally ignoring the people and the environment around them? *"One scientist working on what is often called the machine-human interface believes — these are his words — that 'interacting with a computer can be a far richer experience than interacting with another human being'."*[16]

Meshing "the Everyday" With Outer and Inner Space

The exploration and use of outer space is no longer part of science fiction; it is scientific *fact*. And through such fields as medicine, psychology and psychiatry, we know a great deal about a human's inner spaces. However, two recent newspaper clippings — one about a Russian cosmonaut and inner space, the other about American astronauts and outer space — reveal something very surprising. Within the context of highly scientific, highly technological space activities, some very ordinary, very human factors arise.

In the Russian case, cosmonaut Valery Lebedev reported that he cultivated radishes, cucumbers and salad greens in a kitchen garden during his 211 days living in space. He says *"I never before wanted to grow any plants..."* and he went on to say that it was a psychological boost watching his space crops respond to *"a drop of water, which I had dropped."* Humans still need to experience real growth and greenery and water — the primary forces of Earth's *nature*.

In the American case, the astronauts *"soared twice around the globe... enjoying two sunsets and sunrises"* during their three hour and forty-seven minute space walk in early April, 1983. They had *"a breathtaking vista of sky, sun, stars and the Earth."* Astronaut Musgrave said *"They were too busy to sightsee..."* But this little reference to sightseeing brings us back to a sense of desire for the commonplace — to Hawaii, the sun and sparkling water.

We can expect that the new architecture(s) will continue to address the ordinary, the everyday, the common place. What will be different will be the overlays and sense of collage brought about through meshing the everyday with the new extremes of outer and inner space. An architecture of simultaneity will emerge which, being built on and reflective of electronic systems themselves, will promote the merging and exchanging of radically varied images, places and times in an exciting new spatial order. 'The everyday' (including traditionally understood and modern space) will be used to mesh the new extremes of outer and inner space.

Conclusions (as Predictions)

The conflicting energies and spatial sensibilities discussed here as ingredients of a new Electronic Mannerism suggest several things, generally, about architecture in the latter part of the twentieth century:

1. *THE HISTORY OF ARCHITECTURE WILL BE RADICALLY REWRITTEN.* As an indicator, look at what is happening in the area of film. An 'electronic painting' process is now being used to transform old black and white films into full colour productions; ie. an intentional falsification is being performed. New generations will not know or remember that "The Fixer Uppers", a 1935 film, was a world of black and white. The new colour will not necessarily have anything to do with the colours of the real scene when the film was originally produced. It is easy to imagine that black and white photographs, drawings and films of buildings will be electronically re-painted to either accurately represent the real, original colour of the building or to intentionally distort the palette. What colour was *or will be* Gropius' 1914 Werkbund buildings in Cologne? It will become increasingly difficult to distinguish what is/was real — facts — from what might have been/could be.

2. *THE DEFINITION OF ARCHITECTURE WILL BE RADICALLY EXPANDED.* Architecture will become, more and more, a part of other disciplines and fields. The lines between architecture and telecommunications will blur; the lines between architecture and biomedical engineering will blur; and the lines between architecture and aerospace engineering will blur. Certain kinds of fine building activity will still be known as architecture; but the traditional focus on shelter and enclosure will diminish. The new networks of high-tech, solar powered telephone booths in desert areas are representative of a newly defined architecture — part of an electronic servicing system with associated *pieces* manifested and given material form.

3. *THE ELEMENTS OF ARCHITECTURE WILL BE RADICALLY CHANGED.* Within this new condition of networks and fragments, we will continue to find preoccupations with scale, proportion, texture and light necessary and useful. But the elements — the ingredients we use to make architecture — will change radically. We will be able to design with ingredients like regional electronic beams, as well as classical and modern fragments from history. (The recent Richards/Santon/Urban competition entry for a seriesof *"Ceramic Communication Towers"* in Faenza, Italy attempts to overlay new electronic networks and fragments on the place, while simultaneously reinforcing the existing spatial system, material vocabulary and primary reality of Faenza.)

I imagine the nature of much architectural work ahead to be predominantly technical and intellectual. Like the vestibule of Michelangelo's Laurentian Library, it will be rich with ambiguous, conflicting energies; it will be extremely restless and might well be labelled Electronic Mannerism.

1. Rudolf Wittkower, "Michelangelo's Biblioteca Laurenzian", **Idea and Image: Studies in the Italian Renaissance**, pp. 58-67.
2. Wittkower, p. 59.
3. **Planning Now for an Information Society: Tomorrow is Too Late**, Science Council of Canada Report 3 (March, 1982), p. 10
4. J. Richard Munro, "Up With the New — And the Old", **Communications in the Twenty-First Century**, p. 41.
5. Science Council of Canada, pp. 58-59.
6. Munro, p. 41
7. "Introduction to the Integraph System", Integraph Corporation (March, 1981), p. 16.
8. Superstudio, "Description of the Microevent/Microenvironment", **Italy: The New Domestic Landscape: Achievements and Problems of Italian Design**, p. 247.
9. Hirashi Sasaki, "The Best of the Constructivists — Tchernykhov and His Designs", **Process: Architecture (No. 26): Jacob Tchernykhov and His Architectural Fantasies**, p. 19.
10. Alvin Toffler, **The Third Wave**.
11. Elie Abel, "Looking Ahead From the Twentieth Century", **Comunications in the Twenty-First Century**, pp. 7-8.
12. Toffler, p. 157.
13. Munro, p. 41
14. Toffler, p. 158.
15. Munro, p. 41.
16. Munro, p. 39