

ARCHITECTURAL DISJUNCTIONS. Morphological identity and syntactic contrasts of visibility and permeability

AUTHOR: Daniel KOCH
School of Architecture, KTH Royal Institute of Technology, Sweden
e-mail: daniel.koch@arch.kth.se

KEYWORDS: *Spatial Configuration, Architecture Theory, Architectural Disjunction, Spatial Analysis, Architecture, Building Morphology*

THEME: Architectural Theory and Spatial Analysis

Abstract

Architecture can be understood as deliberate elaborations of physical forms and configurations into socially and culturally meaningful objects, enabling activities and programmes as well as communicating ideas and values. It can be argued that part of this elaboration is that of staging, and that of the treatment of differences of visibility and permeability, which carries strong cultural and social connotations. However, this is often discussed either as singular situations of exposure or accessibility, or as compensatory use of one over the other, where visibility serves to compensate for accessibility, or provide a certain form of transpatiality. Studying structures of relations between visibility and permeability, however, leading to an understanding of emergent degrees of exposure and availability, seems to say a lot about architectural character and identity. This paper argues that a more thorough study of this relation is central to developing architectural morphology, and proposes a model for 'building profiling' that sets up an analysis of how the interrelation between visibility and accessibility can be used to inform architectural analysis of the identity of architectural structures as well as the way that identity of the content is described. This is done on the one hand elaborating on basic architectural morphologies commonly used within space syntax, but also compares to experimental works such as Autant's Théâtre de l'espace from 1937 and everyday urban and architectural situations. The main line of argument is the change from individual situations to a system of syntactic, configurative relations which, it is argued, requires a degree of secondary abstraction – an abstraction that provides thorough understanding of certain architectural effects of configuration that contributes to the character and identity of buildings or urban spaces.

Architecture can be understood as deliberate elaborations of physical forms and configurations into socially and culturally meaningful objects, enabling activities and programmes as well as communicating ideas and values. It can be noted that such elaborations rather than being a property that comes with the introduction of 'Architecture' (with a capital A; compare McMorrough, 2001; Whitehand & Carr, 2001; Venturi, Scott Brown, & Izenour, 1977) bringing with it cultural elaborations into otherwise pragmatic solutions, appear to be rather the opposite – that is, that one of the main purposes of the material practice of building in general lies in this sort of cultural communication (although it may take different forms). As noted by Hanson (1998), thorough studies of housing, and furthermore 'traditional housing', unearths this quality as one of the vital parts of how homes are constituted configurationally as well as symbolically:

"Contemporary literary and sociological studies of people's homes were unearthing a wealth of evidence that space configuration featured in British society in surprising, and often unexpected ways, as a means of social and cultural identification. The manifest variety of ordinary people's lifestyles seemed to point away from behavioural universals and basic human needs towards a view that, if space had a purpose, this was to encode and transmit cultural information." (Hanson, 1998, p. 109)

The degree of deliberate or conscious manipulation or emergent spatial practice – that is, whether the manipulation is used to produce new, unexpected, or transformative results, or emerging through or following established social and cultural norms and habits – may vary, and in various times the degree to which elaborations of space and spatial configurations have taken center stage within the discipline architecture has shifted.

It can be argued that part of this elaboration is that of staging, and that of the treatment of differences of visibility and permeability, which carries strong cultural and social connotations. Arguably, modern architecture made this sort of elaboration its central point as compared to symbolic-formal plays of post-modernism or orders, geometries and sequences of certain types of classical architecture (see e.g. Rowe, 1982; compare: Hadjichristos, 2003). However, this is often discussed either as singular situations of exposure or accessibility (Koch, 2010), or as compensatory use of one over the other (Dalton & Dalton, 2010; Beck & Turkienicz, 2009), where visibility serves to compensate for accessibility, or provide certain forms of transpatiality (Sailer & Penn, 2009). Relations between metric permeability and visibility in simple geometric forms have been clearly discussed by Hillier (e.g. 2003), pointing to some inherent contradictions or oppositions on a small scale while providing reasoning for them being possible to treat as similar in an urban analysis as performed through axial analysis. Zamani and Peponis (2007) further study changes in visibility and permeability in the High Museum of Art in Atlanta, a comparison that in certain respects comes very close to the one in this paper as it studies overall systemic changes. Studying structures of relations them in-between, however, leading to an understanding of emergent degrees of exposure and availability, seems to say a lot of architectural character and identity. Again, Hanson (1998):

"However, in looking at the visual and volumetric qualities of architecture, we need not be constrained by the pragmatics of everyday space use and movement. Indeed we should not be, since architectural speculation almost invariably brings into play the relationship between visibility (what you can see) and permeability (where you can go) through spatial layering, transparency, the inter-penetration of volumes and the dissolving of boundaries." (p. 54)

While it thus can be argued that this difference between ‘seeing and going’ has been present in the field since long, a number of recent papers have discussed it on an overall level of principles, perhaps most notably in Koch (2010), Dalton and Dalton (2010), and Beck and Turkienicz (2009) (compare: Sailer & Penn, 2009). Different between these is the handling of such a ‘split’ between visibility and permeability; Koch discusses it as social and cultural communication, enhancing situations of representation, function, control or privacy, whereas Dalton and Dalton and Beck and Turkienicz argue around the possibilities of complementarity or compensatory effects. In this paper, I will follow the discussion outline above by Hanson and further focused on as principles by Koch, partially because it can be argued to be the least developed of the two, but also because in as far as such disjunctions are inherent in architecture (e.g. Tschumi, 1996) it is of importance to better understand them. In Koch (2010) for instance, it stops at individual situations or relations between specific positions.

Following, it will continue the discussion of Hanson above, in relation to what Markus (1993) has discussed as overall understanding of building forms through comparison to studies such as those of Steadman (1983), comparing permeabilities and visibilities to geometrical proximities and structures. I will be argue that a more thorough study of these relation is central to developing architectural morphology, and will investigate what could sketchily be called a method for ‘building profiling’ that analyses how the interrelation between visibility, accessibility, and adjacency can be used to inform architectural analysis of configurational identities of architectural structures as well as the way that identity of the content or programme is described.

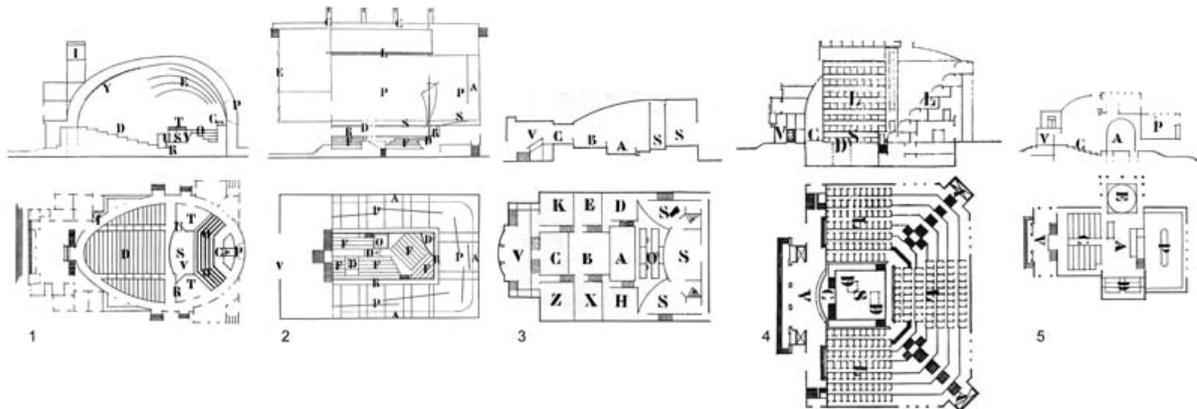


Figure 1: Art et Action worked with five concepts of Dramatic Structure, linking kind of theatre with genre of performance and architectural situation. The five are Théâtre Chorequie (Choral Theatre; choral poetry/vocal music), Théâtre de l'espace (Theatre of Space; Improvisation), Théâtre du Livre (Theatre of the Book; literary readings with commentary); Théâtre de Chambre (Chamber Theatre; introspective drama) and Théâtre Universitaire (University Theater; intellectual drama). The figure shows drawings by Autant, from Read (2005, p. 54). Original source: Bibliothèque nationale de France.

While the main argument will be elaborated upon through basic spatial models as presented already in the Social Logic of Space (Hillier & Hanson, 1984), it will be discussed in comparison to experimental works such as Edouard Autant's and Louise Lara's *Théâtre de l'espace* from Paris, 1937 (Read, 2005) and everyday urban and architectural situations, which were also investigated in the former (Figure 1). The main line of argument is the change from individual situations to a system of syntactic, configurative relations which, it is argued, requires a process of secondary abstraction, which provides thorough understanding of certain

architectural effects of configuration that contributes to the character and identity of buildings or urban spaces. As it turns out, this secondary abstraction also provides an interesting comparison to the normalizing values commonly employed within the field.

FIRST DISJUNCTION: PERMEABILITY AND VISIBILITY

As discussed by e.g. Hillier & Hanson (1984) and more precisely by Hanson (1998; as quoted above), further elaborated by Koch (2010), a disjunction between permeability and visibility can be studied as a cultural connotation (or at least suggestion). The end result is not simply equitable to singular effects as the *how*, *where*, and *when* heavily impacts the *what*, but there are some general effects that can be discussed in terms of control, representativity, community emergence, and power. I will not at current go into these as specific situations but rather refer to Koch (2010), yet briefly sketch the discussion, and in the process slightly tweak it: in this paper the figures square, balcony, catwalk, wardrobe and glass box are used. It is argued that they are architectural figures making different use of the relations between visibility and permeability, and that through either directionality or from whose point of view you are looking they further hold certain social and cultural implications through this configurative setup, such as the catwalk being inherently emphasizing representation (indirectly self-control) and the balcony emphasizing view (indirectly positions of power). At the same time, e.g. Hanson and Zako (2007) argue for the benefits of making use of certain ways of working with the distinctive properties of vision and bodily presence/movement to establish communities. Similarly, it can be argued that that producing visibility while restricting access provides a certain *kind* of community and life (based on recognition and sharing of space; e.g. Berström, Marcus, & Koch, 2010), without being intrusive or disturbing, or while maintaining certain social distinction (e.g. into groups and subgroups of community). Thus similar figures that can be seen to produce sense of community and safety can conversely be seen as a way to produce control and surveillance (Foucault, 1991), increasing the demand on conduct and taste as a result of generating spaces where your conduct is continuously scrutinized and in the end generating exclusion (Koch, 2010; Bennet, 1995; Bourdieu & Darbel, 1991).

There are several cases where this split is intentional. The Barcelona pavilion is one example from 'high architecture' (see Quetglass, 2000), whereas more everyday examples could be luxury stores (Koch, 2007), or parts of homes such as described by Hanson (1998). From an inhabitation perspective, Hillier and Hanson (1984) use the example of the 'boss' normally having his or her room deepest inside a building, which can be argued for often being complemented by them, from a *visibility* point of view, being quite close to entrances, squares, or similar public spaces. As a result of distance and geometry, these positions tend to be similar to 'balconies' in Koch's figure terminology, but not seldom there is also a symbolic effect of being able to see not the person, but the 'window' of the one in power from the outside without being able to reach it. While positions of power, balconies are also calm places from which one can still participate in urban life (compare: Lefebvre, 1996), and while putting conduct and person under scrutiny, a stage or catwalk is also a place for recognition and showing off excellence and confidence.

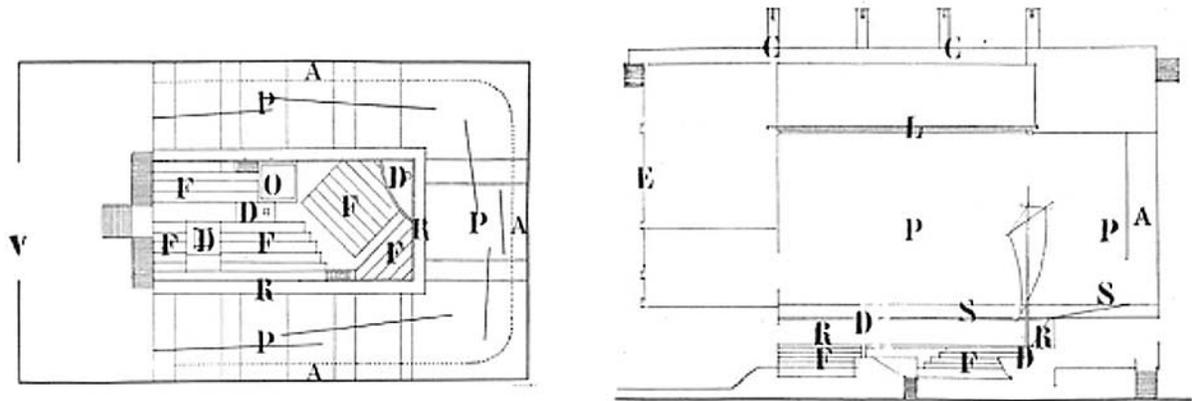


Figure 2: Théâtre de l'espace, plan (left) and section (right). Drawings by Autant, from Read (2005). Original source: Bibliothèque nationale de France.

These situations are similar to what is played with in Autant's *Théâtre de l'espace* (Figure 2), which was an experimental theatre in part created to experiment with everyday urban situations through how the relation between audience and performers were staged, in providing one scene 'in front of' the audience – who also saw each other in a horseshoe-like setting – two scenes 'amongst' the audience, and a scene above and around the audience (see Figure 2). In a sense this theatre investigates the very same qualities as Koch if on a practical/material level, while also clearly making a point of all of them being part of everyday urban, public space. For this reason it will be returned to throughout this paper as it can help give more concrete understanding of the at times exceedingly abstract line of reasoning in the attempts to syntactically capture these situations.

To the point: What happens if we were to try and understand such figures, or more specifically the disjointed relation between configurations of permeability and visibility on a *system* level? Under the conditions that this should be done emphasizing and describing the *difference* and the *systemic distribution and effect* of such difference, it can be argued not to have been done thoroughly in the ways that investigations of complementarity are by comparison. Therefore, we will make use of simplified geometric representations of potential (abstracted) buildings similar to how it is done in Hillier and Hanson (1984) and Hillier (1996); See figure 3.

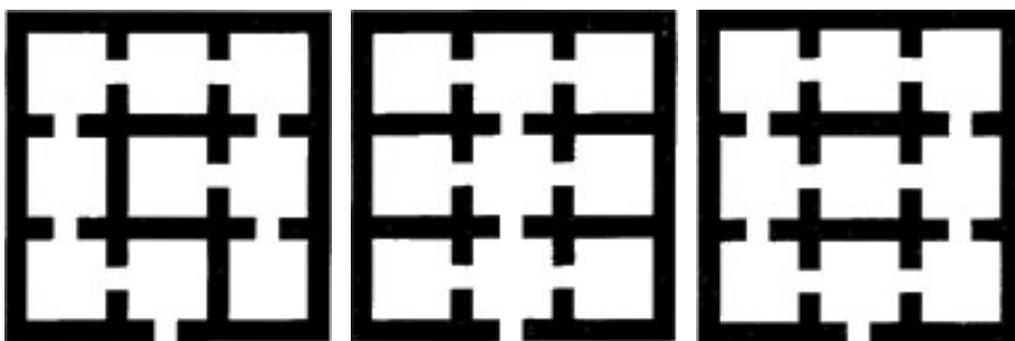


Figure 3: three standard conceptual plans used to illustrate space syntax principles, after Hillier & Hanson (1984).

The investigation can then be rather simply set up. From a logical point of view (if we allow ourselves to consider doors to be connections of permeability but not visibility and windows/glass walls as the opposite), there is nothing saying that one of these figures considered as *visibility relations* could not be overlaid another considered as *permeability relations*. That is, we can take plan (a) to be the visibility conditions of a building with the permeability pattern (b), plan (b) to be a building with the permeability pattern of plan (c), and plan (c) to be the visibility pattern of a plan with permeability pattern of (a). While perhaps not 'realistic' or 'probable', neither of these are currently the point.

If we accept this proposal, what is then the next step? Comparing justified graphs only tells us so much, and while to some extent logical reasoning could take us quite a far way it becomes difficult on a system level. Learning from Hillier (2003, e.g. p. 06.5), it shows that it is entirely possible to do a mathematical comparison. This comparison will here be made through Relative Asymmetry, as the identical size of the buildings do not require normalization as in RRA or integration (there are further reasons, but I leave that for later), and it is chosen over Mean Depth because the preference is for relative system properties. The end result would, however, be very similar. Second, as the current discussion is of buildings it is reasonable to discuss the relation to the entrance, why an exterior is added by process of *mirroring*. That is, an identical but mirrored structure is added opposite, and a single external step is introduced in-between. This draws the minimal mean depth to the entrance (lowest RA, highest Integration) by definition. While it could be argued to be an arbitrary operation, cutting a building off at the entrance is just as arbitrary, and it can be argued that relation to the entrance is one of the few things that is somehow 'inherently' or at least 'intuitively' of importance in the configuration of a building. RA is calculated using JASS (Koch, 2004).

These values, can then be compared to one another similar to how is done in intelligibility analysis (Hillier 1996), simply comparing the degree of correlation between $RA_{visibility}$ and $RA_{permeability}$. While ostensibly perhaps a conspicuous operation, where results may seem predictable, it turns out to be quite intriguing. Whereas the simple overlay of using the same plan for both visibility and permeability (used for control purposes, Figure 4a) predictably turns out to be a straight line, the changes in the following graphs appear to be less predictable and rather thought-provoking. While overlaying the series with a tree (4b), for instance, we get something of a cloud, and with a network (4c) we get something of an S-curve, and if we overlay the tree with a network (4d) we get a more discernible 'split' of higher and lower degrees of visibility compared to permeability.

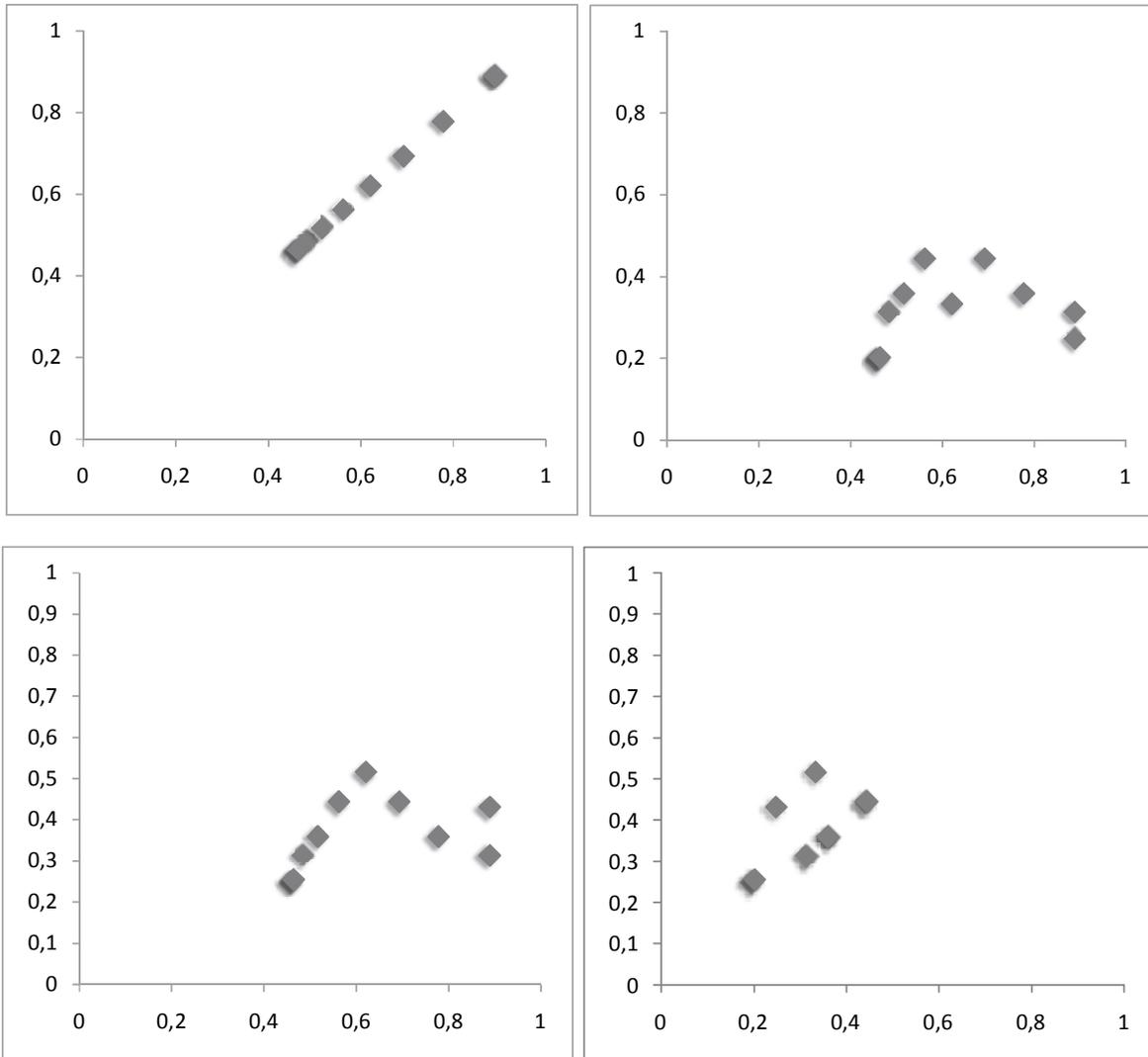


Figure 4: scattergrams of the relations between configurations of permeability (horizontal) and visibility (vertical) as: (a) series-series, (b) series-tree, (c) series-network, (d) tree-network.

While these patterns are intriguing in themselves, there is another step that may help us understand them: adding in the permeability connections as in Figure 5, the results are even more interesting – for completeness this figure includes all six possibilities where permeability is always on the horizontal axis.

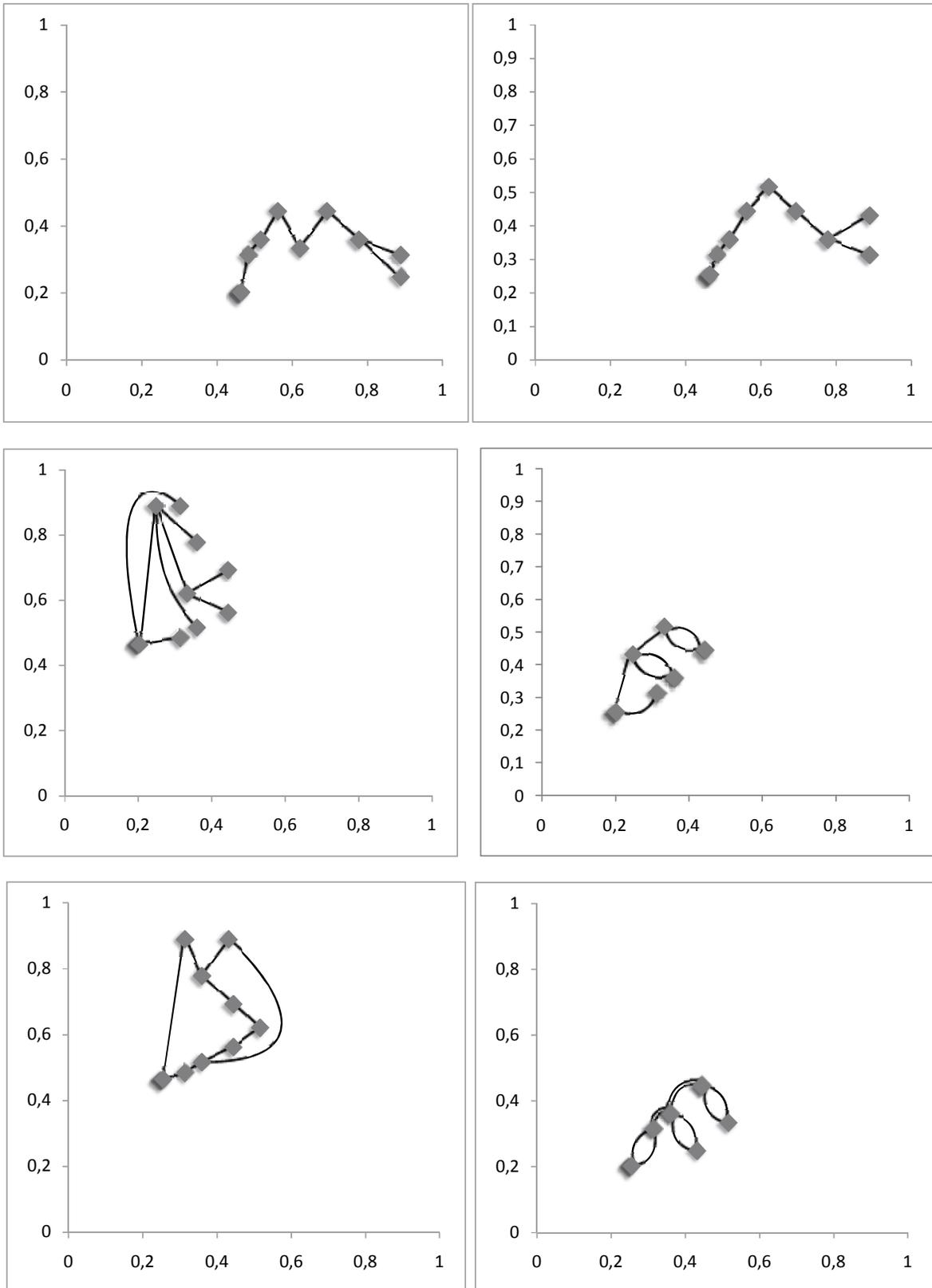


Figure 5: Permeability lines drawn (two lines if two spaces occupy the same point), with series (top), tree (middle) and network (below) as permeability configuration along the horizontal axis and visibility on the vertical axis (series+tree, series+network, tree+series, tree+network, network+series, network+tree).

To add to this discussion, it is worth considering effects of architectural configuration in three dimensions. This can be sketched by simple application of a second story from which we remove the central room on the top floor and make it an atrium, the four spaces adjacent to it instead *visibly* connected to the ground floor central space, but *permeability-wise* disconnected. This is similarly made on the ground floor so that the four spaces around it always have visibility connections to the central room regardless of the permeability situation. For the purpose of this discussion I will limit myself by proposing that permeability extends logically into two branches from the tree (stairs in the entrance room), into a series (stairs in the far end of the configuration) and into a ring (stairs in the middle rooms, right and left side). The end-result turns out as in figure 6.

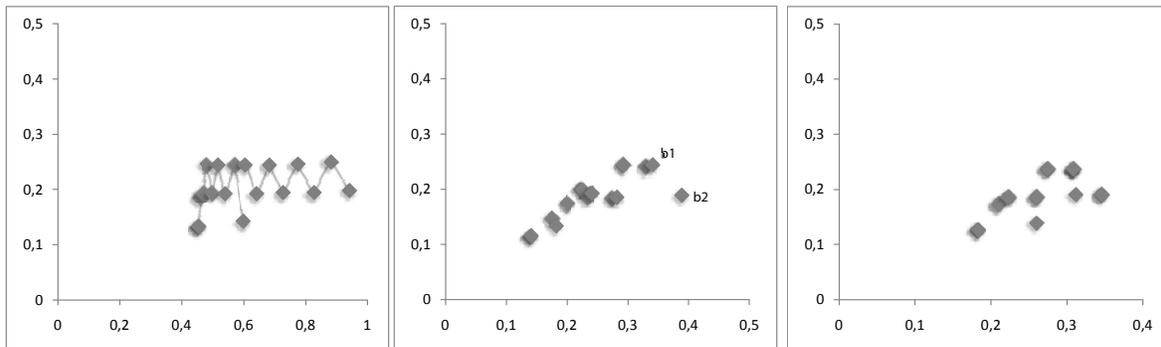


Figure 6: The 'atrium' situation of permeability patterns of a series (a, left), a tree (b, middle), and network (c, right). The series has the permeability connections in light grey.

Here we see some remarkable results that are also quite enlightening. Adding the permeability patterns into the graph of the series (grey lines) we see, for instance, how it produces a clear rhythm of alternating visible contact and separation while moving along a singular sequence, forming two near horizontal lines of visibility relations. Such is not the case for the others, but for the tree we find that endpoints of the branch end up either exposed or hidden (marked b1 and b2 in the graph) and that while there is a rhythm in the network as well, it is a rhythm that makes 'full circle' and returns to the stair thus not having the same length of increased disjunction.

At this point we can to a certain extent study the Théâtre de l'espace in relation to a regular theatre, if on the level of comparison of principles, in that Autant's creation, for the *actors*, creates a situation similar to figure 6c, whereas a traditional theatre possibly creates that of figure 6a, even though it can be argued the visibility connections would not be there. The walls and openings, however, do provide a rhythm of exposure and separation, while keeping this within a ring of permeability *around* the audience instead of a tree or a series *separate from* them.

But, this argumentation aside, that is, that we can definitely find social characters or social roles that seek out, produce, or make use of individual cases, it is more important to address the systematic situation and its potential effects. What is the difference between a system where being visible is highly separated from being accessible *as a general rule*, and a system where being visible generally means being accessible? To a certain extent we get clues here both from pattern and from connections, but we can drive it further to include degrees of correlation and steepness of the correlation line (Figure 7) – does visibility or

permeability asymmetry increase most, and with what inclination? – and through studying systemic positions of individual spaces in relation to their program, for instance.

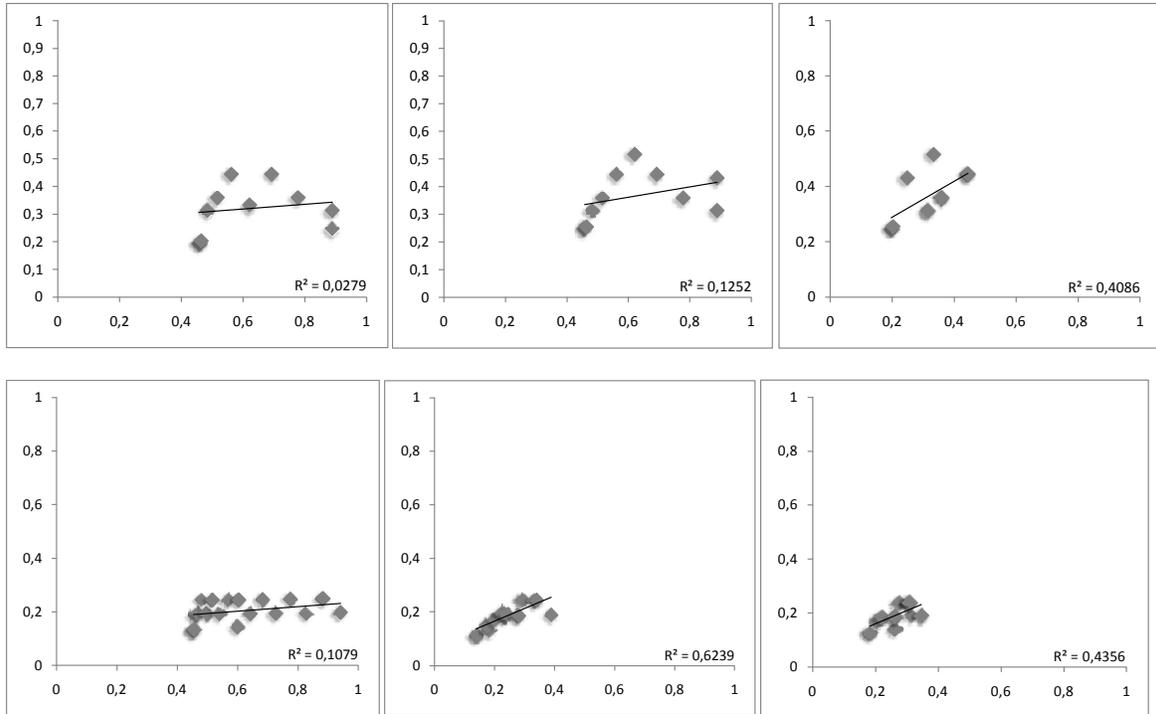


Figure 7: trendlines and correlations for graphs of figure 4 and 6. Note that the graphs of Figure 4 have been re-adjusted to have an equal scale in the y-axis as those of figure 4.

Furthermore, we can through the secondary abstraction, that is, the graph comparing the graphs of these systems, get an understanding of to what extent this complexity is played with and what character it produces. While one of the figures produce a split, for instance, another presents a curve and another a continuous whole. The question is then what this means. Is it so simple so as to say that an increase of visibility compared to permeability is an emphasis on representation, versus a correspondence being a sign of focus on orientation or use? That would be the implication of Koch (2010), although it must be kept strictly in mind the figures employed in that paper are for singular situations whereas this is a question of systemic characters, and direct translations between the two are risky at best. Again this is clearly shown by Autant's work, providing a range of situations for, in, and around the audience that normally are not part of a theatre or a stage, but which also relate differently to the actors than a normal theatre does – yet as individual positions they would still find their counterparts therein. That is, for specific spaces the figures hold true, but for the system as a whole the question is more complex.

Comparatively, for instance, a traditional theatre is likely to have a few spaces (not only the stage but also e.g. the foyer) very well visually integrated, and some (e.g. artists' dressing rooms) severely segregated. A palace, on the other hand, may have less apparent emphasis on the exposure of specific places yet stronger overall emphasis on representation (representativity), and a finer-scale understanding of the systemic distributions of permeability and visibility is important. Not the least an understanding of *which* spaces are

exposed or permeable compared to *which* spaces – compare for instance the similarly permeability-segregated spaces of what Koch terms ‘the catwalk’, and the one analysed by Colomina (1996) in Adolf Loos’s house for Josephine Baker, setting the inhabitant on stage for visitors repeatedly with little control over the interface for the inhabitant. In many senses they are doing the same configurational operation, but they do it to different spaces and different *programmes*. In a strictly spatio-configurational manner, however, they could be claimed to be more or less the same, whereas Autant’s theatre does something radically different. I will return to this later.

SECOND DISJUNCTION: GEOMETRY AND ACCESS

If these relations can be analysed in this way and it becomes informative, it is worth noting that the graphs that are analysed (visibility and permeability) are both ‘sub-graphs’ of adjacency graphs – as acknowledged by e.g. Steadman (1983). Steadman does not make any further point of the permeability graph, however, while it can be argued that the realization of its importance is in part the success story of space syntax. Is it relevant, then, to bring this adjacency graph back into the argument? I will argue it is, especially when it comes to architecture, as it can be used as a proxy for ‘proximity’, or ‘sense of location’; that is, as Thomas Markus states it:

“My experience is of the location and general form of the building, the details of what is on its surfaces, its colour, the stories told by its carvings, the geometrical ornament. [...] Further, I sense how its spaces are organised, even the sanctuary to which I cannot gain access, the crypt, and those outside where I have recently been. I know what is near the entrance, what lies deep in, what is next to what, how all these spaces are connected.”
(Markus, 1993, p. 7)

It can further be argued that ‘I’ also know when ‘I’ am in the back end, the front, on the top floor, *et cetera*, as a configurative position of adjacency regardless of position of permeability. That is, ‘I’ know that one floor down, just below my feet, is the entrance, even if ‘I’ have to traverse most of the building to get there. This is the ‘cognitive’ argument. Another argument is purely architectural-formal: it is of interest to know how a geometric construction of adjacency relates to a configurative construction of permeability (or visibility), because this tells us something about the interrelation between space and volume, and hereby about *architecture* – and this is something that the integration value or J-graph *does not show*. In space syntax measures, geometric adjacency is simply deliberately removed from the equation. That is, we can construct an adjacency graph, and for purpose of cognition (Markus) and symmetry of figure perform an equal operation of mirroring it around the entrance. This operation is, again, arbitrary – but it can again be questioned why it would be less arbitrary to assign geometric adjacency centrality to the central room rather than the entrance. All the same, if we do this we can overlay all of the single-floor permeability graphs over the adjacency graph (all spaces connected to all of their neighbours) and see the results as in Figure 8.

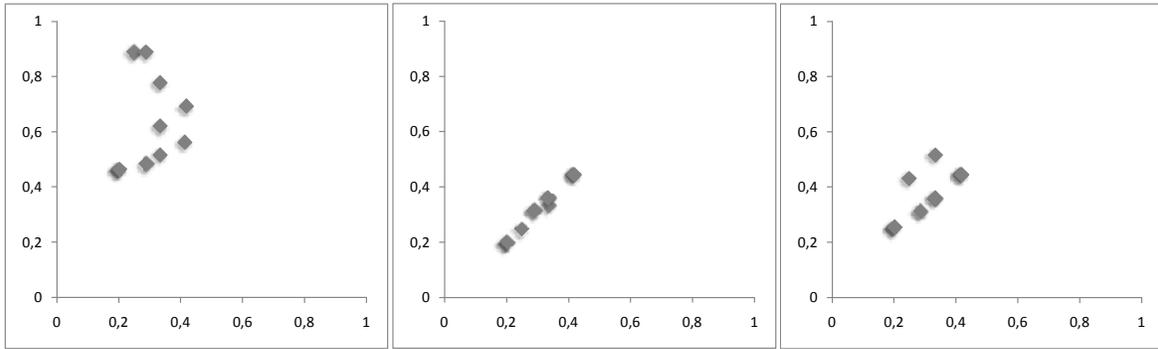


Figure 8: adjacency-permeability of the original figures (figure 3/4). Note (a) how similar they are to those using the tree as permeability/horizontal axis, and (b) the extreme correlation between adjacency and tree configuration.

For now simply noting the remarkable similarity between adjacency and the tree structure, we can in order to up the stakes in the game extend this into three dimensions by conceptually mirroring the plans into section. That is, we let the ‘series’ continue to develop serially by linking floors at the very end to construct as deep a structure as possible, we let the tree structure continue its tree logic by linking floors straight up from the entrance to then branch on each floor, and we let the network logic expand its ‘rings’ by adding the two rings as permeability section in the center row (making staircases of the middle-left and middle-right rooms). Again, we can compare it to the adjacency graph (everything is adjacent to its neighbours – also vertically). The results are as seen in Figure 9.

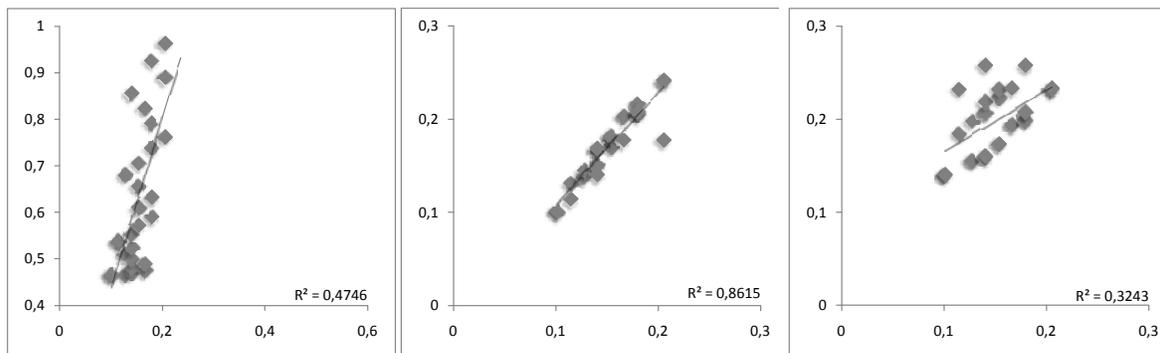


Figure 9: three-dimensional evolution of the *logics* of the original figures. Still the tree is remarkably well correlated, whereas the network is the *least* correlating. Note that the y-axis in the case of the series is more than three times as expansive as in the tree/network graph, making the steepest correlation by far much steeper.

Now, to some extent, it could be claimed that this is just a normalization process similar to the P or D-values in space syntax analysis. I confess it could be in the current model – we could re-iterate the same comparison as between adjacency and P or D-value (Hillier & Hanson, 1984), focusing on how they differ or correspond (as above), or for that matter instead of using P and D-values to normalize the relative asymmetry into real relative asymmetry study the character of the topical configuration to an ‘ideal’ configuration. However, this holds true only as long as we work with idealized (simplified and abstracted)

forms. If we were to turn to real buildings, adjacency graphs would look very different depending on the geometry of the building, and the same configuration would get radically different scattergram profiles when relative asymmetries are compared. What I argue is that the pattern of, and the relation between, relative asymmetries emerging from the comparison of adjacency and permeability (or visibility) is highly informative of the use the configuration makes of a *specific volume*. That is, formal properties are brought into configurative research. It can then further begin to illustrate the difference between *similar* configurations in *dissimilar* geometries. While a different question than regularly asked in space syntax research, it is highly central to *architectural* research. To illustrate this, a single example will be used: that of the central corridor. It is an alternate evolution of the tree, continuing the central 'stem' of the tree all-through with single-step branches along it. This can then form a single long corridor passing through nine spaces, or the same permeability sequence can be folded over itself so as to form a cube. These two 'tree' configurations can then be compared to the cube constructed with a tree 'logic', as is done in figure 10.

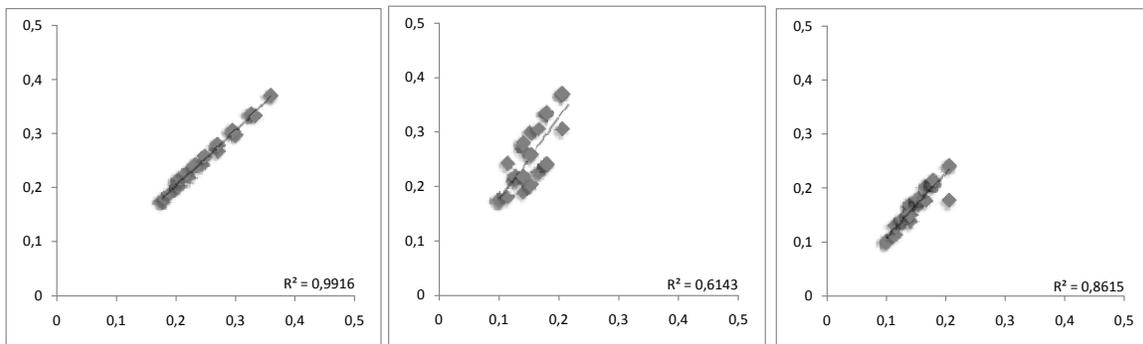


Figure 10: Comparing the correlations of a 'flat' tree/corridor, a 'folded' cube tree/corridor, and a 'tree-logic' cube. We can see how the tree permeability *logic* follows adjacency, whereas an insistence on the same configuration gives weaker results.

What we can see is that the tree effectively equalizes geometric and configurative depth, whereas other configurations play with it by for instance maximizing disjunction, mixing or splitting off, or creating rhythms. The capacity of the 'tree' to function 'equal' to adjacency is, however, embedded in its configurative *logic* in the way it treats distances of configuration and adjacency *providing that the logic adapts to the geometry*, and not in a specific, pre-decided configurational permeability/visibility development. Following, it is reasonable that there are configurations that more closely follow geometries of other kinds and configurations that play with them differently *based on what geometry is played with*.

THIRD DISJUNCTION: DIRECTIONALITY AND POSITION

Let us try, finally, to investigate the relation between *exposure* and *visual experience*, as a means to study how in certain situations visibility is decidedly directional. That is, how does a particular setup work if we allow for directionality and take into consideration that some places are *seen* while others are *seen from*.

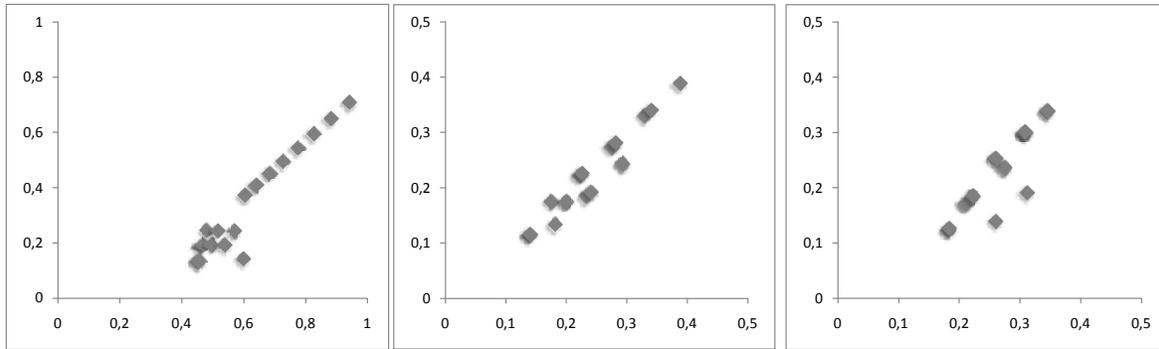


Figure 11: Relations between permeability and ‘exposure’ understood as directional visibility *from* the second floor to the first, but not the other way around.

As a first excursion, we can assume that the atrium visibility discussed above is an analysis of *visibility*, that is, integration from the subject able to move around the building, looking out or down from windows, et cetera – for instance the actors in Autant’s theatre. In such a case, seeing into a window equals seeing a place possible to get to, and the situation becomes similar to the one argued by Dalton and Dalton (2010), why it in the prolonging could be studied through their layered graphs. If we instead consider ‘exposure’, that is, the position of the *seen* subject and/or the visitor, some restrictions could be applied. For simplicity we can use similar restrictions as discussed in the introduction, that windows high up may not give vision into those rooms while providing vision down, that is, there is a *direction* of visibility that goes from upstairs to the atrium but not back. In that case, we need to recalculate the ‘exposure’ asymmetry to include the reciprocal vision of the ground floor, but the relative asymmetry calculation would have to be separated for ground and second floor. Pragmatically this can be done by running two calculations, one ‘exposure’ including the links between ground and second floor, and one ‘vision’ removing these, then replacing the earlier values for the top floor. If we accept this logic as a mathematical proxy, it leads to a pattern as seen in figure 11.

The patterns are interesting. Somewhat surprisingly, perhaps, we see specifically few spaces that stand out as exposed as compared to available in the *series* and the *network*, whereas the tree (compare figure 4) continues to follow a general high degree of correlation. The *series* quite specifically keeps the same rhythm on the ground floor (every second exposed, every second ‘hidden’), but then rapidly grows deeper and deeper. This in particular is predictable but dramatized through the setup. The *network*, on the other hand, only marginally changes with a small part of the rings gaining depth. In both cases, however, the rhythmic sequential change of degree of exposure is removed. The directionality has, it seems, radically much stronger impact in a deep permeability structure than in a network structure. In effect, the deeper the structure, the more powerfully a disjunction of directed vision can work. As it turns out, the difference of the theatre setup of Autant’s Théâtre de l’espace, conceptually similar to the network figure analysed here, and the traditional theatre, conceptually similar to the series figure as analysed here, on a systemic level becomes greater for the *audience* in their relation to the *performers* than for the *performers* in relation to the *audience*. Or, the difference is greater studied as a question of relations of *exposure* than it necessarily is studied as relations of *visibility*. That is, the exposure of actors to audience is radically de-emphasised in a traditional theatre while rather (systemically) present in Autant’s work. Providing this line of reasoning holds true, this can be illustrated through a final series of scattergrams, comparing *exposure asymmetry* to *visibility asymmetry* (Figure 12). Graphs that make it utterly clear the extent to which the structures are sensitive to directionality.

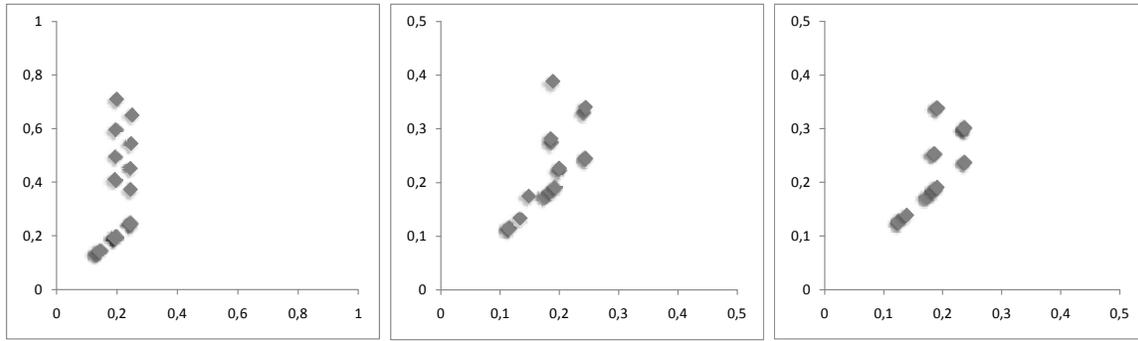


Figure 12: the asymmetric relationship between 'exposure' (vertical) and 'visibility' (horizontal).

As we can see, the difference between exposure (y-axis) and visibility (x-axis) asymmetry is somewhat similar in its pattern, predictably deviating for the spaces of the upper floor. However, the degree of deviation is remarkably different, with the tree and network models still resembling a correlation and hereby an intelligible relation, whereas the series structure does something completely different. At this point, we are far inside a discussion of 'spatial logic', and it could be argued to have reached a point where it is hard to see its correspondence in actual built structure. However, it could be argued to be the logic as seen from the second floor compared to the logic from the entrance floor, or as the spatial logic for residents (actors) as compared to visitors (audience), and a comparison of to what extent they are similar, where, and how. This only holds so far, however, and it is more proper to point to, again, the rather illustrative Figure 11, especially a, which could be argued to quite well illustrate various forms of theatre or fashion houses in staging both the stage itself, and the lobby and foyer for everyone in the building, while deliberately segregating all of the spaces in which workers are. The comparative depth for visitors comes even more clear in Figure 12 a, and we can see a logic emerging of ensuring on one hand *representativity* of certain spaces while emphasizing *privacy* or *control* of others. This directionality is to certain extents questionable and should only be considered with care – as should all cross-floor visibility analyses be. It may be that a comparison between Dalton and Dalton's layered graph analysis and regular permeability is more fair, as this blunt comparison exaggerates certain properties of vision, and investigations into graph isomorphisms (Conroy-Dalton & Kirsan, 2005) can shed further light on *where* the differences are instead as of here, their systemic effects.

CONCLUSION: COMPLEXITY AND CONTRADICTION AS CULTURAL COMMUNICATION

The above constitutes an initial, very formal analysis of principles of 'spatial disjunctions' – that is, inherent disconnections between 'seeing and going', or visibility and permeability, as discussed in e.g. Hillier & Hanson (1984), Hanson (1998), Hillier (2003) and Koch (2010). It moves to establish an analysis of systemic differences instead of specific situations or case-to-case comparison. Through a series of comparisons of *relative asymmetry* of different systems, it shows that not only for individual spaces or individual cases, it is telling to study relations of visibility and permeability as architectural, *system* properties. It further went on to compare elaborations of spatiality through proximities and permeabilities, whereby the spatial configuration turns out to provide rather different results depending on their implementation into structures of adjacencies not only as regularly understood in space syntax research but also in how similar configurations are elaborated into structures of adjacency. Such systemic differences seem to offer a fair

deal of information on architecture both as a cultural, social and a spatial artefact, even if the way it links to social or experiential values still remain to be clarified beyond initial observations. There seems to be little question, however, that as *architectural properties*, these systemic differences are of interest, and also that they are of potential high interest to understand the way in which different architectural traditions elaborate space and geometry into physical structures, in a formal analysis that may or may not then be brought further into the realm of performativity or emergent behaviours. This analysis is performed through what could be called *secondary abstraction* – that is, by comparing the abstractions that are relative asymmetries of spatial configurations with one another, studying their formal, graphical output in a chart rather than returning to the concretion of a plan.

What we are talking about is, in a formal way of expressing it, asymmetric relations between relative asymmetries that are not complementary or compensatory but characterizing on a configurational and geometrical level; perhaps we can speak of *configurational aesthetics*. We can then look at the tripartite configuration of visibility-permeability-adjacency as the way in which the physical structure is elaborated as configurative system into a complex whole containing contradictions and complementarity on all levels but perhaps more than most in the ways these three are combined together. A cube elaborated into a series is a very different thing from a cube made into a tree, or a three-dimensional network, but also how equal configurations become different if elaborated into different configurational-geometric structures. Providing that the adjacency relations of the cube (or any configuration) are to certain extents cognitive, or at least present in both interpretation and use of spaces, reading of narratives, and the understanding of contextual social role and position (Markus 1993; compare: Tversky, 2003), this is of importance for what the configuration does with architectural perception.

In a larger scale we could investigate cities in the same way, where for instance Stockholm could be said to be characterized by high degrees of discrepancy between distributions of visibility and permeability configuration, providing we allow visibility configuration to reach over water, whereas perhaps London has a higher degree of similarity. This split is, it is worth noting, is mainly a result of the masses of water and the archipelago-like nature Stockholm is built on. Exactly what this means is of course debatable but the case can be made that one of the results is a series of viewpoints that consecutively leads to a number of tourist-friendly walks and postcard-friendly environments, produced by the water and archipelago-like topography, understood as ‘the water’ but perhaps as much a result of this split as any inherent quality of water. That is, from many points of views cities located in highly uneven terrain would provide similar results in terms of viewpoints. Naturally, the treatment of these disjunctions are important for their effects, just as it is for any architectural formulation and not specifically this particular form, and thus while this paper begins to find ways to describe the degree, distribution, and profile of such a disjunction, further studies are required to develop how it can be used beneficially in actual cases.

The main point here is that if these simple models provide such different graphs, and these graphs say something even if it at this stage remains to be fully elucidated just what information it is they provide, then it can be as informative, if not more, to understand graphs made of actual buildings. This is not done in this paper *by choice* as the line of argumentation is conceptual rather than practical, and that it would lead to a discussion on cases rather than generality – at which point a high number of other characteristics need to also be taken into consideration. However, in the prolonging it seems to point towards formulative logics of configurative aesthetics.

REFERENCES

- Beck, M. P., & Turkienicz, B. (2009). Visibility and Permeability: Complementary Syntactical Attributes of Wayfinding. In D. Koch, L. Marcus, & J. Steen (eds.), *Proceedings of the 7th International Space Syntax Symposium* (pp. 009.1-009.7). Stockholm: KTH.
- Bennett, T. (1995). *The Birth of the Museum*. London: Routledge.
- Bergström, A., Marcus, L., & Koch, D. (2010). *KI Arkitektur och Kunskapsmiljö: Tävligen/Etableringen/Förnyelsen*. Stockholm: Akademiska Hus.
- Bourdieu, P., & Darbel, A. (1991 [1969]). *The Love of Art: European art ,useums and their public*, trans. C. Beattie & N. Merriman. Cambridge (UK): Polity Press.
- Chua, B. H. (1992). Shopping for Women's Fashion in Singapore. In R. Shields (ed.), *Lifestyle Shopping: The subject of consumption* (pp. 114-135). London: Routledge.
- Colomina, B. (1996). *Privacy and Publicity: Modern Architecture as Mass Media*. Cambridge (MA): MIT Press.
- Conroy-Dalton, R., & Kirsan, C. (2005). Graph Isomorphism and Genotypical Houses. In A. van Nes (ed.), *Proceedings to the 5th International Space Syntax Symposium, Volume II* (pp. 15-17). Delft: Techne Press.
- Dalton, N. S., & Dalton, R. C. (2010). Solutions for visibility-accessibility and signage problems via layered-graphs. *Journal of Space Syntax*, 1(1), 164-176.
- Foucault, M. (1991 [1975]). *Discipline and Punish: The birth of the prison*, trans. A. Sheridan. London: Penguin Books.
- Hadjichristos, C. (2003). The Would, The Could, the Should and the Is: The role of the architect and client in the production of the spatial characteristics of the contemporary Greek-Cypriot House. In J. Hanson (ed.), *Proceedings to the 4th International Space Syntax Symposium* (pp. 23.1-23.14). London: Space Syntax Laboratory.
- Hanson, J. (1998). *Decoding Homes and Houses*. Cambridge (UK): Cambridge University Press.
- Hanson, J., & Zako, R. (2007) Communities of Co-Presence and Surveillance: how public open space shapes awareness and behaviour in residential developments. In A. S . Kubat, Ö. Ertekin, Y. I. Güney, E. Eyüboğlolu (eds.), *Proceedings to the 6th International Space Syntax Symposium Volume I* (pp. 021.1-021.22). Istanbul: ITU Faculty of Architecture.
- Hillier, Bill. (1996). *Space is the Machine: a configurational theory of architecture*. Cambridge (MA): Cambridge University Press.
- Hillier, B. (2003). The architectures of seeing and going: Or, are cities shaped by bodies or minds? And is there a syntax of spatial cognition? In J. Hanson (ed.), *Proceedings to the 4th International Space Syntax Symposium* (pp. 6.1-6.6.34). London: Space Syntax Laboratory.
- Hillier, B., & Hanson, J. (1984). *The Social Logic of Space*. Cambridge (UK): Cambridge University Press.
- Koch, D. (2004). *Spatial Systems as Producers of Meaning: The idea of knowledge in three public libraries*. Stockholm: KTH.

Koch, D. (2007). *Structuring Fashion: Department Stores as Situating Spatial Practice*. Stockholm: Axl Books.

Koch, D. (2010). Architecture Re-Configured. *Journal of Space Syntax*, 1(1), 1-16.

Lefebvre, H. (1996). *Writings on Cities*, trans. E. Kofman & E. Lebas. London: Blackwell.

Markus, T. A. (1993). *Buildings & Power: Freedom & control in the origin of modern building types*. London: Routledge.

McMorrough, J. (2001). City of Shopping. In C. J. Chung, J. Inaba, R. Koolhaas, and S. T. Leong (eds.), *The Harvard Design School Guide to Shopping/Harvard Design School Project on the City 2*, (pp. 193-203). Köln: Taschen.

Quetglas, J. (2000 [1980]). Loss of Synthesis: Mies's Pavilion, trans. L. E. Carranza. In K. M. Hays (ed.), *Architecture Theory since 1968*. Cambridge (MA): MIT Press.

Read, G. (2005) Theater of Public Space: Architectural Experimentation in the Théâtre de l'espace (Theater of Space), Paris 1937. *Journal of Architectural Education*, 58(4), 53-62. doi: 10.1162/1046488054026796.

Rowe, C. (1982). *The mathematics of the ideal villa and other essays*. Cambridge (MA): MIT Press.

Sailer, K., & Penn, A. (2009). Spatiality and Transpatiality in Workplace Environments. In D. Koch, L. Marcus, & J. Steen (eds.), *Proceedings of the 7th International Space Syntax Symposium* (pp. 095.1-095.11). Stockholm: KTH.

Steadman, J. P. (1983). *Architectural Morphology: An introduction to the geometry of building plans*. London: Pion Limited, 1983.

Tschumi, B. (1996). *Architecture and Disjunction*. Cambridge (MA): MIT Press

Tversky, B. (2003). Structures of Mental Spaces: How People Think About Space. *Environment and Behavior*, 35(1), 66-80. doi:10.1177/0013916502238865.

Venturi, R., Scott Brown, D., & Izenour, S. (1977). *Learning from Las Vegas: the forgotten symbolism of architectural form*. Cambridge (MA): MIT Press.

Whitehand, J. W. R., & Carr, C. M. H. (2001). *Twentieth-Century Suburbs: a morphological approach*. London: Routledge.

Zamani, P., & Peponis, J. (2007). Radical Discontinuity or Variations on a Theme? The recent history of the High Museum of Art. In A. S. Kubat, Ö. Ertekin, Y. I. Güney, E. Eyüboğlou (eds.), *Proceedings to the 6th International Space Syntax Symposium Volume II* (pp. 071.1-071.14). Istanbul: ITU Faculty of Architecture.