

UNLOCK THE BOX: ARCHITECTURAL SLUGGISHNESS IN THE DIGITAL ERA OF NEO-MODERNISM

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ABSTRACT

"The inertia of a building industry that for the most part employs century old technologies, which avoids risk & innovation, weight of historic & semantic considerations in the evolution of the discipline have been determining factors in architecture's sluggishness when compared to the progress made by other design-related practices, such as the automobile & aeronautical industries" – Tomoko Sakamoto

This paper aims to address the resisting factors of global architectural design in today's Neo-Modernism era that is still locked within the boundary of a box despite the presence of advanced digital tools that enable designers to execute generative indeterminate forms, especially through Generation Y architects who were trained under the computer aided technology.

The quadrilaterals; mainly squares and rectangles have been the popular projection by architects. Though the Modernist-Simplism movement resulted by the birth of industrial manufacturing back in mid-20th century has long ended, architectural production today has rather been unsuccessful at keeping up with technological advances, or at least pushing the demand to optimise digital tooling towards erecting algorithmic structures.

Crossing between Alfred Yarnbus' unconscious thought tracking and Anthony Greenwald's method of subliminal semantic activation, the research takes place in an experiment made on a sample group of Generation Y architects from around the globe between the age of 24 - 32 with good capability of handling BIM and digital tools into mapping the trajectory of their initial design footprint.

This paper concludes the sample group members are accustomed yet indoctrinated to see 'box' as the definite form of architecture, abandoning their digital skills. Hence it indicates the urge for this field to cross the square territory to release itself from the continuing sluggishness in the next few decades. It is time to unlock the box.

1.0 THE BOX SYNDROME

Stand in the middle of any modern city– tilt our head up, make a 360 degree panoramic turn to realise we are surrounded by giant boxes, one next to another scraping the sky. Capture the image with our eyes and zoom in the detailings; doors, windows, columns, roof, stairs, furnitures – they are all mostly boxes. In contrasts, these giant boxes are surrounded in the foreground with aerodynamic cars, fluid sculptures, and human parading in the latest gadgets and the season's fashion. In the picture, everything is evolving except one that has been remaining in the same form for decades; the buildings [1]. Architecture has gone through Post-Modernism to the recent Neo-Modernism, changes in culture, social systems, trends, yet architects up to the current Generation Y are still suffering from the box syndrome. Why?

The rise of industrial manufacturing in the 1950s was the turning point of global production sectors, where machines were producing mass. In the parallel world of the building industry, it marked the end of the 'hand-made' artistic design era in architecture and lead to the beginning of the 'Less-Is-More' simplistic Modernist style, or the 'box' era.

The phenomena is in fact noticeable by non-architectural observers, as an article published by the Engineering and Physical Science Research Council (EPSRC), University of Oxford, indicates "From children's pictures to architect's drawings, most of us imagine houses and buildings as being made up of squares and rectangles; not surprising given the majority of the buildings we see in the city around us are based on right angles" [2].

It is unfortunate for this industry to still be reproducing solid boxes until present, when other design-related disciplines such as the industrial and automotive design have evolved rapidly taking the advantage of digital tools to generate infinite forms through quantitative modelling.



Figure 1.1: A satire artwork derogating the production of Lada's repetitive design for 30 years compared to the evolution of BMW 5 Series, turning out to put a shame on architecture for making humankind living in a box for thousands of years (Source: archdailypost).

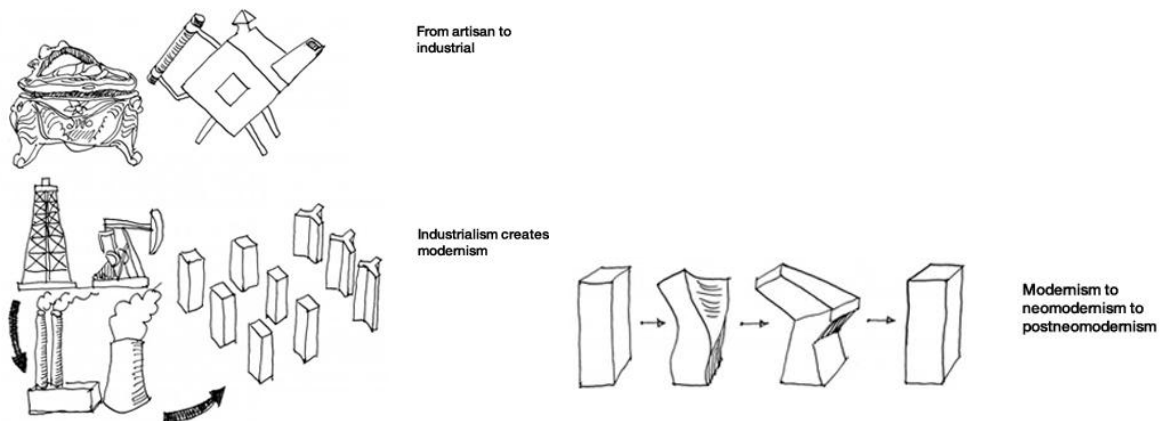


Figure 1.2: A diagram by Nikos Salingaros showing the development of architectural trend depends on the technology available at the time, and under-utilisation of technology will pull it back to square one (Source: Archdaily).

1.1 The Layer Cake Trend



Figure 1.3: Layer cake (left) compared to typical box buildings as seen in Komplex Leipziger Straße, Berlin (Source: Nyonyafood and Wikipedia).

A layer cake is a cake consisting of multiple stacked sheets of cake [3]. It has a physical characteristic of a repetitive layer being laid on top of another and it continues as high as the baker makes it. The same analogy applied to architecture referring to boxy buildings with repetitive homogenous shape of plan arranged on top of another, continues as high as the architect makes it. The 'layer-cake' architecture trend has been colouring the scene in this field since the rise of modernism prior to the invention of digital tools, and strangely, still being practiced today. This trend is the result of conforming to the cult of industrial images [4].

The production of architectural drawings in the older years were limited to the use by architects of instruments – specifically drawing boards with T-squares and set-squares – that made it easier to draw rectangles than other shapes. Therefore it is understandable that architects had the restriction to produce out-of-the-box design [5]. The drawing apparatus of this general kind is very ancient and nevertheless rectangular. General quadrilaterality in buildings could be caused by a mental and bodily disposition to see and move in the world relative to an orthogonal system of 'body coordinates'.

The form of building erected in real life is mainly depending on the architect's skills and ability of what he or she is able to produce on paper through the availability of technology. The higher capability an architect has in mastering the tools, the higher variety the product can be shaped up. For present cases, without the designing architect to master the digital tools and technology, the only option that one has is to play safe, ie, producing more and more of this 'layer cake' product increasing the chances for a building to be a box . It is a loss of opportunity for architects to express their artistic skills and chance of building a masterpiece through this limitation [6].

2.0 TO WHOM ARE THE BUILDINGS MADE FOR?

2.1 Living Occupant Vs. The Non-Livings

As a building's ultimate purpose was meant for human to live, the industrial manufacturing has created a disorder into redefining buildings to fit in for its inhabiting furnitures and objects instead in the name of spatial efficiency. Buildings are all built with right angled walls to doors, windows and even hand railings to cater for the right angled furniture surfaces, dissolving the fact that the main occupant – the living human – was created with non-linear anthropometry. A space with angled surface definitely creates

'comfort' to the non-living industrial products as tables and chairs, however a discomfort to the nature of human figure. It seems to be a norm for architects nowadays to give the priority to furniture fittings onto the layout. Where is the consideration towards the human organics, who supposed to be the main occupant?



Figure 2.1: Comparison of Casa Batllo's curving ergonomic handrail designed to fit the human palm by Antoni Gaudi (left) in comparison to industrial manufactured handrail with 90 degree angles that violates the nature of human figure (Source: Flickr).

2.2 Negative Psychological Response To Boxes, Positive To Curves

Eric Jaffe wrote in 'Why Our Brain Loves Curvy Architecture' on architect Philip Johnson's reaction of his first visit to the Guggenheim Museum in Bilbao, designed by Frank Gehry, when he started to cry. "Architecture is not about words. It's about tears," Johnson reportedly said. Jaffe suggests that there is something about the museum's majestic curves moved Mr. Johnson at an emotional level. The Bilbao-sized question is why exactly curves give us a visceral pleasure. Some neuroscientists believe the answer may have adaptive roots. Whether or not Johnson and Gehry realised it, the Bilbao and its swirling façade tapped into a primal human emotional network [7].

A study by The Cognitive Neuroscience Laboratory of Harvard School of Medicine (HSM) has shown that human affection for curves is not just a matter of personal taste; it's hard-wired into the brain. When people are asked to choose between an object that's boxy and one that's curved, they prefer the latter. That goes for watches with circular faces, letters rendered in a curly font, couches with smooth cushions--even dental floss with round packaging. Viewing objects with sharp elements- square watches, pointy couches, and the like -activated the amygdala, the part of the brain that processes fear.

Oshin Vartanian, human psychology researcher of the University of Toronto at Scarborough concluded that roundness seems to be a universal human pleasure. In his tandem research with designers in Europe, 200 images of building spaces were compiled to see the impact of building forms to human. The research slid people into a brain imaging machine showing pictures, and asked them to label each room as 'beautiful' or 'not beautiful.' The result shows the participants were far more likely to consider a room beautiful when it was flush with curves that keeps the aesthetic engines going, rather than full of straight lines. Curved design creates more activity in anterior cingulate cortex (ACC) of the brain, compared to linear ones [8].



Figure 2.2: Two dental flosses of curve and box forms being experimented on human in the study by HSM shows that human would buy the one with curved packaging (Source: CNL, Harvard).



Figure 2.3: Image of two rooms with one being curvy (left) and the other is rectilinear (right) being tested in Vartanian's study. Participants were far more likely to consider the free-form room as beautiful (Source: Oshin Vartanian).

3.0 EXPERIMENT ON SAMPLE GROUP

3.1 Theoretical Ideas

The basis of experiments in this research is to capture and examine the sample group's initial thought to map the trajectory of their design 'beliefs'. Author Michael Brown mentioned the first came to human mind is the universal truth [9]. In order to acquire this truth in the form of a collective data, Yarbus' philosophy on ways of seeing through unconscious thought tracking is reinterpreted in this research by crossing with Greenwalds' subliminal semantic activation.

Yarbus' theory utilises the eye movements as a tool to map the observer's attention of a particular object, frequently drawn on certain points or elements that is seem to be favourable to the observer's mind. The raw pattern produced by saccadic tracking reflects the actual human thought processes, without intervention by brain manipulation [10][11].

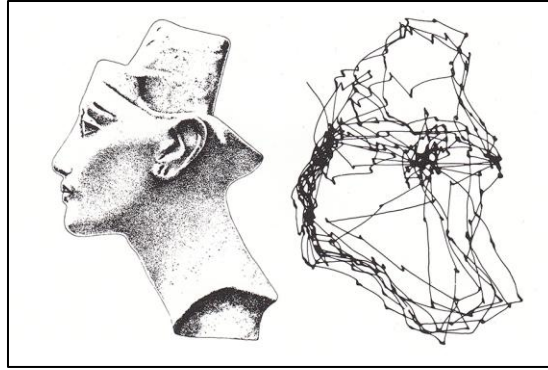


Figure 3.1: Bust of Nefertiti, Yarbus' signature experimental eye cognition tracking (Source: A.L. Yarbus)

3.2 Methodology

As how the observer's eyes become the tool in Yarbus' method of mapping, this research proposes the drawing pen to architects, which is their familiar tool. The experiments in this research were being carried out individually in a white room under a quiet and relaxed environment with no distraction, considering Greenwalds' theory on the social psychology and the unconscious mind.

The sample group was ensured to be fit in condition- physically, mentally and emotionally – in order to achieve precision in result. Simplified sketching tasks divided into Experiment 1 and Experiment 2 which are related to daily architectural practice. The sample group were given verbal instructions once and a limited time to complete the task with their first-come-to-mind thought to avoid reinterpretation and biasness.

At the end of experiments, they were given a minute to reflect on what they have produced with their pens, and being surveyed on the possible factors of consideration that determined the shape of their initial design footprint. Adapting Sir Francis Dalton's *Composite Portraiture* method of developing a single blended image through different subjects combined [12], mapping by each architect was re-scaled and laid over on top of another on computer to create a pattern of architectural language representing the group's collective thoughts, or architectural belief.

3.3 Construction of Experiments

The construction of experiments in this research was made basic architectural drawings of plan and elevation, named Experiment 1 and Experiment 2 respectively. Architecture's purpose is to provide living diversity for human [13], therefore the instruction of experiments is being designed basic for the convenience of the sample group to generate their initial thought involving the simplest form of human living unit: a single occupant living space.

The instructions for both experiments were arranged in the idea of no restriction in design is imposed on sample group and assumed imaginary; which means no specific cost, site, client or regulation is mentioned. This is to allow the sample group to have the ultimate freedom to express their initial thought. The experiments have been pre-tested by a set of participant in the industry to find the optimum time needed by an architect to fully complete an instant sketch on the paper provided with minimal manipulation by the right brain to affect the initial thought [14]. The average time recorded in the pre-test is 15 seconds.

3.3.1 Experiment 1: Planning Layout

Experiment 1 is a free-scale planning layout experiment, conducted by a verbal instruction to sketch on a 15cm x 15cm paper. This experiment is designed to analyse the probability of quadrilateral arrangement on the plan mapped leading to the extrusion of a box. The instruction is designed as the following: *“Given 15 seconds: sketch a plan of a single occupant space (not to scale) consisting of one bedroom and one bathroom”*.

3.3.2 Experiment 2: Projection of the Elevation

Experiment 2 is a free-scale building extrusion experiment in response to Experiment 1. It is designed to analyse the probability of a box form to arise from a 2-D plan of Experiment 1. It was conducted under the given verbal instruction to the sample group in response to Experiment 1 on a 15cm x 7.5cm paper and carried out under similar circumstances. The instruction is as the following: *“Given another 15 seconds: from the layout mapped in Experiment 1, sketch the elevation up to 5-storeys (not to scale)”*.

3.4 Selection of Data Sampling

A group of Generation Y architects randomly selected from 40 different countries of 5 continents, sharing similar characteristics; aged between 24-32 with the background of being trained with digital tools through their architectural studies and having the experience of 2-10 years in practice. As this research is universal, the sample group gender is neglected. The sample group detail tabulation is as below:

SAMPLE NO	COUNTRY OF ORIGIN	AGE	SAMPLE NO	COUNTRY OF ORIGIN	AGE	SAMPLE NO	COUNTRY OF ORIGIN	AGE
1	Algeria	31	17	Italy	27	33	South Korea	28
2	Australia	27	18	Japan	25	34	Spain	32
3	Bangladesh	29	19	Malaysia	27	35	Sudan	27
4	Brazil	28	20	Mauritius	28	36	Sri Lanka	27
5	Canada	30	21	Nepal	25	37	Taiwan	24
6	China	31	22	Netherlands	29	38	U.K	28
7	Colombia	30	23	New Zealand	31	39	U.S.A	29
8	Cyprus	26	24	Nigeria	32	40	Vietnam	28
9	Denmark	31	25	Pakistan	28			
10	Egypt	30	26	Turkey	24			
11	France	28	27	Philippines	27			
12	Germany	30	28	Portugal	25			
13	Greece	31	29	Poland	29			
14	Indonesia	26	30	Russia	30			
15	India	27	31	Senegal	32			
16	Iraq	31	32	Singapura	29			

CONTINENT	NO
Asia	16
Europe	11
Africa	6
America	4
Australasia	2
TOTAL	40

Table 3.1: Statistic shows the selected sample group of Generation Y architects by the country of origin and age, and breakage by continent.

4.0 RESULT ANALYSIS

4.1 Experiment 1 Review

Data collected from Experiment 1 has been standardised in the same scale, while other items sketched on the paper other than the outline of the layout, such as doors and furnitures were erased for image noise reduction during analysis. Image editing is required to retrieve precise data. A superimposed image

using Composite Portraiture technique was created through overlapping all 40 samples to produce a collective initial thought. The result is as follows:

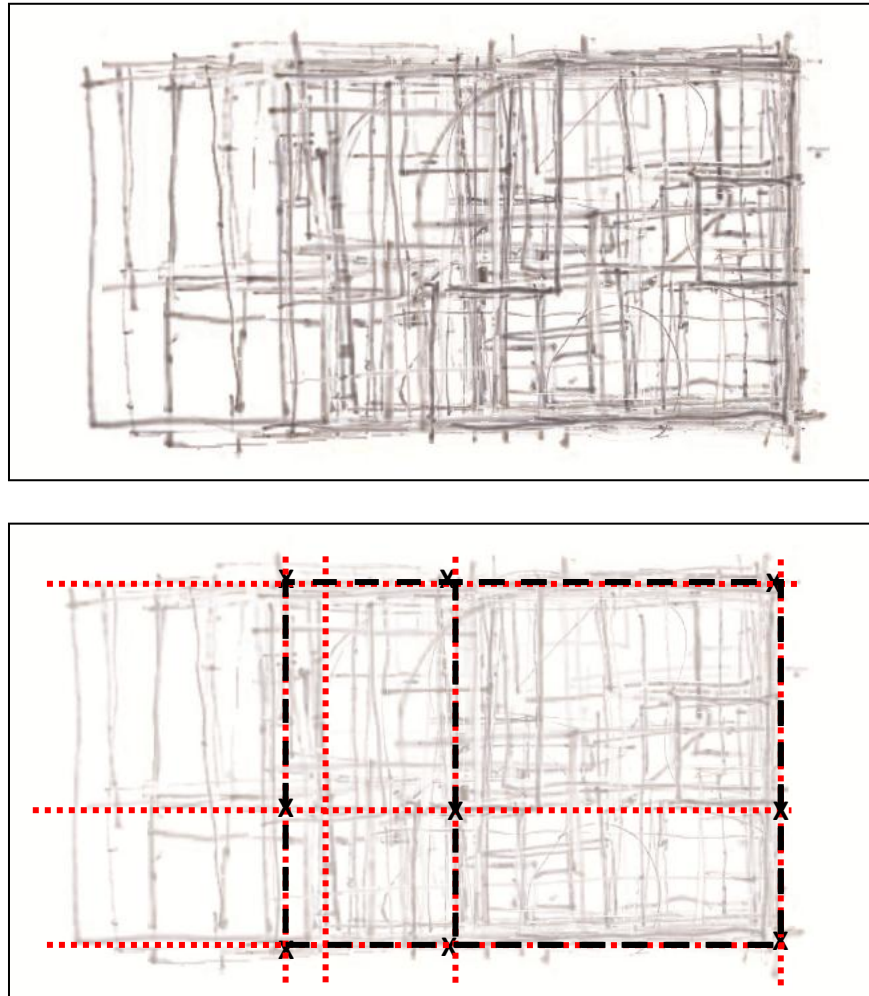


Figure 4.1: The pattern produced from overlapping all 40 sample layout mapping shows a clear domination of quadrilateral arrangements (top); the analysis shows major line intersections (marked X) being linked forming a square and a rectangle in black line, the most common shapes shared by all projections by the sample group (below).

4.2 Experiment 2 Review

Data collected from Experiment 2 has been standardised in the same scale, while other items sketched on the paper other than the outline of the elevation, such as doors, windows, balconies, louvers and railings were erased for image noise reduction during analysis to capture the absolute shape line. Image editing is required to retrieve precise data. A superimposed image using was created through overlapping all 40 samples to produce a collective initial thought. The result is as follows:

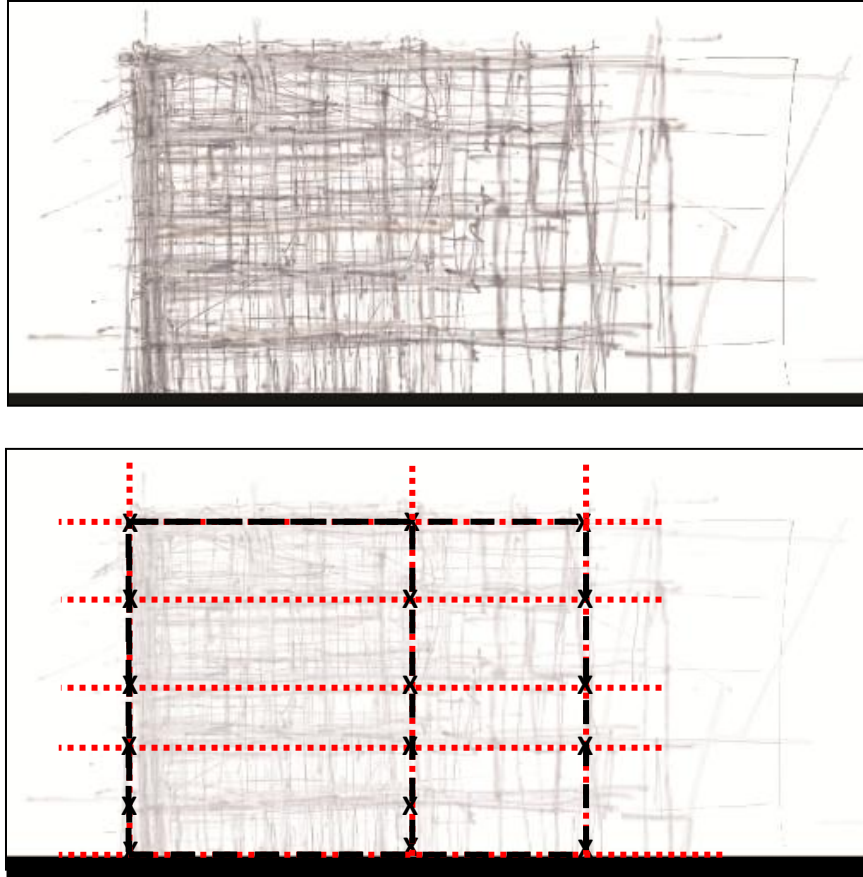


Figure 4.2: The pattern produced from overlapping all 40 sample elevation mapping forming a clear domination of quadrilateral arrangements, engaged to Experiment 1 (top) the analysis shows major lines forming rectangles on elevation, the common identity shared by the projections by the sample group.

4.3 Denomination Factors

Below is the recorded possible consideration factors by each of the architects in the sample group of why their sketch was executed the way it was. The reasoning given by each sample is as below:

SAMPLE NO	CONSIDERATIONS	SAMPLE NO	CONSIDERATIONS	SAMPLE NO	CONSIDERATIONS
1	Easy for architects	15	Easy for architects	29	Common shape
2	Furnitures	16	Furnitures	30	Furnitures
3	Cost	17	Preference	31	Furnitures
4	Time	18	Norm	32	Norm
5	Cost	19	Common shape	33	Easy for architects
6	Flexibility	20	Norm	34	Norm
7	Self-preference	21	Easy for architects	35	Fear
8	Cost	22	Norm	36	Norm
9	Easy for architects	23	Fear	37	Furnitures
10	Norm	24	Quick money	38	Space efficiency
11	Space efficiency	25	Cost	39	Stability
12	Furnitures	26	Norm	40	Cost
13	Cost	27	Unknown		
14	Furnitures	28	Norm		

Table 4.1: Table shows the possible factor of consideration by the sample group towards determining their sketch.

DENOMINATIONS	CONSIDERATION VARIABLES	NO OF SAMPLE	PERCENTAGE
Rejection	Easy for architects, Quick money, Time, Preference	9	22.5
Indoctrination	Furnitures, Cost, Space efficiency, Stability, Fear	18	45
Customary	Norm, Common shape, Unknown	12	30
Others	Flexibility	1	2.5
TOTAL		40	100

Table 4.2: Table shows the grouping of the 3 factors determining the experiments result and breakage of contributing numbers and its percentage.

5.0 THE SLUGGISHNESS HYPOTHESIS

5.1 Rejection



Figure 5.1: Hadid's new 'Parametric' 2020 national stadium in Tokyo protested by Maki for disrupting the visual harmony of Tokyo (left); while Maki's own 'Metabolist' Metropolitan Gymnasium in Tokyo was also an alien in the 1950s (right) (Source: Architectural Moleskin).

The sense of rejection by fellow architects in the industry who were from different school of thoughts and holding on a fixed philosophy is resisting the pace of architectural design to evolve outside the box, as proven by the result. From the consideration variables by the sample group in Table 4.2, 22.5% of the architects 'rejected' to produce a non-box design by the reasons of easiness, quick money in practice as well as time and personal preference.

On reflection of their answers, the architects claimed their selfishness of preferring to choose the convenience of completing the job quick and easy, instead of spending a longer time onto producing a thoughtful design. This is unlikely to be helpful for architectural design to grow and evolve at a supposed rate when laziness is placed above passion.

Some refused to catch up with the current technology and softwares other than the older softwares they had in studies. This has happened on the previous the generation of architects, where the technology in design moves rapidly after the post-1980s computer era, making those who were not trained under the softwares to face difficulties into keeping up with the speed of technology at the time. When new digital tools are alien to their architectural territory, the breaking of a rectangular arrangement is being seen as an abnormality rather than innovation.

Personal preference comes when architects reject new ideas and movements by sticking to their older philosophical beliefs. For instance one sample holds to Mies Van der Rohe's philosophy of 'Less Is More' is reluctant to divert from the favourite belief, has been producing boxes through her studies and practice. Such ego would limit architects from expanding their ability of utilising their digital tools skills as well as making use of the merits of latest design approach for humanity.

In reality, rejection of new ideas and movements could lead to the lost of opportunities for the development of architecture itself. Architects feud with conventional fellows is very common when it comes to constructing a new 'foreign' building into the context. Zaha Hadid's design for the New National Stadium in Japan for 2020 Olympics has been protested by an elite group led by prominent architect and fellow Pritzker Prize winner Fumihiko Maki, architect Sou Fujimoto, urban historian Hidenobu Jinnai, and architecture critic Taro Igarashi. Maki criticised the design as 'too massive,' and would pose numerous problems from the perspective of cost and safety, in addition to disrupting the visual harmony of the neighbouring area. The Sankei Shimbun newspaper also criticised Hadid's design for historical and heritage reasons [15].

While Maki criticised Hadid's stadium design as alien, was not his 1960s movement of Metabolist architecture in Japan disrupted the visual harmony of the neighbouring area in Tokyo as well? Was not his architectural approach alien back then? This is where an example of egoistic rejection by seniors could be seen in this industry, while they should be supporting the new movement, like how they would like to be supported in the past.

5.2 Indoctrination

Indoctrination is largest factor contributed to the research finding with 45% of samples considered this in the experiments. The samples answered cost, arrangement of furnitures, space efficiency, building stability, and fear of idea dismissal by seniors as the factors. Young graduates who were trained with new methodologies in digital design processes are having the ability to execute unprecedented generative forms with the most recent skills. The situation in the industry is somehow reversed. Young hopefuls are being instilled with false ideologies and intimidation towards the industry.

For instance, the terminology of 'cost' is being overused by fellow architects in the industry as an excuse to avoid the risk of new design approach than finding solutions. If cost was the biggest impediment in the industry, the rest of the design-related disciplines in the world would have not been evolving rapidly leaving architecture behind as Sakamoto claimed. Say cost was the ultimate issue, there would have been no new fashion style every season, no new mobile phone released every month, or new car model design every year. The answer lies in the designer themselves. They solve, instead of avoid. They push, instead of pulling back. They unite aggressively by the rights as ethical designers and push the buyers to buy their newly designed products, instead of being 'yes sir' workers to beg clients for fees.

It is also surprising to find architects from the sample group produced rectangular plan in order to prioritise the arrangement of furnitures rather than considering the nature of inhabiting human. Describing their thoughts at the reflection session, all architects in the sample in this category did not know the fact that human has positive psychological response towards curved form and negative to sharp angles.

The popular belief of a box building has a higher stability than curved ones is easily accepted by architects without further verification. By fact, a circular (or cuved) form has a higher strength and resistance by equal distribution of force along the curve to earth [16]. It could withstand tremendous

pressure from all angles in comparison to rectangular form. The Mesopotamians and Ancient Romans had long use curved structure like arches to hold other structural members intact [17]. From tunnels, bridges, oil pipes, aeroplanes, to the nature of a soap bubble promote curves as the most stable yet strongest form.

The result also reveals a number of samples in the group are suffering from fear of idea dismissal by seniors, referring to their early experiences in both studies and practice have shaped their thought of not to take risks on an uncommon design leading them to play safe with boxes to avoid disagreements. This was confirmed by other architects in the sample group that this fear has a minor effect if not major. Intimidation by seniors from different era who are blind of digital tools, unable to operate them yet having no idea of its potential making these fresh architects having to follow the old way of doing things.

On an interesting remark, feedbacks from this category claimed they faced difficulties into proposing out-of-the-box design to their seniors when both sides are speaking of different architectural languages. A number of simple new terms in architecture such as 'algorithm', 'vector' and 'primitives' are completely unknown by their seniors and decision-makers in practice, creating a big resistance for the design process to develop. This suggests an urge for the senior group in this field to first master any latest tools and become future-proof in order to guide their apprentices.

Since Computer-Aided Design invaded all design-related practices almost three decades ago, it has radically transformed their generative foundations and productive capacities, while architecture found itself most-out-of-step and least alert, immersed in ideological and tautological debates adrift in a realm of referents [18]. Therefore architectural profession is unable to react rapidly to changing factors due to its reliance on existing outdated belief and methodologies.

5.3 Customary

Thomas Harris wrote in his psychological thriller *The Silence of the Lamb*, "We covet what we see everyday" [19]. 30% of the sample group answered customary, by taking the considerations of accustomed to the norm of designing boxes through their experience, and seeing rectangular or square as the most common. It was described at the reflection session that architects have been spoon-fed with quadrilateral arrangements as staple food, while non-quadrilateral shapes are being seen as foreign. The situation is exacerbated by the weakness of point of references where the tutors, seniors in their team, magazines, books and digital media are mainly promoting 'boxes' .

Architectural production has turned into a mass manufacturing of what is norm - in this case a box- being reused and recycle. Architects themselves are suffering from internal sluggishness by being in comfort zone of choosing the option to reproduce what they have been taught, practised, and accustomed to, instead of spending time to research, innovate and invent.

6.0 CONCLUSION

"Every generation has to re-invent its culture in new material. It is a question of transformation, not just a transfer of images from the past"- Charles Correa [20]

From the analysis of the experiment carried out in this research, it can be encapsulated that the collective data mapping of the sample group consisting of 40 Generation-Y architects from many parts of the world

via Experiment 1 and Experiment 2 has extruded a box, making it an absolute form of architecture in their collective initial thoughts.

The sluggishness hypothesises of the research – rejection, indoctrination and customary– are proven to be a global issue as 97.5% of architects from different countries in the sample group were inclined to design a box and gave such answers to their mapping reflection. The consideration variables include their custom, costing, furniture layout, and selfishness of opting for the reproduction of same technologies for convenience. Sadly none of the architects in the sample group by instance was aware that buildings were supposed to be built to cater the nature of human to inhabit, and human have a natural neural affinity for curves rather than angles.

Though in circumstances where no restriction and limitation was given to limit the design as in the experiments, it is evident from the result that Generation Y architects are suffering from the box syndrome despite being trained with digital tools, discarding their skills to execute indefinite generative forms. This also signals the future hope for architecture to end its sluggishness and engage at the same velocity to other design-related fields is hardly possible, at least for the coming decades.

The box has been overused. We have seen many boxy buildings being republished over and over again in magazines for decades, sugar-coated with nice wordings and sprinkled with fake theories to make it sound new. As the leader of the construction industry, architects should be the first to embrace new technology and invent it, not waiting for it to arrive from others. Invention requires research and innovation, which is a subject always being avoided by the architects in practice.

Aranda/Lasch suggests in *Pamphlet Architecture 27* that digital tools via algorithmic techniques such as spiraling, weaving, packing, blending, cracking, flocking and tiling could be applied to emulate infinite building forms to shape today's architecture [21]. Architects must fully utilise these tools and release themselves from the habitual disorder of designing buildings as layer cakes by solely using the technique of 'stacking' like the old days which always resulting a box in the end.

The ink strokes have produced a pattern language that has spoken by itself – architecture needs to cross the square realm it has trapped into for so long. Today is the era of Neo-Modernism, where digital tool is the weapon to project unlimited design possibilities. Architecture needs architects to shift its angle of trajectory back in order to evolve in parallel with the technology. Zaha Hadid once said, "There are 360 degrees, so why stick to one?" [22]. It is time to unlock the box.

REFERENCES

- [1] Aimi R.R, Doreen B., 2012. Evolution of Virtual Space in Advanced Digital Gaming: (Re)Defining Neo-Modern Architecture. M.Arch (Re)thinking Architecture, Plymouth University.
- [2] Thomas V., Marcus d.S., Rachel T., 2013. *The Beehive – Oxford*. Engineering and Physical Sciences Research Council, Department of Continuing Education, University of Oxford. Available: <http://www.mathsinthecity.com/examples/beehive.html> . [Accessed 28th Mar 2014].
- [3] Wikipedia, 2012. *Layer Cake*. Available: http://en.wikipedia.org/wiki/Layer_cake. [Accessed 19th Mar 2014].
- [4] Quirk V., 2013. *The Quest to “Liberate” Architecture from Modernism’s Evils: An Interview with Nikos Salingaros*. Available: <http://www.archdaily.com/397653/>. [Accessed 1st Mar 2014].
- [5] Phillips S., 2006. *Why Are Most Buildings Rectangular* . In: Theory, ARQ, Volume 10 No. 2. Available: <http://eprints.ucl.ac.uk/13217/1/13217.pdf>. [Accessed 21st Apr 2014].
- [6] Aimi R.R, Roslan Z.A., 2013. SCULPTecture 2.0: Buildings As Art Sculptures Via Development of New Digital Tools. In: Neslihan C., Efe D. *Creativity, Autonomy, Function*. Istanbul: Mimar Sinan University of Fine Arts. p146, ISBN:978-975-6264-97-3.
- [7][8] Eric J., 2013. *Why Our Brains Love Curvy Architecture*. In: Co. Design. Suzanne L., Available: <http://www.fastcodesign.com/3020075/why-our-brains-love-curved-architecture>. [Accessed 1st May 2014].
- [9] Michael B., 2010. *The First Universal Truth: You Are The Creator of Your Reality*. Available: http://findingthefield.com/?page_id=136. [Accessed 2nd May 2014].
- [10] A.L. Yarbus, 1967. *Eye Movements and Vision*. New York: Plenum. ISBN: 978-0306302985.
- [11] Mahzarin R.B, Anthony G.G, 2013. *Blindspot: Hidden Biases of Good People*. Delacorte Press. ISBN: 978-0553804645.
- [12] Francis D., 1879. *Composite Portraiture*. In: Journal of the Anthropological Institute, Volume 8, p 132-144.
- [13] Eshi International, 2011. Will Future Architecture Do More Than Just Provide Living and Working Space?. Available: <http://www.ecofriend.com/future-architecture-provide-living-working-space.html>. [Accessed 30 Apr 2014].
- [14] Arthur T., Paul T., 2003. *Mapping Brain Asymmetry*. In: Nature Reviews Neuroscience 4, p 37-48.
- [15] Darryl J.W, 2013. *Blouartinfo: Fumihiko Maki Protests Zaha Hadid's Design for Olympic Stadium*. Available: <http://enjp.blouartinfo.com/news/story/970652/fumihiko-maki-protests-zaha-hadids-design-for-olympic-stadium>. [Accessed 12th Apr 2014].
- [16] William H., 2006. *How Tunnels Work*. Available: <http://science.howstuffworks.com/engineering/structural/tunnel.htm>. [Accessed: 24 Feb 2014].
Patel M., Michael W., 2000. *How Things Work Today*. Crown Publishers, New York. ISBN: 0375410236.
- [17] The Oriental Institute of the University of Chicago, 2012. *Ancient Mesopotamia: Architecture*. Available: <http://mesopotamia.lib.uchicago.edu/teacherresources/>. [Accessed: 26 Mar 2014].
- [18] Sakamoto T., Ferre A., Kubo M., 2010. *From Control To Design - Parametric/Algorithmic Architecture*. Actar Publishers, ISBN: 8496540790.
- [19] Thomas H., 1988. *The Silence of the Lambs*. St. Martin’s Paperback, ISBN: 0312924585.
- [20] Zohvyah B., 2013. Anniversary Issue Report: *Arcasia 2013*, SPACES Magazine, Kathmandu. ISSN: 2091-2188.
- [21] Aranda, B., Lasch, C., 2006. *Pamphlet Architecture 27- Tooling*. New York: Princeton Architectural Press.
- [22] Goodread Inc, 2013. *Zaha Hadid Quotes*. Available: http://www.goodreads.com/author/quotes/167635.Zaha_Hadid. [Accessed 31st Mar 2014]