The Advantage of Generality

Dwellings' Potential for Housing Different Ways of Living

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Abstract

In a world striving for environmental sustainability, one out of the many possible contributions from the field of architecture is to construct buildings capable of facing changing demands and diversity of use rather than buildings appropriate only for a particular purpose in a period just after being built. The challenge of housing is therefore not only to satisfy the people who first move in. What we as architects must strive for is to design buildings that also have the potential of becoming good homes for numerous more future residents, people that we, at the time of designing the building, know little about. Based on an empirical study, this paper shows that basic space syntax parameters, such as integration and topological position of particular rooms, describe properties of a floor-plan that are highly relevant to dwellings' potential to cater for a diversity of people. The study presented in this paper has examined "potential usability" of dwellings by combining two research traditions. One is a space syntax analysis that has revealed a chronological typology of dwellings. The other is the Scandinavian tradition of survey-based housing research examining correspondences between the buildings and peoples' lives inside them. By an interview-based survey of about two hundred apartments, the study has found a series of correspondences between an apartment's spatial layout and who that are living in the apartment, how these residents use their rooms and how they evaluate their dwelling. Among the results is that apartments with a "bush-like" spatial configuration house the widest range of "kinds of households". One other result is that apartments with floor-plans that according to Hillier's theories should be general are the ones where residents need least floor area in order to be satisfied with the apartment's size. This paper not only shows how space syntax analyses are useful for identifying theoretical classifications of floor plans. It also shows that such a typology is highly relevant to people's real lives. Therefore, in addition to shedding light on relations between space syntax parameters and real-live situations, the study provides explicit knowledge that should be relevant to architects' practice.

Background

The aim of any architect's design-practice is to develop buildings for the future, but the ideals about what these "buildings for the future" should be like are diverse at any given moment and are also changing over time. However, in the context of climate change, our world's limited natural resources and it's still rapidly increasing population, it is hard to disagree on aiming at buildings capable of handling changing demands and diversity of use rather than buildings appropriate only for a particular purpose in a period just after being built. This challenge of achieving long-time usability has been discussed by influential writers on architecture. Jacobs (1961) was concerned about this subject in the urban scale. She criticised architects and planners for sorting out some specific functions only and designing cities by handling these functions separately, without understanding that well working cities are dynamic places where intricate pattern of diverse activities must be allowed to develop. Duffy discussed office-buildings and focused on the need for "responsiveness to change", i.e. "the ability to accommodate, over time, changes in individual requirements." (Duffy, 1992, p. 175) Brand argued that there is a conflict inherent in architects'

Proceedings of the 7th International Space Syntax Symposium
Edited by Daniel Koch, Lars Marcus and Jesper Steen, Stockholm: KTH, 2009.

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design-practice; while we as architects attempt to design buildings of permanent excellence by responding to time- and user-specific "programs", the requests or needs that constitute these "programs" are continuously changing. (Brand, 1994, p. 181)

Where dwellings are concerned, changing needs and preferences are due to individual persons' changing phases of life as well as society's cultural, social, economical and demographic development. When Klarqvist (1969, p. 81-86) argued for dwellings capable of housing the plurality of contemporary households as well as future changes in needs and preferences, he described generality as one out of three relevant strategies for housing design. Generality here means the ability of a fixed situation to cater for a variety of demands. The other strategies he described were flexibility and elasticity, where flexibility means a situation's ability to be easily changeable, while elasticity means the ability to adapt by modifying size. When comparing these three strategies for achieving the same purpose, generality has the advantage of being a permanent feature; generality does not (or it does to a far lesser extent than flexibility or elasticity) require the action of making physical changes.

Specificity is a strategy contrary to generality in that it aims to satisfy some particular out of the many possible demands; the nature of specificity is to respond precisely to needs or preferences that are explicit and often time-specific. Since detailed requests rarely correspond well to long-time demands, specificity can be a risky design-strategy if aiming at architecture of long-term usability.

When Hertzberger (1991/2005) discusses architects' task of "making space" but at the same time "leaving space" and allowing people to develop their space in accordance with personal preferences, he dismisses flexibility as well as specificity. According to Hertzberger, flexibility expresses uncertainty and lack of clear-cut standpoint and therefore results in buildings without identity or distinctive features. Specificity, on the other hand, he argues, represents too much expression; "being just right - but for whom?" What he advocates, is what he terms "polyvalence", - a feature very similar to generality as described above.[1] (Hertzberger, 1991/2005, p. 146 - 152).

Marcus (2000) has examined the "functional performance" of cities, or the "capacity of urban form to carry differences". His conclusion is that urban areas from the 20th century have a higher degree of specificity when it comes to functions than older areas and that older areas have more actors as well as more diversity of actors. He argues that 20th century architectural knowledge has provided preferences of form that are characterised by "specificity and actuality as opposed to generality and potentiality" (Marcus, 2000, p. 189-192).

## Features important to generality of domestic space

Concerning generality of dwellings, it is possible to distinguish between two important aspects of interior space. One is features of each room, such as size and shape of the room, daylight conditions and technical equipment. The other is the "context" of the individual room; the potential use of a particular room depends on the surrounding rooms, on which they are, on exactly where they are located and on how all the rooms are mutually accessible. In the study here described, the two features being examined are room-sizes and apartments' spatial configurations. A room's size is crucial to its potential use; a room of 1.2 m2 without a window and containing a WC is highly specific regarding function, whereas a room of 12 m2 with good daylight has a wide range of potential use. In the study summarised in this paper, room sizes have been analysed by comparing floor-areas, while spatial configurations were studied by space syntax methodology.

Space syntax theory as well as numerous space syntax analyses has pointed out spatial configurations' relevance to functionality or usability. Hiller (1996, p. 315) defines functionality as

"the ability of a complex to accommodate functions in general and therefore potentially a range of different functions, rather than any specific function". (Hiller, 1996, p. 315)

He distinguishes between "occupation" and "movement" as two kinds of "human behaviour's physical and spatial manifestations in space". (Hiller, 1996, p. 317) "Occupation" includes activities

Proceedings of the 7th International Space Syntax Symposium
Edited by Daniel Koch, Lars Marcus and Jesper Steen, Stockholm: KTH, 2009.

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like meeting, reading, eating and sleeping while "movement" is about changing from occupation of one space to occupation of another space. How, or to what extent, a spatial complex generates or is appropriate for occupation or movement determines the functionality of the individual spaces as well as the functionality of the entire complex. Leupen (2007) applies a kind of space syntax analysis and argue that "polyvalent" dwellings depend on the number of large rooms and on the rooms being organised in "circle" or "star" rather than in a "chain structure". (About "polyvalent": see note 1) Hillier has elaborated the concept of movement versus occupation by defining a typology of positions in a spatial configuration. (Hillier, 1996, p. 318) In short, A-space is a dead-end-space, B-space is a through-passage-space that is not on a ring, C-space is part of one ring while D-space is part of more than one ring. These "kinds of positions" strongly influence the potential usability of a space; "A-kind" of space has no thru-passing that may restrict potential use, while the "B-kind" is the most constraining in that the potential use is limited by the necessary thru-passing for accessing one or several other spaces. Figure 1 shows three dwellings that due to room-sizes and spatial configuration are likely to be general rather than specific as regards functions or use.
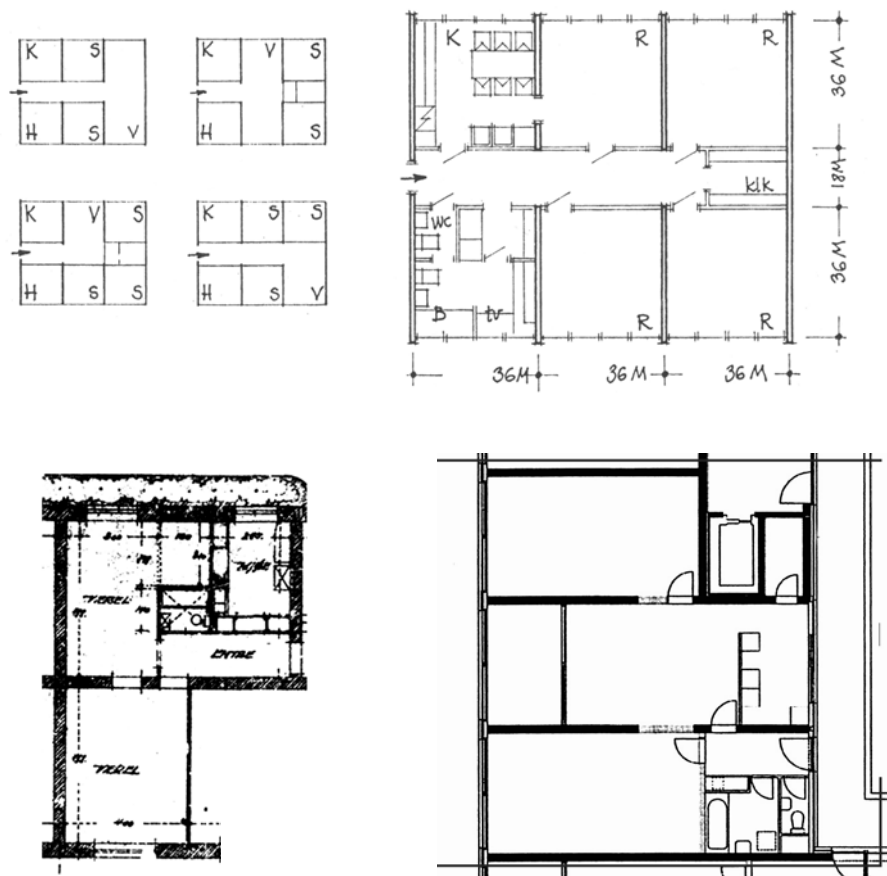
Figure 1

Three apartments where several rooms, due to room-sizes as well as spatial configuration, are "general" in the meaning allowing for a diversity of functions/use/activities.

Top: *Project by arch. Sven Thiberg, Sweden, 1967.*

Bottom, left: *Maridalsveien 64, Oslo, arch.: Einar Engelstad, 1932.*
            In this drawing from 1932, the two largest rooms are not intended for any particular function; they are both termed "værelse" (equal to the English "room") instead of the function-prescribing "living room" and "bedroom".

Bottom, right: *Apartments at KNSM Island, Amsterdam, arch.: Diener & Diener, 2002.*

In urban analyses, reciprocity of theory, methodology and statistics on real-life situations have been a driving force for the wide-spread use of space syntax. Where dwellings are concerned, numerous studies have compared space syntax analyses with historical development of dwellings or with floor-plan typologies, Hanson (1998) being the most influential. However, studies comparing dwellings' space syntax properties with larger samples of real domestic lives

Proceedings of the 7th International Space Syntax Symposium
Edited by Daniel Koch, Lars Marcus and Jesper Steen, Stockholm: KTH, 2009.

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are harder to find. This paper aims to shed light on correspondences between dwelling-typology identified by the means of space syntax and real residents' preferences and evaluations.

A chronological typology of apartments

According to Manum (2005 and 2006) Norwegian apartments built since the 1930s can be distinguished into three types of floor-plans or three generations of floor-plans, since these types have a chronological order. Figure 2 summarises main characteristics of the three generations of apartments and shows floor plans and connectivity graphs for apartments representing the three generations.

Type (or generation)	I	II	III
Time period	1930 - 1955	1965 - 1980	2000 - ?
Average floor area (m2)	62	95	59
Number of "bedrooms"	1 - 2	2 - 3	1-2
Living room, kind of space	A	C	B
Internal rings	some -E-L-Bd-	often (large rings usually including washing room)	few
"potential usability"	general	spesific (but some flexible due to lightweight interior walls)	specific

Brief descriptions of the floor plan layouts	
I	The bedroom/second largest room is not much smaller than the living room. All rooms have access from a "neutral" entrance.
II	The rooms are individually tailored to particular functions. The bathroom, washing room and WC are often three separate rooms. The living room is by far the largest room of the apartment. The kitchens are often openly connected to the living room No particular "typical layout" (due to the many rooms and thereby many possibilities)
III	No separate kitchen; the kitchen is included in the living room. The living room is by far the largest room of the apartment. One bedroom is usually accessible only through the living room.

Figure 2

Top: Apartments representing the three types or three generations of floor-plan layout. The space syntax graphs (justified connectivity graphs) are coloured in accordance with function/use. (RED: bedroom, GREEN: living or kitchen, YELLOW: transition space, BLUE: wc/bath/washing, BROWN: balcony, PINK: storage)

Bottom: The three types or three generations, a brief description of main characteristics.

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The three generations are hereafter labelled type-I, -II and -III, in chronological order. In brief, type-I consists of kitchen and 2 or 3 rooms[2], its habitable rooms are similar by size and all rooms are accessible directly from the entrance. In space syntax terms, the latter implies that kitchen, living room and bedroom are equally integrated and that the entrance is the far most integrated space. This floor-plan was usual from the 1930s until the mid 1950s. Compared to this, the type-II apartments are larger in floor area as well as in number of rooms; most of them have 3 or 4 rooms. Concerning functions or use, the rooms of type-II apartments are more specific than the rooms of type-I apartments. This is due to room-sizes as well as spatial configuration; the living rooms are larger, the bedrooms are smaller and the functions of WC, bathing and washing are often separated into three rooms and the different rooms are positioned in accordance with their particular intended use. The type-II is the common apartment-layout of suburban housing built during the period from late 1960s until about 1985. The third category, type-III, is smaller than those of type-II. They are usually of 2 or 3 rooms, the kitchen is now included in the living room and WC, bathroom and washing room are no longer separate rooms. Compared to type-I, the "living and kitchen room" of type-III are more integrated, being the most integrated space in 50% of the cases. If applying Hillier's typology of spaces (Hillier, 1996, p. 318), the "type of space" of the living rooms differs significantly across the three generations or types of apartments. In type/generation-I apartments, the living room is an A-space, in type/generation-II it is usually a C-space, while in type/generation-III the living room is a B-space.

Methodology

The typology described above is a theoretical categorisation intending to capture "assumed functionality"; it is a categorisation of dwellings' functionality that is made without any knowledge of real lives inside any dwelling. In the following, this paper compares this theoretical classification of floor plans with information about real residents and their evaluations.

The method for doing this has been to select apartments representing the three types of floor-plans and to find out who that live in each apartment, how these residents use their rooms and how they evaluate their dwelling. The sample of apartments consists in all together 9 housing-projects. These projects are named by abbreviation where the prefix refers to the year of construction, i.e. the project 41-2 was built in 1942.[3] In every project, several identical apartments were studied, all together about 170 apartments.

The aim of this study has been to shed light on apartments' spatial layout. There are numerous other parameters that also influence people's choice of dwelling, such as the price of the dwelling, the kind of building, the neighbourhood and distances from home to important daily destinations like work, schools and shops. More extensive studies examining both such contexts of the particular dwellings and residents' income, education and social background would surely add information about people's choice of dwellings, but knowing the sample of projects selected for this study it is not likely that the main results would be altered.
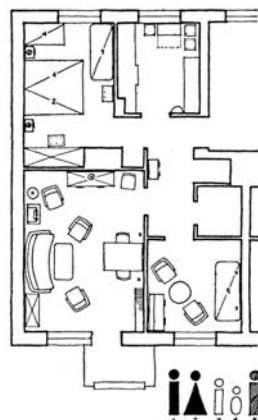
Figure 3
Scandinavian housing research from the 1940s. A drawing by Odd Brochmann showing one out of the numerous apartments he examined. Here: a family of four with one room for rent. (Brochmann, 1948)

The survey was structured as a kind of "two-step interviews", where the "first-step" was a few questions asked by ringing door-bells and the "second-step" was an interview-based survey visiting the residents in their apartments. The door-bell interview provided information about who the residents were (i.e. identifying "kind of household" in terms of number of people, age and relationships), their time of living there and their general well-being. The "second-step" was a more in-depth interview and a registration of use of rooms, following a tradition of Scandinavian housing research established by Brockmann (1948) and Holm (1955). (See figure 3).

32-1   33-1   41-2

70-2   74-1   76-1

77-2   83-1   98-2
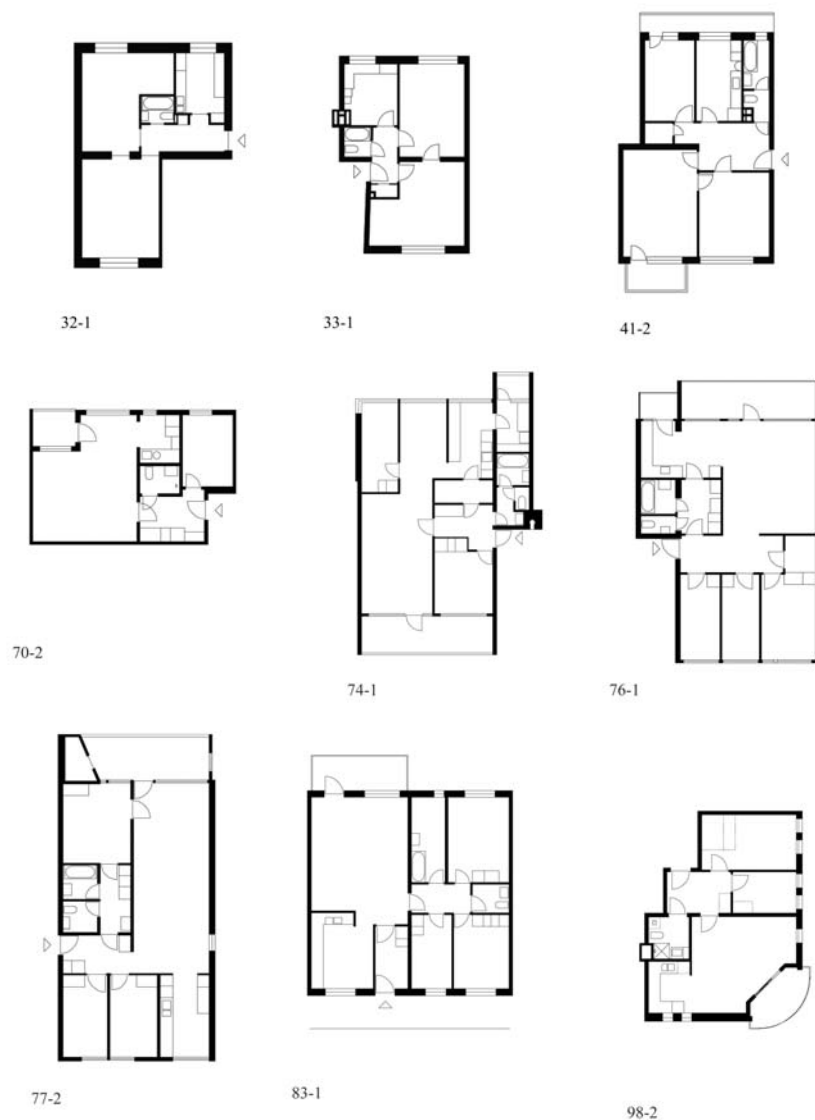
| Project	Rooms**	Size (m2)	Type *	Name / address		Location (by part of Oslo)
32-1	2	57	I	Maridalsveien 64 / Maridalsveien 64	Ila	Centre-N/E
33-1	2	50	I	Fagerheimen / Fagerheimgata 2-12	Dælenenga	Centre-E
41-2	3	75	I	Bøkkerløkka / Brockmannsgate 8-10	Bjølsen	Outer-centre-N
70-2	2	56	III	Vosseløkka / Vossegate 18, 20, 20B	Torshov / Lilleborg	Outer-centre-N/E
74-1	4	83	II	Orremyr / Odvar Solbergs vei 28-30	Romsås	North/East
76-1	4	95	II	Svarttjern / Odvar Solbergsvei 126-128	Romsås	Nort/East
77-2	4	104	II	Sandaker / Åsengata 2-4-6-8	Sandaker	Outer-centre-N
83-1	4	98	II	Casinetto / Gustav Vigelandsvei 42-44-46	Skøyen	Outer-centre-W
98-2	3	62	III	Frydenlundsgate / Frydenlundsgate 5-7	Bislett	Centre

* : Apartment layout according to the typology showed in figure 2
**: number of rooms: habitable rooms except kitchen

Figure 4

Floor-plans and key-data of the apartments being examined.

Proceedings of the 7th International Space Syntax Symposium
Edited by Daniel Koch, Lars Marcus and Jesper Steen, Stockholm: KTH, 2009.

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Kinds of household and spaciousness of living were studied across the sample of apartments by examining the following data: floor-plan of the apartment (by "project", see figure 4), floor-plan type (by the floor-plan-types I, II and III, see figure 2), apartment-size (by floor area and by number of rooms), room-sizes (by floor area), kind of household (by ages, relationship and number of persons), households' evaluations of their dwelling (such as cramped versus spacious living) and, finally, their use of rooms (according to furniture and naming of rooms).
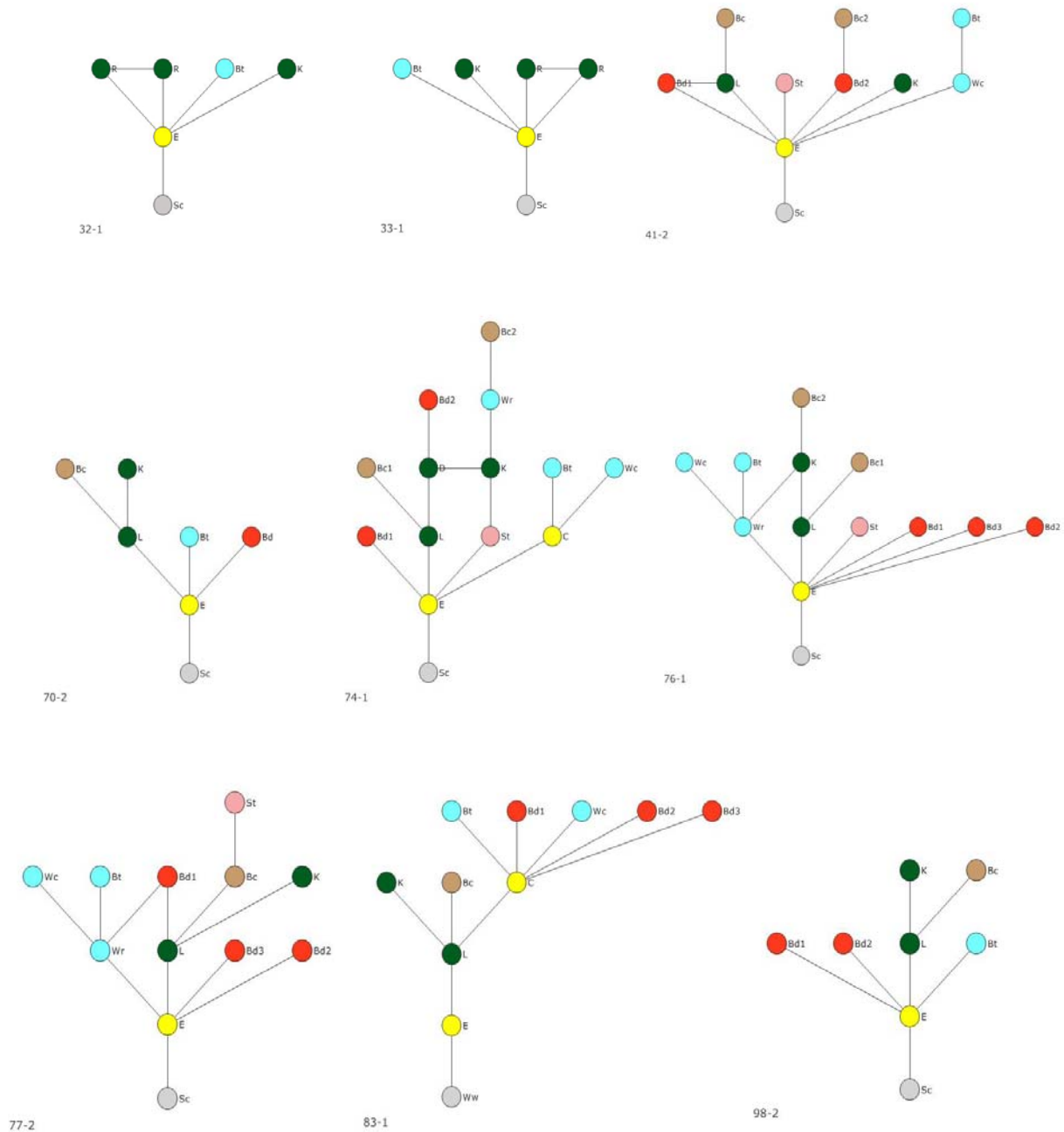
Figure 5

Justified connectivity graphs of the apartments being examined (the same apartments as in figure 4). For legend of colours: see figure 2.

"Kinds of household"
In order to examine the distribution of households in different apartments, the following five "kinds of household" were chosen: 1: single, 2: couple, 3: single with children 0-18 years, 4: couple with

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children 0-18 years and 5: several adults, with or without children. The latter, the "several adults category" is households containing other adults than one single or one couple, such as two (or more) adults (for instance students) sharing an apartment (without being a couple), families with adult children still living at home, households with adult relatives other than mother or father and households with a room for rent.

"Spaciousness of living"
"Spaciousness of living" was examined in two ways. One was a quantitative measurement, examining floor area per person and number of "persons per room". The other was more qualitative, asking the residents to evaluate their living on a 5-step scale from "very cramped" to "very spacious".

Where Norwegian housing conditions are concerned, Ås (1971) has categorised to what extent living conditions are cramped or spacious by comparing number of residents to number of "habitable rooms" (see note 2). Based on an extensive survey, he defined dwelling-sizes as appropriate when number of persons in a household was equal to their number of "habitable rooms". By this definition, a couple lives in an apartment of appropriate size when this has "two rooms", this usually means living-room, kitchen and one bedroom. By the same definition, a couple with one child has an apartment of appropriate size when they have one more room, a room usually used as bedroom for the child. The data collected in this survey has been an opportunity to examine if such an evaluation of spaciousness still makes sense today.

Based on the results of Ås, a 5-level "index of spaciousness", ranging from "very cramped" to "very spacious", would be as showed in table 1. Together with floor-area per person, this "index" is applied as a way of "measuring" peoples' "spaciousness of living".

"Index"	Description	Number of persons versus rooms
1	Very cramped	P>R+1
2	Cramped	P=R+1
3	Appropriate size	P=R
4	Spacious	P=R-1
5	Very spacious P<R-1	

Table 1
A 5-step "index of spaciousness" comparing number of persons and rooms, based on Ås (1971). Where P is the number of persons in the household, and R is the apartment's number of "habitable rooms" (kitchen not counted).

By this "index", a single-person household live "very cramped" only when the number of rooms is "0" (zero). In common terminology there is no such thing as a dwelling of no rooms. However, if the traditional Norwegian terminology is applied strictly (which means that the kitchen is not counted), an apartment where the living room is the kitchen and where there is no separate bedroom would be an apartment of "0" rooms. This is a kind of dwelling of which numerous have been built in Norway the recent five years.

Results

Kinds of household
Table 2 lists distributions of households according to the household-categories defined above. Some patterns as well as some seemingly peculiar results appear when simply comparing all projects (see table 2-1). Most significant are the projects 41-2 and 74-1, with many "several-adults-households", and 83-1 with extraordinary many households with children and where there are no couples without children.

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Table 2-1, All projects, ranked by chronology

Case, by project number	Type of apartment (****)	Number of rooms (***)	Floor area (m2)	Number of households known	Average time of living (**)	Average "well-being" (*)	Kind of households (in numbers)						Kind of households (in % of known)				
							1 Single	2 Couple	3 Single + child(ren)	4 Couple + child(ren)	5 Several adults	Unknown (of sample)	1 Single	2 Couple	3 Single + child(ren)	4 Couple + child(ren)	5 Several adults
32-1	I	2	57	12			6	4	1		1	0	50	33	8		8
33-1	I	2	50	19	3,2	4,6	13	5	1			1	68	26	5		
41-2	I	3	75	20	11,4	4,9	6	4	2	5	3	0	30	20	10	25	15
70-2	III	2	56	19	7,0	4,7	15	4				4	79	21			
74-1	II	4	83	18		4,3	3	7	3	2	3	0	17	39	17	11	17
76-1	II	4	95	19	14,1	4,6	6	5	2	5	1	1	32	26	11	26	5
77-2	II	4	104	21	16,9	4,4	12	6		3		0	57	29		14	
83-1	II	4	98	19	6,2	4,7	4		4	10	1	2	21		21	53	5
98-2	III	3	62	11	3,0	4,3	5	4	1		1	7	45	36	9		9
Average													44	19	7	11	5
Total of Oslo (percentage of total population of households)													52	18	5	16	9

Table 2-2, The "two-rooms-apartments" only

32-1	I	2	57	12			6	4	1		1	0	50	33	8		8
33-1	I	2	50	19	3,2	4,6	13	5	1			1	68	26	5		
70-2	III	2	56	19	7,0	4,8	15	4				4	79	21			
Average													66	27	5	0	3

Table 2-3, The "three-rooms-apartments" only

41-2	I	3	75	20	11,4	4,9	6	4	2	5	3	0	30	20	10	25	15
98-2	III	3	62	11	3,0	4,3	5	4	1		1	7	45	36	9		9
Average													38	28	4	5	5

Table 2-4, The "four-rooms-apartmenst" only

74-1	II	4	83	18		4,3	3	7	3	2	3	0	17	39	17	11	17
76-1	II	4	95	19	14,1	4,6	6	5	2	5	1	1	32	26	11	26	5
77-2	II	4	104	21	16,9	4,4	12	6		3		0	57	29		14	
83-1	II	4	98	19	6,2	4,7	4		4	10	1	2	21		21	53	5
Average													32	23	12	26	7

(*) :   Average well being as answered in the "ringing door-bells-interviews" .
        (by a 5-step-scale where 5 is the best score)
(**) : Average years of living in current dwelling, among those still living there.
(***): Habitable rooms except kitchen
(****): Typology according to figure 2

Table 2

Distribution of households across each of the 9 projects.

The apartments 41-2 and 74-1 seem to be particularly preferred by "several-adults-households". Given that spatial layout strongly influences kinds of households preferring an apartment, which here is an assumption, these apartments should have some features in common that distinguish them from the others. When comparing the floor-plan-types, such pattern is not found since apartment 41-2 is type-I while 74-1 is type-II. However, when looking more closely at the rooms and their configurations, other patterns occur. Firstly, both apartments have two bedrooms. Secondly, these two bedrooms are not adjacent; in both apartments the main bedroom is accessible directly from the entrance and located as far from the other bedroom as possible. Thirdly, both apartments have kitchen that is separate from the living room and accessible directly from the entrance. By this floor-plan, the kitchen can be used without disturbing what goes on in the living room and vice versa; these dwellings have two rooms appropriate for daytime living. (See floor-plans in figure 4.) If considering balconies as extensions of the living rooms (and not as being separate rooms) both apartments consist of four habitable rooms that, according to Hillier's typology, all are "A-spaces" and thereby general rather than specific regarding functions or use. In conclusion, apartments intended to attract households consisting of adults that are not couples should have several not too small

Proceedings of the 7th International Space Syntax Symposium
Edited by Daniel Koch, Lars Marcus and Jesper Steen, Stockholm: KTH, 2009.

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rooms being of A-type. More in detail, the two floor-plans here found to be particularly appropriate to "several-adults-households", both have a large bedroom positioned by the entrance and not adjacent to the other bedroom and kitchen and living-room that are separate rooms. By this kind of floor-plan, two adults not intimately related have the possibility of separate privacy within one dwelling.

The results of project 83-1 are remarkable in that the rate of households with children is as high as 74 % (21+53 %), far higher than any other project. We also see that number of couples without children is converse to this; among the households in project 83-1 known through this survey, there are no couples without children. Looking at the floor-plans (figure 4), we see that apartment 83-1 differs from the other apartments by its more separate private and social sectors; similarly to most single-family houses, bedrooms, bathroom and WC constitute a private sector of the dwelling located farthest from the entrance and separated from the dwelling's social sector by a corridor.[4] This layout might explain a higher that average rate of households with children, but hardly an increase to 250 % (which is the rate of households with children in 83-1 compared to the similarly sized apartments 74-1 and 76-1). By looking at the outdoor situation, further explanations of the many households with children can be found. Project 83-1 is located in the west of Oslo among single family houses and attached houses, close to Frognerparken, the largest park in Oslo. The areas between the houses have character of playgrounds, the use of cars within the area is restricted and school as well as kinder-garden is located nearby. By all means, this project is particularly suited for households with children. In the interviews, the residents particularly pointed out the children-friendly outdoor areas as a reason for living here. Where the lack of couples without children is concerned, a likely explanation can be this attractiveness for children. The fact that the apartments as well as the out-door areas are so highly preferred by households with children, can make the place less attractive for others. The outdoor areas appear like a large kinder-garden; this is not the place to live if you prefer to sit in quiet sun-bathing on your balcony or if you want a park-like garden with rare flowers. More in general, this project shows how the feature of being highly appreciated by particular groups of people may imply the exclusion of others.

So far, we have looked at the most conspicuous results. The presumed effect of apartment layout on the kind of households choosing an apartment can be examined more closely by comparing apartments of similar size. In this study, there are three projects where the examined apartments have "two rooms". These are 32-1 and 33-1, which are of type-I, and 70-2, which is of type-III. (See table 2-2.) The latter, 70-2, houses only singles and couples,[5] while 32-1 and 33-1 accommodate other categories of households as well. Even though the type-I apartments house a wider range of households than the type-III apartments, the type-I apartments do not have many households with children. However, here the apartment's number of rooms must be borne in mind; whatever the spatial layout might be, these apartments with only one bedroom cannot be expected to house many families. Therefore, in order to shed more light on different floor-plans' potential for housing a diversity of households, we must examine apartments larger than "two-rooms-apartments".

Where apartments of three rooms are concerned, the sample contains two cases: 41-2, which is of the type-I and 98-2, which is of type-III. (See table 2-3) The apartment 41-2 is the case with the most even distribution of kind of households; all 5 household-categories being represented, varying from 10% of the apartments housing singles with children to 30% of the apartments housing single-person households. Looking more closely at the rate of households with children, the percentages among the type-I and the type-III apartments are 35 (10+25) and 9, respectively.[6]

When it comes to apartments of four rooms, there are four projects and they are all of type-II. (See table 2-4) Due to the floor-plan as well as to the suburban locations, one expect these projects to house numerous families with children. This is the case for the projects 74-1, 76-1 and 83-1, the percentages of households with children being 28 (17+11) and 37 (11+26) and 74 (21+53), respectively. The exceptional many households with children in project 83-1 are just commented. What is strange and worth further inquiry is the very few households with children in the project 77-2.

Apartment 77-2 is the largest of this survey with a floor area of 104 m2. These apartments house numerous singles but very few households with children.[7] This strange distribution of households is not due to the apartments or the building being particularly appropriate for singles or

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extraordinary inappropriate for children. Looking closer at table 2-1, we see that 77-2 is the project where the residents have been living in their current dwelling for the longest time; on average they have been living there for 17 years. In fact, half of the households interviewed have been living there all the 28 years since the building was constructed. To put it simple; those who bought these apartments for family-living back in the 1970s still live here; having no garden to worry about, a spacious apartment, a nice view, access by lift and no more loan to pay, they have no reason to move when getting older. Despite what first might appear to be an apartment preferred by limited categories of households only, the apartment 77-2 has shown to be appropriate for numerous kinds of households, ranging from young couples expecting children, to families and to elderly.

The general pattern in these results is that kinds of households living in the different apartments correspond with the "theoretical generality" described by the floor-plan typology showed in figure 2. The type-I apartment, which is the one characterised as most general, houses the greatest diversity of households while type-II houses the least. However, this alone does not prove that type-I apartments are much better dwellings than those housing fewer kinds of households. It could for instance be that the "higher than average" rate of households with children in 42-1 was due to other dwellings not at all being suitable for children, increasing the rate of children in the dwellings that are fairly suitable. However, this is not likely the case. From table 2-1 we see that project 41-2 has the highest score on "well-being". Another result indicating that 41-2 is appreciated by its residents is for how long they have been living there; 41-2 is the project with the second highest score in this respect, only beaten by the project 77-2 just described. This indicates that generality represents a potential not only for housing a diversity of households, but also for being highly appreciated by all of them.

Spaciousness of living

Table 3 shows "evaluation" and "measurement" of "spaciousness of living" across the three types of floor-plans. First, comparing the residents' evaluation with the "index" that simply describe the ratio of people versus rooms, we see that the index based on Ås (1971) still is relevant.[8] However, it must be kept in mind that preferred number of rooms depends on the size of the rooms. Due to tiny bedrooms in most new Norwegian dwellings, evaluations of "spaciousness of living" by simply comparing number of persons to number of rooms, should be done with more care for new apartments than for older ones.[9]

Looking closer at the results in table 3, we see several correspondences between apartment-type and evaluation of spaciousness. Households living in type-I apartments evaluate their living as slightly more spacious than captured by the "index", while those living in the other types of apartments consider their living significantly more cramped than indicated by the index. We find the same pattern when comparing the floor areas; households who consider their living conditions appropriate where spaciousness is concerned, have on average 28 m2 per person in the type-I apartments, while those living in type-II and type-III apartments need on average 35 and 50 m2, respectively, in order to consider their apartment appropriate by size. This is an astonishing big difference in favour of type-I, the general layout. However, since the apartments to compare become few when going into such details, larger samples should be examined in order to find out if spatial typology really is this significant to residents' evaluation of spaciousness.[10]

Apartment type	Area/ person	Spaciousness (**)			Area/person in apartments evaluated by the residents to be of "appropriate size"
		by evaluation	by index (*)	deviation	
I	34	3,4	3,3	0,1	28
II	48	3,6	4,2	-0,6	35
III	49	3,6	4,1	-0,5	50

Table 3
*Apartment types and households' spaciousness of living; **spaciousness of living described by a 5-step-scale (where 1 is very cramped, 3 is appropriate, and 5 very spacious); * "index of spaciousness" compares number of residents to number of habitable rooms (see table 1 for definitions).*

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Conclusion

The typology of apartments showed in figure 2 was the result of studying floor-plan drawings, not a result of visiting the sites or of knowledge about lives in the dwellings. The survey summarised in this paper, constitutes an empirical basis for shedding light on correspondences between this theoretical typology of apartments, a typology consisting in three types of floor-plans, and real residents' evaluations and preferences.

Concerning the projects of type-I and type-II, these were selected in order to be comparable, trying to achieve some kind of "other conditions being equal". Among these projects, the diversity of households (diversity of households living in identical apartments) corresponds to the generality of the apartment as described by the floor-plan-typology in that type-I apartments (which should be the most general ones), house the widest range of households, while few others than singles and couples live in the less general type-III apartments. Concerning the type-II apartments, which are the suburban four-room apartments from the 1970s, the projects were selected in order to represent similar spatial layouts in various settings with respect to outdoor-areas and location in the city. These apartments function as intended in that they house a large number of families with children. The apparent exception is project 77-2, where a majority of the households are now elderly singles or couples. Contrary to what we might suppose, this shows how apartment 77-2 has been appropriate for all kinds of households; those who moved into these apartments as young adults in 1977 have been living there throughout their lives. Without moving to other dwellings, they have passed most categories of households, such as being a couple, having children, bringing up teenagers, having grown-up children living at home and now living there as elderly singles or couples.

If we summarise the results from comparing apartment-sizes (in terms of floor areas as well as numbers of rooms) to spaciousness of living, residents consider apartments of the general type-I much more spacious than similarly sized type-III apartments. In the latter, since the rooms are more specific with respect to use, there are few or no places for daytime activities other than the living room; for the many households where daytime-living consists in numerous parallel activities not peacefully taking place in one room, this spatial layout is not appreciated.

Comparisons of dwellings' spatial properties and domestic lives, such as carried out here, are important for two reasons. Firstly, it provides knowledge about the relevance and applicability of space syntax. Secondly, by pointing out correspondences between real buildings spatial properties and real peoples' preferences and evaluations, it provides knowledge easily applicable in architects' design practice. This study shows that types of apartments identified by space syntax methods are not just a theoretical classification but also a typology that captures properties relevant to real domestic lives.[11] In conclusion, generality works. Unfortunately, it is a strategy rarely applied in contemporary Norwegian housing design.

The results of this study have parallels to the earlier mentioned criticism of urban planning raised by Marcus (2000). Combining the results of this paper with those of Marcus, it can be argued that the concept of functional specificity not only limits the functional performance of cities but represents a problem for the functional performance of architecture and built space of any scale.

Notes

1 Hertzberger describes polyvalence as efficaciousness or capacity in terms of befitting specific situation without being neither specific nor being neutral or explicitly non-specific. By this explicit intention of "anti-neutrality", polyvalence means a somewhat more focused strategy for architectural design than generality. However, working within the tradition of Scandinavian housing research, where generality, flexibility and elasticity have been clearly defined terms since the 1960s (Klarqvist (1969), Cold (1984) and Thiberg (1967)) and applying space syntax where generality is a well established term, this paper stick to the term generality rather than replacing it by the also relevant but more peculiar term polyvalence. (According to Webster dictionary, "Polyvalent / polyvalence" are medical terms for vaccine containing antigens from more than one kind of micro-organism.)

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2   The categorisation of apartment-size by number of rooms is done according to Norwegian terminology where the rooms being counted are the "habitable rooms", i.e. rooms for living and sleeping, not including kitchen or "service spaces" such as bathrooms, washing, storage or circulation.

3   The number after the prefix, "2" in the case "41-2", relates to details in the sampling that is not elaborated here. However, these "two-number abbreviations" are kept in order to distinguish these "project- names" from numbers.

4   This layout, distinguishing between a social sector (containing living room and other rooms for the residents as well as for guests) and a private sector (containing bedrooms and bathrooms/service-rooms for the residents) is common for apartments in many countries. (See for instance Cunha and Magalhães (2005) about Brazilian dwellings.) In Norway, this layout is typical to single-family houses but very rare in apartments built since the early 1930s. This raises interesting issues about dwelling typologies and social and cultural contexts that will not be discussed here.

5   The type-III apartment 70-2 is the apartment with the highest rate of single person households (79%).

6   This is the same pattern as among the apartments of two rooms. Among the apartments of two rooms, the type-III apartments 70-2 are the only ones where there live no children. (See table 2-2.)

7   Only the cases 33-1 and 70-2, which are the smallest apartments in the survey (being only half the size of 77-2), have a higher percentage of single-person households.

8   If keeping a scale of integers, the evaluation of spaciousness should differ from the index by more than 0.5 before an adjusted scale (i.e. a scale where $P=R+1$ was the appropriate size) would be more descriptive.

9   See Manum (2005) or Manum (2006) for details about the development of floor-areas.

10 There is for instance some correspondence between residents' age and their "preferred floor area" that might represent a bias.

11 The result that kinds of households and use of rooms correspond to spatial properties is interesting in light of the fact that very few households explicitly mentioned the spatial layout as being important when they in the interviews were asked about reasons for choosing their dwelling. This corresponds to a results of Blombergsson and Wiklander (2006), showing that we behave in accordance with configurational features that we are not consciously aware of. According to space-syntax terms of Hillier and Hanson, this is "the non-discursive social logic of space".

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Edited by Daniel Koch, Lars Marcus and Jesper Steen, Stockholm: KTH, 2009.

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