

U. / 100 / 07

“Manner of operation: nature vs architecture”:

An examination of the principles of
In innovative architectural applications

LIBRARY
UNIVERSITY OF MORATUWA, SRI LANKA
MORATUWA

A dissertation submitted to the

Faculty of Architecture, University of Moratuwa.

For the final Examination in the

Degree of Master of Science in (Architecture) 2007



University of Moratuwa, Sri Lanka.
Electronic Theses & Dissertations
www.lib.mru.lk

72 07
72(043)

University of Moratuwa



89468

89468

D.A.Withana.

Department of architecture

University of Moratuwa

Sri Lanka

January 2007

Declaration

I declare that this dissertation represent my own work. Except every where due acknowledgement is made and that it has not been previously included in a thesis dissertation report submitted to this university or any other institution for degree diploma or other qualification.

UOM Verified Signature

D.A. Withana.



University of Moratuwa, Sri Lanka.
Electronic Theses & Dissertations
www.lib.mrt.ac.lk

UOM Verified Signature

Archt. Arosh Gamage,
Dissertation Supervisor,
Department of Architecture,
Department of Architecture,
University of Moratuwa,
Sri Lanka.

| | |
|------------------------|-----|
| Preface; | iii |
| Acknowledgement; | iv |
| List of illustrations; | v |
| Introduction: | vii |

Chapter one

THE WAY OF NATURE OPERATIONS.

| | |
|---|----|
| 1.1 Identifying nature as a creative manner | 01 |
| □ Character | 01 |
| □ Quality | 02 |
| □ Multiplicity | 03 |
| □ Measurable facts | 04 |
| □ Nature and creations | 06 |
| 1.2 Expression of Nature in operation | 07 |
| 1.3 Transformation of nature in to creative forms | 08 |
| 1.3.1 language of nature | 10 |
| □ Pure forms | 10 |
| □ Geometry of nature | 11 |
| 1.3.2 grammer in nature | 13 |
| 1.4 Expression and innovative forms of nature | 14 |



University of Moratuwa, Sri Lanka.
Electronic Theses & Dissertations
www.lib.lg.ac.lk

Chapter two

USE OF OPERATION FOR ARCHITECTURAL COMPOSITIONS

| | |
|---|----|
| 2.1 Introduction | 19 |
| 2.2 Architectural expression | 23 |
| 2.2.1. Transformation of forms | 24 |
| 2.2.2. Elements of form | 25 |
| 2.2.3 Signs and symbols | 26 |
| □ Inventional representation | 27 |
| □ Conventional representation | 28 |
| □ Imitative representation | 28 |
| 2.2.4 Meaning and symbolism | 29 |
| 2.2.5 Expressions and symbolism | 29 |
| 2.3 Innovative forms and nature inspiration | 31 |

Chapter three

APPLICATIONS OF THE NATURE EXPRESSION IN INNOVATIVE ARCHITECTURE

University of Moratuwa, Sri Lanka
Electronic Theses & Dissertations
www.lib.mrt.ac.lk

| | |
|---|----|
| 3.1 Introduction | 33 |
| 3.2 The concepts of innovative architecture | 35 |
| 3.3 Expressions of natural organization | 36 |
| □ Inventional representation in architecture | 37 |
| □ Conventional representation in architecture | 40 |
| □ Imitative representation in architecture | 42 |
| 3.4 Expressions of natural operation | 47 |
| 3.4.1 Cosmogenic architecture | 48 |
| 3.4.2 Geometry in architecture | 51 |
| 3.4.3 Ephemeral architecture | 54 |
| □ Tracing architecture | 55 |
| □ Hypersurface architecture | 57 |
| □ Architecture in cyberspace | 58 |
| Concluding remarks | 60 |
| Bibliography | 64 |



Preface;

Architecture is also a complex form of art. It is also an effective medium of expression. It also communicates symbolically rather than directly. This symbolic communication should address to the reality from the pleasure gained from beauty or far more than joy to wisdom.

We are the first generation in the world to know the approximate age of the universe. The main line of its history and its fundamental principle of emergence by the modern science appeared. We are the first to unravel the major laws of its development and the creativity. Beauty and hard ship they must being. We are the first to understand our significant place in a single. Unfolding process that has lasted some fifteen billion years, and we are the first to be amazed by celebrate, and question these discoveries.

We now know, how ever the counter lesson of the butterfly: mechanistic behavior is only one mode; the most reduced and least characteristic one. As the new science of complexity are, revealing, most of the universe is self organizing .unpredictable creative and self transforming like a butterfly.

Can a machine repair it self? Every living has the property of self repair, a small version of its great power of self organization .but no machine does .the butterfly is an example for self transformation. it jumps from stage to stage in growth, Changing identity from a vertically articulated egg to a horizontally segmented caterpillar. Then it miraculously metamorphoses in to a slug like chrysalis. It emergence finally from its heavy, blob like form to become a light weight flying instrument, something surprisingly unexpected and as beautifully different from the egg.

Its unexpected transformations are a perfect symbol of thought jumping from idea to idea, and the universe as it leaps from stage to stage towards higher organization. Hence, can believe that the universe is much more like a butterfly than a Newtonian machine.

This hypothesis, amounting to a new paradigm or world view, has only recently been formulated. It is no doubt that it will within a few years, because it is becoming standard science and is being incorporated into competing ideologies. As building reveal a way of life. This new world view will be most visibly expressed in architecture. Our world view and way of life are represented in architecture, and today both are becoming more attuned to what contemporary science is revealing about nature.

Acknowledgement;

- This study, with many complexities, and difficulties was completed due to the assistance, guidance and encouragement given by all of the following persons, to whom I wish to extend my heartfelt gratitude.
- My dissertation coordinator Dr.Harsha Munasinghe, year master for guidance valuable comments and criticism, which encouraged me to do this study
- Archt. Arosh Gamage for giving me preliminary instruction and guiding me to have a glimpse into the subject, discussing in this dissertation by understanding my intentions to do such a study.
- I offer my heart felt thanks to Eng: Susira Udalamaththa for his valuable comments and unreserved help given to me for the completion of this task....without whose help this could never be a reality.
- I offer my heart felt thank for Archt. Sithumina Rathnamalala his valuable advise given me in this study.
- All external and internal tutors, who tutored me in design progress from first year, for their valuable criticisms made on my designs, which pushed me to a different field of study.
- More ever, Pubuduni Meegahapola (sister of my boarding) for allowing me to use her computer without any hesitation.
- To my batch mate friends Sampath, Ranga and Sajani encouraged me and their valuable support to render in completing this task.
- I expressed my deepest gratitude to my father, mother, only sister and Nirusha their unlimited love, affection and encouragement to make this a reality.
- Finally, I thanks who helped me encouraging words.



University of Moratuwa, Sri Lanka.
Electronic Theses & Dissertations
www.lib.mrt.ac.lk

| | | | |
|-----------|----|---|----|
| 1) Plate | 01 | visual nature | 01 |
| 2) Plate | 02 | character of nature | 02 |
| 3) Plate | 03 | quality of nature | 02 |
| 4) Plate | 04 | multiplicity of nature | 03 |
| 5) Plate | 05 | natural creations | 06 |
| 6) Plate | 06 | nature inspired mans creations | 06 |
| 7) Plate | 07 | dry leaves | 09 |
| 8) Plate | 08 | rainbows | 09 |
| 9) Plate | 09 | butterflies on the stone (natural form) | 10 |
| 10) Plate | 10 | leaves on the stone | 11 |
| 11) Plate | 11 | contrast leaves | 12 |
| 12) Plate | 12 | rhythm of leaves | 13 |
| 13) Plate | 13 | thumbasa | 15 |
| 14) Plate | 14 | bird viewing nest | 15 |
| 15) Plate | 15 | beaver's home | 16 |
| 16) Plate | 16 | spider on his home | 16 |
| 17) Plate | 17 | rankumbala's home | 17 |
| 18) Plate | 18 | architect of nature | 17 |
| 19) Plate | 19 | vehilihini nest | 18 |
| 20) Plate | 20 | from inside to outside | 21 |
| 21) Plate | 21 | colourfull roofs | 21 |
| 22) Plate | 22 | think about our nature | 22 |
| 23) Plate | 23 | handrail with nature | 24 |
| 24) Plate | 24 | combinations of forms (grill) | 25 |
| 25) Plate | 25 | repetition of arches | 26 |
| 26) Plate | 26 | Pompidou center | 37 |
| 27) Plate | 27 | Pompidou center | 37 |
| 28) Plate | 28 | Expressive architecture by Gilado Gaudi. | 37 |
| 29) Plate | 29 | Lloyd's building. natural metaphoric In its expression. | 38 |
| 30) Plate | 30 | Skeletons of pompidou | 38 |
| 31) Plate | 31 | Inmost microprocessor factory | 39 |

| | | | |
|-----------|----|---|----|
| 32) Plate | 32 | Medical faculty. technical university | 39 |
| 33) Plate | 33 | Communication tower by Norman foster. | 39 |
| 34) Plate | 34 | John utzon's Sydney opera house. | 40 |
| 35) Plate | 35 | Shonadai cultural center. Japan. | 41 |
| 36) Plate | 36 | Shonadai cultural center. Japan. | 41 |
| 37) Plate | 37 | Fish diono at Brawuschweiger platz a bus halt | 41 |
| 38) Plate | 38 | Milan Triennale Pavilion | 42 |
| 39) Plate | 39 | Kansai international Airport.Japan. | 42 |
| 40) Plate | 40 | IBM traveling pavilion | 43 |
| 41) Plate | 41 | IBM traveling pavilion | 43 |
| 42) Plate | 42 | Development of joinery | 43 |
| 43) Plate | 43 | Crown princess cruise ship | 44 |
| 44) Plate | 44 | Santiago Culatrava. bridge | 45 |
| 45) Plate | 45 | Santiago Culatrava. bridge | 45 |
| 46) Plate | 46 | The leaf of the menil collection | 46 |
| 47) Plate | 47 | The leaf of the menil collection | 46 |
| 48) Plate | 48 | Santiago Calatrava.TGV station | 46 |
| 49) Plate | 49 | Eric Mendelsohn.Einstein tower | 48 |
| 50) Plate | 50 | Arata isozaki –disny head quarters | 49 |
| 51) Plate | 51 | Arata isozaki –disny head quarters | 50 |
| 52) Plate | 52 | Itsuko Hasegawa.Nagoya expo pavilion | 50 |
| 53) Plate | 53 | Itsuko Hasegawa.Nagoya expo pavilion | 50 |
| 54) Plate | 54 | PlateHouse at Kuwahara | 50 |
| 55) Plate | 55 | PlateHouse at Kuwahara | 50 |
| 56) Plate | 56 | Peter Eiseman-house three | 51 |
| 57) Plate | 57 | Vitra Museum | 52 |
| 58) Plate | 58 | Guggenheim Museum | 53 |
| 59) Plate | 59 | Zaha Hadid.fire station | 53 |
| 60) Plate | 60 | A hotel project by Henrietta palmer | 54 |
| 61) Plate | 61 | acropolis museum | 55 |
| 62) Plate | 62 | Villa malrax.Artist residence and studio | 56 |
| 63) Plate | 63 | Unsculpting architecture | 56 |
| 64) Plate | 64 | Cultural information exchange | 57 |
| 65) Plate | 65 | Beach ness-hotel sequence | 58 |

| | | | |
|-----------|----|---------------------------|----|
| 66) Plate | 66 | Beach ness-hotel sequence | 58 |
| 67) Plate | 67 | city Tokyo bay. | 59 |



University of Moratuwa, Sri Lanka.
Electronic Theses & Dissertations
www.lib.mrt.ac.lk