

The Impermanent House: A Psycho-analytical Approach to Improving Glasgow's Social Housing Scheme

Janice Fung, Colin D. A. Porteous and Tim Sharpe

Mackintosh School of Architecture, The Glasgow School of Art, University of Glasgow, Glasgow, United Kingdom

ABSTRACT: This paper discusses the design philosophies of Richard Neutra as a suggestive approach to improving social housing in Glasgow, Scotland. Starting in the late-19th Century, Glasgow has experienced a range of reformative measures to improve the housing situation, from massive slum clearance and demolition to stock refurbishment and new-build in the social sector. Vast populations were also decanted to peripheral estates, resulting in changes in the city's demographics, economy and social circumstances. Whilst many of these decisions were made with good intentions, they resulted in unforeseen side effects on the social housing conditions at present in Glasgow. Neutra's psycho-analytical approach to architecture gives rationale to the rippling effects caused by such changes and brings light to future problem avoidance for decision makers. Inherently, his philosophy determines that the design of the house is a physiological, psycho-social and reactive process where its lifecycle cannot remain static or lack flexibility in order to sustain itself in its environment, equally engaged in change. Examining Neutra's philosophy in conjunction with a review of a satisfaction and observation study (conducted amongst social housing tenants in Glasgow regarding their present living conditions and habits in the home), indicates a way for the city to re-examine current trends, avoiding past mistakes, and providing better social living conditions for the future.

Keywords: energy, comfort, social housing, health, well-being, design, modern architecture

1. INTRODUCTION

Richard Neutra (1892-1970), was born in Vienna and emigrated to America in 1923, moving from Chicago to Los Angeles, California in 1925. It was here that Neutra's design work incorporated unique, regional qualities, where he adopted a progressive psycho-analytical approach to architecture. This paper discusses Richard Neutra's design philosophies as a suggestive method to improve social housing in Glasgow, Scotland through the monitoring of four local social housing schemes.

In Neutra's *Survival Through Design* (1954), he states that "space is the stage on which design performs. But every performance is also contained in time and its results extend within it" [1, p171]. The space-time continuum becomes Neutra's foundational concept in his psycho-analytical approach, heavily centred around Freud's theories and own developmental work. He further argues that in order for our survival, design must incorporate our human physiological and psycho-social processes through the recognition of importance in stimuli and its affects on our comfort and well-being on a conscious and sub-conscious level:

(a) **Stimuli** elicit sensory responses in our physiological make-up, where our sensory receptors respond accordingly. Thus, the built environment acts as one the most primary sources of stimuli, aside from our natural

surroundings, where response can range from dual ends of the spectrum – i.e. shock and arousal versus fatigue and exhaustion. Neutra's approach states that the body is in need of excitement and change in order to avoid monotony and boredom, often caused by repetition or *pseudomorphism*, a term he uses to refer to imitation based solely on aesthetic value [1, p92] – e.g. linoleum taking the appearance of wood. He suggests that although there is need for variety and versatility, it is imperative that decisions are not made arbitrarily to simply indulge in the sake of relieving fatigue or satisfying temporary aesthetic compulsions [1, p87].

(b) **Stress** is stimulated by irritation and fatigue on both a conscious and sub-conscious level. In reference to Freud, Neutra discusses the birth trauma theory as part of our physiological development. Since conception in the womb, we have been habituated to warmth and spatial security, and negatively disrupted by the initial action of birth. Thus, our psyche sub-consciously longs to find this original comfort, namely through the built environment or moreover, the house. Conversely, the focus of housing design has drifted from the physiological to a heightened commercial approach, where we have become increasingly attached to possessions and have been led to determine the value of a house

based on size and scale. Our homes have become lifeless and uninteresting, packed with things we do not use or have no use for, because "it fails to echo life as we live it" [2].

- (c) **Habit** develops through repetition and routine driven by environmental, social and economic factors. Oftentimes, we begin to lose sight of problems and learn to compromise with our environment through habituation. Just as we are non-static beings, our homes should follow suit to be designed with flexibility and transparency – i.e. to make room for easy adjustments and to draw connections with our constantly changing natural environment [1, p187].
- (d) **Space-Time continuum** encapsulates Neutra's fundamental approach to design, whereby built space must incorporate the constant evolution brought by time. Neutra affirms that, "design as an aid to survival must always have an intimate kinship to the life processes it serves within time" [1, p171], and that without a space-time relationship, crippling effects arise, witnessed in Glasgow's social housing history.

Taking a psycho-analytical approach presents alternative methods to improve Glasgow's attitude towards social housing and to the schemes themselves. Subject to massive slum clearances and demolitions starting with the City Improvement Trust (1866-1914), Glasgow experienced drastic reformative measures from the late-19th Century. Piecemeal succession, followed by another round of demolitions in the 1950s and 1960s, with later decanting vast populations to peripheral estates led to detrimental demographic, economic and social shifts. The form of the city itself also adjusted to a new skyline as multi-storeys were erected within the city's gap sites. Today, Glasgow is once more undergoing massive regeneration and faces a repetition of mass demolition and rebuilding. The following case studies attempt to identify conditions pertaining to these factors.

2. CASE STUDY

2.1 Satisfaction Study

A series of satisfaction studies were conducted between end-Nov to Dec 2005 and revisited in early Mar 2006 to note any changes in conditions and home habits. Data was garnered through a questionnaire by interview, observations and measurements for temperature, relative humidity and carbon dioxide levels. The Glasgow housing sample consisted of three high-rises in the Gorbals and one low-rise from Maryhill erected in 1981, just after Glasgow's homogeneous multi-storey boom and the sudden decline a decade later with a new emphasis on redevelopment and brick construction [3]. The high-rises were selected based on their proximity in location and progressive nature in improvements, whereas the low-rise was used as a contrasting example:

- (1) **5 Norfolk Court** – 23-storey high-rise with six units per landing (three 2- and 3-apartment homes), and remains unrefurbished. Located in

the Gorbals, south of the Clyde River, and managed by the New Gorbals Housing Association (the Local Housing Organisation or LHO of Glasgow Housing Association). Situated on an east-west axis as a reinforced concrete structure rendered with brick on the ground floor and roughcast. The windows are steel-framed, single-glazed, and apartments are heated by electric storage units. There are wall vents in the living room for passive ventilation. Six households were interviewed, measurements conducted in five, and five revisited with measurements re-conducted.

- (2) **200 Sandiefield Road** – 23-storey high-rise with eight units per landing (four 2- and 3-apartment homes). Located south-east of Norfolk Court in the Gorbals and also managed by the New Gorbals Housing Association (LHO). Undergone minor refurbishments with steel-framed, single-glazing replaced with uPVC, double-glazed windows almost seven years ago. Each apartment is heated by electric storage units with wall vents in the bathroom and no extract fans. Situated on an east-west axis as a reinforced concrete structure rendered with tiled-panels (exterior façade). Twelve households were interviewed, measurements conducted in eight, and nine revisited with measurements re-conducted.
- (3) **305 and 341 Caledonia Road** – two 23-storey high-rises (two 2-apartments and four 3-apartments per landing). Situated in the east-Gorbals on an east-west axis, the high-rises are managed by the New Gorbals Housing Association and have had major improvements made in the last 12 years in two phases: (1) new aluminium-faced, timber-framed, double-glazed windows and an unheated enclosed sunspace; (2) newly fitted kitchen and bathroom facilities, district heating systems, added insulation along with brick and render for exterior-cladding (roughly two years ago). Sixteen households were interviewed, measurements conducted in twelve, and ten revisited with measurements re-conducted. It is important to note that two unimproved high-rises, situated beside these two multi-stories with the same original plans, were demolished in Feb 2006 for new low-rise developments.
- (4) **Napiersshall Place** – on Napiersshall Street in Maryhill, located north-west of Glasgow's city centre, as 3-storey tenemental housing – central access to stairs leading to two flats per landing. It is an example of low-rise, mixed-ownership housing where 54 units are managed by the Queen's Cross Housing Association for sheltered tenants (those over the age of 60 and usually declining in health). The original exposed brick-cavity construction and plasterboard interior was refurbished four years ago – cavity wall and loft insulation, draught proofing, instalment of uPVC, double-glazed windows, newly fitted kitchens and bathrooms with extract fans in each, and installation of gas Combi-boilers in place of the original gas fires with back boilers (increased

efficiency). The ground floor units each have a private yard space and the upper units have open balconies which all face into a central court and community hall. Eleven occupants were interviewed and had measurements taken in their two-apartment flats. Ten were revisited with measurements re-conducted.

2.2 Methodology

The satisfaction study was carried out within Glasgow's winter period (damp and cool climatic conditions), and early spring (increased daylight but still cool ambient conditions, sometimes colder than the winter set), which were recorded daily. The questionnaire was conducted in an interview format with audio and photographic documentation upon tenant consent. Measurements were taken with the Comark 2020 Humidity Kit and Vaisala GMP 222. Immediate observations were noted by the interviewer subsequent to entering each apartment before the interview started. The tenant sample was constrained by random assignment through each of the housing associations in combination of each tenant's availability and willingness to comply with survey requests. Survey questions regarding perceived stress and personal well-being were taken from existing validated models. Individual sections of the survey are listed below; (a) to (h) relevant to overall comfort, and (i) to (l) signifying physical and psychological responses to home environment: (a) Personal Details, (b) Habits in the Home, (c) Room Temperature and Heating, (d) Access to Sunlight, (e) Windows, (f) Ventilation, (g) Humidity, (h) Acoustic Insulation, (i) Changes to Home, (j) Perceived Stress Scale, (k) Positive and Negative Affectivity Scale, (l) Personal Well-Being.

2.3 Results

In terms of thermal comfort, Norfolk Court had the lowest measurements with mean temperatures ranging from 17.8-18.4°C (winter) and 14.8-15.9°C (spring) (Table 1, Fig. 1). Lower room temperatures were found in the spring measurements perhaps due to the gradual decline in the use of heaters as daylight lengthened. Although temperatures were not significantly warmer, the perception of daylight was observed to affect occupants' behaviour and habits in the home. It is important to note that Table 1-3 measurements were taken at Norfolk Court in the morning under dry outdoor weather conditions at 3-4°C (winter), and sunny, clear conditions at 4-6°C (spring). On average, tenants claimed to have paid roughly £21.50 per week for heating and electricity, which was slightly reduced by March to about £18.75 per week by power cards. Due to steep fuel costs, 92% of tenants' windows were left closed to avoid any additional heat loss with a reliance on casual gains. All surveyed tenants were found to be heavy smokers, again refusing to open windows to reduce heat loss and lacking other ventilation alternatives, such as opening trickle vents for passive ventilation. As a result, CO₂ levels measured the highest reaching a mean minimum of 1026.0ppm (winter) and 1016.0ppm (spring) (Table 3, Fig. 2) due to minimal air change rates. Humidity levels were not

significantly unfavourable, yet over 80% of surveyed occupants were in the habit of doing nearly two loads of laundry, seven days a week, with 50% of these individuals using tumble dryers and keeping the steam emitted from the flexible hose ventilation system in their homes for added heat gains. All surveyed tenants expressed difficulty in managing the cost for fuel and relied on additional sources beyond the electric storage heaters for warmth – i.e. electric fire or additional electric heater(s). The restrictive qualities in the flats at Norfolk Court with rapid heat loss due to the poor insulation and single-glazed windows were combining factors generating negative stimuli to cause added stress for occupants. In terms of access to sunlight, 67% occupants felt that it was of major importance and 50% desired private outdoor space. Only 34% felt a need for communal outdoor space, 50% disagreeing and 16% indifferent. On a frequency scale from one to five, one being "never" and five being "always", 42% surveyed tenants rated feelings of pride and enthusiasm for their home at one, and 33% at three. Overall, tenants expressed their frustration in dealing with damp, cold flats and occasionally some with disruptive neighbours. However, most had accepted their living conditions, due to the lack of choice, and held little hope to expect any changes to their current situation. Neutra's psycho-analytical perspective brings understanding to occupants' response in fuel poverty situations, where conditions initially caused awareness of acute stress with negative side-effects on health and well-being. Yet, over time habituation settles and occupants trapped in a fuel poverty situation simply come to accept the lack of heat, high humidity levels and generally poor air quality. As the situation worsens over time, these underlying problems diminish into the background and more immediate issues, but ultimately intrinsically linked to their initial causes, call for attention due to their identifiable nature – i.e. growth of black mould and mildew, buckling wallpaper, broken electric heaters. Neutra indicates that although "man does not realise the harmfulness of a product or design element in his surroundings, it does not mean it is harmless" [1, p84]. Therefore, through fatigue we become static, non self-regenerative or self-adjusting, fighting against our natural physiological process, and consequently, achieving only temporary contentment [1, p98].

At Sandiefield Road, temperature results were slightly warmer than Norfolk Court, where Table 1-3 measurements were taken in partly cloudy, windy and wet conditions at 4-6°C (winter), and sunny, clear conditions at 4°C (spring). Nonetheless, tenants were also found in a similar situation with lack of control for heating costs. Tenants were automatically placed on a "Heat-for-Rent" programme charging approximately £9 per week for heating, regardless of whether or not heating was used, and an additional £12.50 per week for other uses of electricity. Much like Norfolk Court, Sandiefield Road tenants suffered immense frustration in having to deal with expensive fuel prices (especially with the majority of tenants being either retired or unemployed). In terms of air quality, 71% windows at Sandiefield Road were opened and 56% of the trickle vents were used regularly. This resulted

in slightly improved CO₂ levels to Norfolk Court, with a mean minimum of 706.3ppm (winter) and 861.3ppm (spring) (Table 3, Fig. 2), indicating more acceptable rates of air quality. It is notable to mention that 75% of surveyed occupants were smokers, where 11% of these regularly opened their trickle vents in the living room and 44.5% regularly opened living room windows or had both ventilation systems in use on a daily basis, exercising user-control for air exchange within their home. Unlike Norfolk Court, newly installed uPVC, double-glazed windows at Sandiefield Road made a significant improvement for occupants' comfort with increased user-control. With regards to access to sunlight, 42% occupants felt it was of major importance and 75% desired private outdoor space. 67% did not prefer communal outdoor space due to social problems in the area and lack of convenience living in upper storeys. On a frequency scale from one to five, 25% surveyed tenants regarded feelings of pride and enthusiasm for their home at three, and 29% at five. Neutra proposes that "permanence without maintenance becomes the ideal, perhaps the illusion" [1, p69], and that the lifecycle of any built space requires transition and change in conjunction with human physiological development. The impermanence of the house is not to dismiss its value and simply demolish once reaching its projected term, but to incorporate upkeep and repair in its lifecycle planning.

In the case of Caledonia Road, flats measured the warmest, where results in Table 1-3 were taken under dry weather conditions at 7°C (winter), and partly cloudy, foggy and wet conditions at 5-6°C (spring). All tenants agreed that heating was affordable and easy to control and, on average, tenants paid roughly £5-7 per week for both gas and electricity. The district heating system provided considerably more heat and user-control throughout the day, whereas storage heaters proved relatively restrictive with slow rates of response after settings were altered. Overall air quality at Caledonia Road also measured at acceptable levels reaching a mean maximum 851.7ppm (winter) and 809.0ppm (spring) (Table 3, Fig. 2). Although only 43% of windows were opened and 19% trickle vents in use for these surveyed tenants, the enclosed sunspace (orientated either east or west for each flat) successfully kept homes dry and warm without having to compromise ventilation, and acted as additional thermal "buffer" space for intermediate heat gains [4 & 5], initially improving overall energy efficiency. Furthermore, the flexible nature of the added sunspace and user-friendly windows supplied proper ventilation for the 50% surveyed occupants who were in the habit of smoking. It is notable that 50% surveyed occupants in the spring had their enclosed sunspace doors opened to the living room for ventilation. In terms of access to sunlight, 88% felt it was of significant importance and highly valued their private sunspace and/or open balconies. A close split was found in preference for communal outdoor space, where 44% felt a need, 50% uninterested, and 6% impartial. Many tenants also expressed considerable enjoyment for the great aspects – one of the pleasures in living in a high-rise flat. On a frequency scale of one to five, 19%

occupants measured enthusiasm and pride for their homes at three, and 59% at five. The overall optimism reflects the significance in relationship between our emotional response to space in time – i.e. opening a window to draw in fresh air and to soak in warmth from the sun within a sunspace, reacting "...from sudden shock to a great steadiness of appeal" [1, p119]. From a psycho-analytical approach, Neutra draws on the importance of transparency between interior and exterior spaces, where a bout of fresh air acts as a stimulus, one which our bodies need for nourishment and well-being. He further explains that it is comparable to "the experience of a lifetime...often summed up in a few memories...clinging to a thrilling occurrence, rather than the former, concerned with humdrum steadiness" [1, p229]. Looking at specific projects, Lavine (2004) explains the restorative qualities in Neutra's own work, whereby "energy transform[s] aesthetic pleasure into a form of therapy and domestic setting [giving] way to the house of pleasure" [6]. Henceforth, she suggests a libidinal quality in the house, much like the excitement of romance, whereby functionality should also elicit positive emotional responses, such as arousal and stimulation through elements of surprise and of contrasting nature.

At Napiershall Place, temperatures measured with means between 18.8-19.2°C (winter) and 19.3-19.9°C (spring). Measurements in Tables 1-3 for Napiershall Place were taken under various outdoor weather conditions between sunny and dry at 4°C, cloudy and damp at 5°C and unusually dry at 10°C (winter), and between sunny with moderate winds at 2-5°C and overcast skies with drizzling rain at 5-8°C (spring). Cost of heating was roughly £7.50 per week for the winter and slightly lowered to £6.40 per week in the spring. All tenants agreed that cost for heating was affordable and that the flats themselves were warm and comfortable. In terms of air quality, flats displayed significantly lower CO₂ levels in the spring compared to the winter, whereby the mean minimum CO₂ level in the winter measured 980.9ppm, falling just below the limit of tolerable air quality, and a lower mean maximum of 829.0ppm in the spring (Table 3, Fig. 2). Winter results displayed that 51% of surveyed occupants claimed to open their windows and only 17% of trickle vents were in use. However, an observed 60% of surveyed tenants in the spring actively had their windows open or slightly ajar during the interview probably due to the increased hours of daylight and change in season. Moreover, 91% tenants continued to use their extract fans in the bathroom and all utilised the kitchen extract for active ventilation. It is important to note that although these low-rise flats did not have similar aspects to the high-rises, the private balcony spaces, ground floor gardens, and defined communal space compensated to comfort and added a sense of security. 73% surveyed tenants valued access to sunlight and highly enjoyed their personal outdoor space. Another 36% held neutral feelings to the communal outdoor area. On a frequency scale of one to five, 73% occupants rated their levels of pride and enthusiasm for their home to be at five. With affordable heating and personal outdoor space, morale for their

Table 1: Mean dry bulb temperature measurements.

N.B. Norfolk Court (max 20.0/19.1°C, min 16.0/11.4°C) – lowest temperatures, worst thermally; Sandiefield (max 22.0/25.7°C, min 18.0/17.3°C) & Caledonia Road (max 23.0/26.1°C, min 15.0/18.2°C) – similar readings for winter and spring; Napiershall Place (max 22.0/22.6°C, min 16.0/15.9°C) – spring measurements marginally up from winter.

TEMP (°C)	Ambient Temp (°C) (winter)	Ambient Temp (°C) (spring)	Lvrn (winter/spring)	Kitch	Bath	Bd1	Bd2	Sunspace
NORFOLK	3-4°C	4-6°C	18.4/15.9	18.0/15.9	18.0/15.7	17.8/15.4	17.8/14.8	—
SANDIEFIELD	4-6°C	4°C	21.1/20.7	20.9/21.0	20.9/21.6	20.9/21.5	20.8/21.7	—
CALEDONIA	7 °C	5-6°C	21.8/21.6	21.3/22.0	21.4/22.4	21.3/22.5	21.4/22.1	20.5/21.0
NAPIERSHALL	4,5,10°C	2-5,5-8°C	18.8/19.7	18.9/19.9	18.9/19.3	19.2/19.4	—	—

Table 2: Mean relative humidity measurements.

N.B. Norfolk Court (max 53.0/55.1%, min 37.0/20.3%) & Sandiefield Road (max 47.0/45.5%, min 31.0/14.0%) – less humid in the spring due to low ambient RH levels; Caledonia Road (max 42.0/51.1%, min 26.0/28.8%) – spring measurements marginally up from winter but still <40%; Napiershall Place (max 53.0/46.5%, min 27.0/22.0%) – less humid in the spring.

RH (%)	Ambient RH (%) (winter)	Ambient RH (%) (spring)	Lvrn (winter/spring)	Kitch	Bath	Bd1	Bd2	Sunspace
NORFOLK	88%	62%	43.4/35.7	44.0/35.9	44.2/38.0	44.8/40.1	44.8/35.1	—
SANDIEFIELD	88%	66%	37.1/23.8	38.1/25.4	37.4/27.1	36.6/28.5	36.4/25.4	—
CALEDONIA	86%	85%,96%	32.7/38.4	33.1/38.1	32.3/36.3	31.5/35.0	32.3/35.2	33.2/37.2
NAPIERSHALL	90%-93%	64%,93%	40.1/34.1	38.1/34.6	37.2/35.5	36.8/34.3	—	—

Table 3: Mean carbon dioxide measurements.

N.B. Norfolk Court (max 2610/1880ppm, min 460/610ppm) – slightly less spring CO₂ levels; Sandiefield Road (max 1740/1400ppm, min 500/560ppm) – spring CO₂ levels for living room down; Caledonia Road (max 1400/970ppm, min 470/630ppm) – marginal drop in spring CO₂ levels; Napiershall Place (max 1700/1140ppm, min 690/600ppm) – spring CO₂ levels significantly lower.

CO ₂ (ppm)	Lvrn (winter/spring)	Kitch	Bath	Bd1	Bd2	Sunspace
NORFOLK	1274.0/1020.0	1224.0/1016.0	1026.0/1050.0	1254.0/1098.0	1357.5/1054.0	—
SANDIEFIELD	1066.3/ 904.4	950.0/ 871.1	817.5/ 877.8	931.3/1018.9	706.3/ 861.3	—
CALEDONIA	851.7/ 804.0	751.7/ 809.0	750.0/ 763.0	657.5/ 776.0	612.9/ 743.3	658.3/760.0
NAPIERSHALL	1208.2/ 792.0	1070.0/ 829.0	1015.5/ 820.0	980.9/ 808.0	—	—

home environment, reflected in most tenants' active lifestyle and home upkeep. Although a majority of tenants held a strong sense of nostalgia for their original gas fires, the assimilation of central gas heating, extract fans and uPVC, double-glazed windows was in fact successful, whereby tenants willingly assimilated new habits in response to home improvements. In accordance with these alterations in lifestyle, Neutra proposes a *liveability index* which aims at determining the value of a dwelling, not by traditional notions of size and scale, but by making "the original physiological factor of handy and sensitive control count, the factor of actually and frequently putting to use every item in our collection – be it a public museum, a library, or merely an arrangement of diversified cooking pots" [1, pp260-261]. Consequently, the assessment of housing should be based on the aptitude to which it can manage our overall needs on a physical and psycho-social level.

In practice, Neutra often worked closely with his clients, asking them to record their daily habits in a journal giving him insight into their regular needs. Such was the case for Neutra's Perkins and Miller

House, where both clients became actively involved in the design process with their inputs and suggestions thoroughly considered. Constance Perkins, commissioning and inhabiting the Perkins House, stated with endearing regards for Neutra's work:

A truly great architect is not one who merely skilfully manipulates a construction to meet the individual functional needs of a client, important as these are. He is one who, doing this, also creates an "art object". My home is not just my "machine for living"; it is my environment. Living includes thinking and feeling as well as mechanical existence. Living is a way of life. To be full it needs an environment that pricks every sense with which the human being is endowed, an environment that is specifically ordered to give direction to ordered thought" [7].

The abovementioned case studies give both positive light and avid room for improvement in Glasgow's social housing schemes at present. It is believed that in taking Neutra's psycho-analytical approach in conjunction with recognising small successes and indicating past mistakes that Glasgow

can move forward to house its population in not only efficient and functional homes, but also ones which synchronically promote well-being and uplift the human spirit.

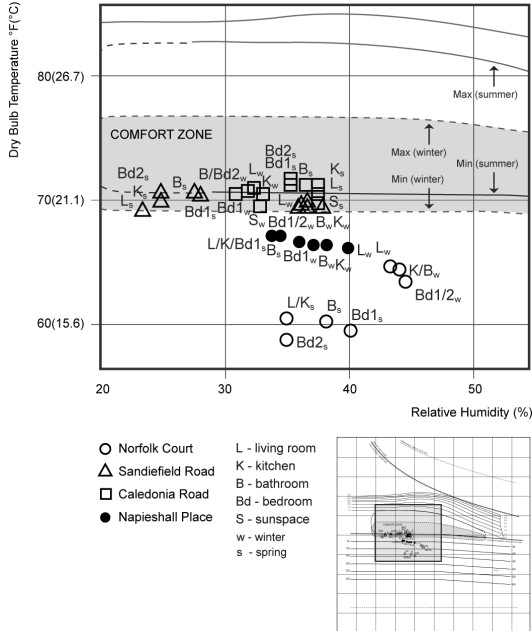


Figure 1: Olgay's Bioclimatic chart [8] indicating mean dry bulb temperature and relative humidity for winter/spring.

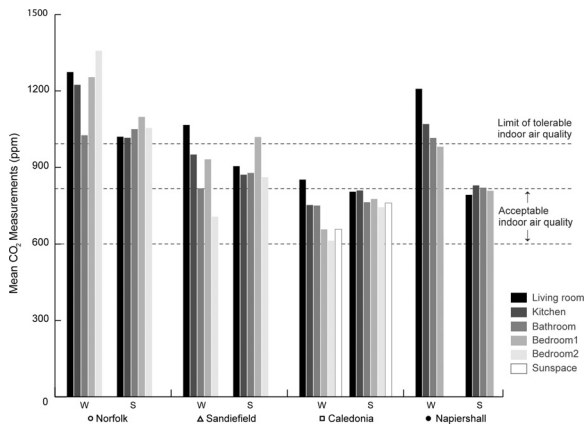


Figure 2: Graph of mean CO₂ levels (winter/spring).

3. CONCLUSIONS

1. It is possible to apply Neutra's psycho-analytical theory to future social housing or regeneration projects in Glasgow by engaging design efforts to holistically satisfy our physiological processes, rather than simply piecemeal endeavours driven by economic aim or constraint. As indicated by Neutra, it should not be overlooked that in essence, "architecture is a social art. It becomes an instrument of human fate because it not only caters to requirement but also shapes and conditions our responses" [1, p314].

2. Comfort is not simply dictated by measured data. Correlations between human perception of space and their interaction in space through time – i.e. by changes in seasons, time of day, varying ages in occupants, etc. must be observed and understood. The design approach can then be an empathetic, qualitative process, whereby clients have an eagerness to assimilate to change and designers can create used and enjoyed living spaces in tune to occupants' needs.
3. Maintenance is unavoidable in the lifecycle of a house. Its impermanence only follows our own physiological process of change, and to assume a static nature would only lead to distorted planning and arbitrary design decisions for temporary gratification. In the same sense, impermanence should not be misinterpreted to mean lacking in value, and rapid conclusions to demolish and destroy should be carefully reconsidered. Preventative maintenance and regular repair may be more viable.
4. To avoid fatigue and monotony caused by tired or stressed response to the surrounding environment – either conscious or sub-conscious – the use of transparency in design offers possibility. The integration of interior and exterior environments, good views, inclusion of an enclosed sunspace, increased sunlight and daylight all add pleasure to practicalities such as heat gains and overall energy efficiency. A sudden alteration through user-controlled interaction can effectively break the repetition and use such pleasure to raise overall morale.

REFERENCES

- [1] R.Neutra, Survival Through Design, Oxford University Press, New York – America (1954) 69, 84, 87, 92, 98, 119, 171, 187, 229, 260-261, 314.
- [2] G.Nelson and H.Wright, Tomorrow's House: a complete guide for the home-builder, Simon and Schuster, London – United Kingdom (1945) 2.
- [3] M.Horsey, Tenements and Towers: Glasgow working-class housing 1890-1990, The Royal Commission on the Ancient and Historical Monuments of Scotland, HMSO, Edinburgh – United Kingdom (1990) 57, 61.
- [4] C.D.A.Porteous, Airing Energy Efficiency: home truths, Alt'ing, The Scottish Journal of Architectural Research, vol. 1, no. 1, Edinburgh – United Kingdom (March 1996) 22-26.
- [5] F.Stevenson and N.Williams, Sustainable Housing Design Guide for Scotland, The Stationery Office Limited, Norwich – United Kingdom (2000) 25.
- [6] S.Lavine, Form Follows Libido: architecture and Richard Neutra in a psychoanalytic culture, The MIT Press, Massachusetts – America (2004) 72.
- [7] A.T.Friedman, Women and the Making of the Modern House: a social and architectural history, Harry N. Abrams, Inc., Publishers, New York – America (1998) 184.
- [8] V.Olgay, Design with Climate: bioclimatic approach to architectural regionalism, Princeton University Press, New Jersey – America (1963) 22.