Systems Changes

Learning from the Christopher Alexander Legacy

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http://coevolving.com

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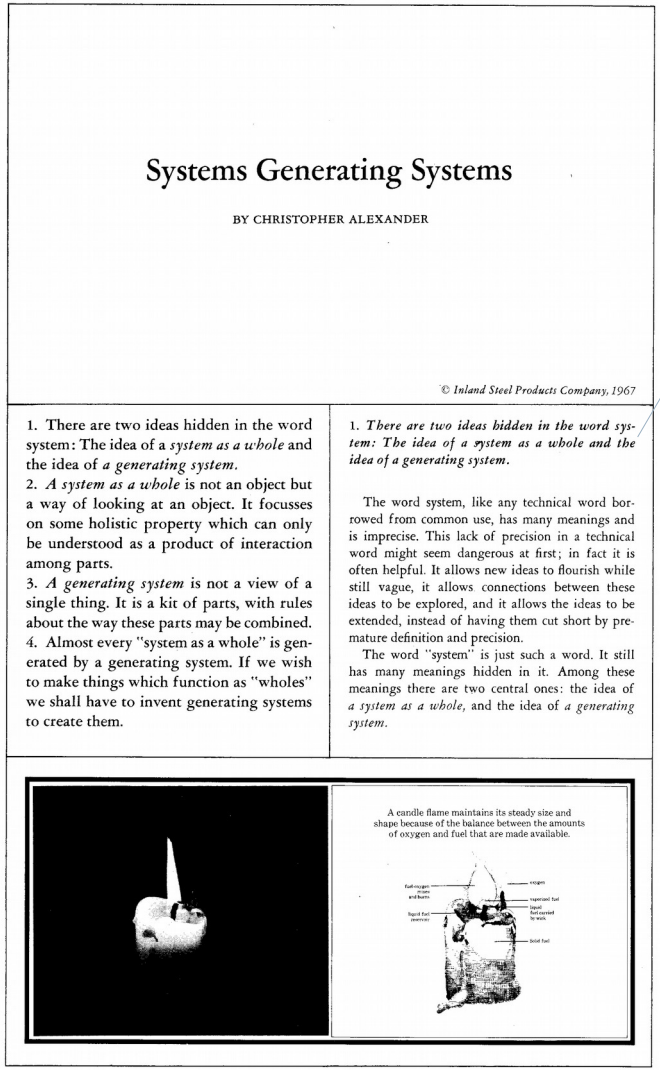
Image CC-BY Mike Cassano (2009) *Most Interesting Pothole*

Systems generating systems — architectural design theory by Christopher Alexander (1968)

The systems thinking roots from architect Christopher Alexander aren't completely obvious in his work on pattern language. A republished version of an 1968 article resurfaces some clarification on a perspective on systems thinking originating from practices in architecture. This article introduced ways in which systems thinking could be most directly applied to built environments. The cross-appropriation of pattern languages across a variety of domain types — object-oriented programmers were the earliest motivating adopters — could be enlightened by revisiting the foundations. Alexander concisely presented 4 points, and then provided detailed reasoning for each:

> 1. There are two ideas hidden in the word system: the idea of a *system as a whole* and the idea of a *generating* system.
>
> 2. A *system as a whole* is not an object but a way of looking at an

Molly Wright Steenson, as part of her 2014 dissertation, has a 66-page digest of Alexander's work between 1962 and 1968. Her deep reading was reflected in a 2009 recorded presentation on "Loving and Hating Christopher Alexander". Generally speaking, interaction designers love Christopher Alexander's approach, while architects hate Christopher Alexander's approach.



Systems Generating Systems

BY CHRISTOPHER ALEXANDER

1. There are two ideas hidden in the word system: The idea of a *system as a whole* and the idea of *a generating system.*
2. *A system as a whole* is not an object but a way of looking at an object. It focusses on some holistic property which can only be understood as a product of interaction among parts.
3. *A generating system* is not a view of a single thing. It is a kit of parts, with rules about the way these parts may be combined.
4. Almost every "system as a whole" is generated by a generating system. If we wish to make things which function as "wholes" we shall have to invent generating systems to create them.

1. *There are two ideas hidden in the word system: The idea of a system as a whole and the idea of a generating system.*

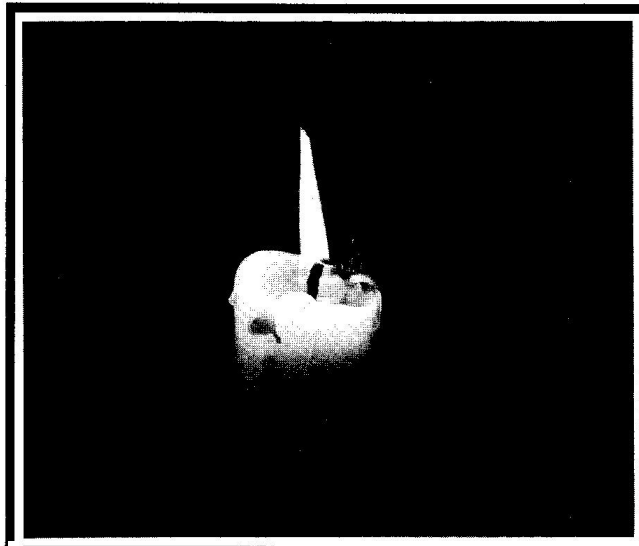
The word system, like any technical word borrowed from common use, has many meanings and is imprecise. This lack of precision in a technical word might seem dangerous at first; in fact it is often helpful. It allows new ideas to flourish while still vague, it allows connections between these ideas to be explored, and it allows the ideas to be extended, instead of having them cut short by premature definition and precision.

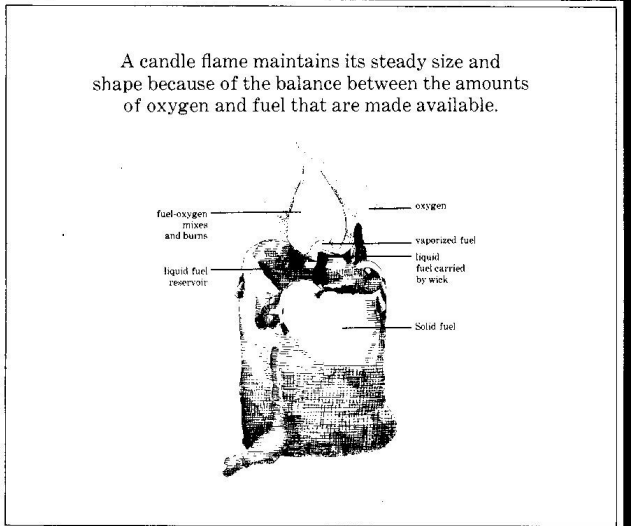
The word "system" is just such a word. It still has many meanings hidden in it. Among these meanings there are two central ones: the idea of *a system as a whole*, and the idea of *a generating system.*

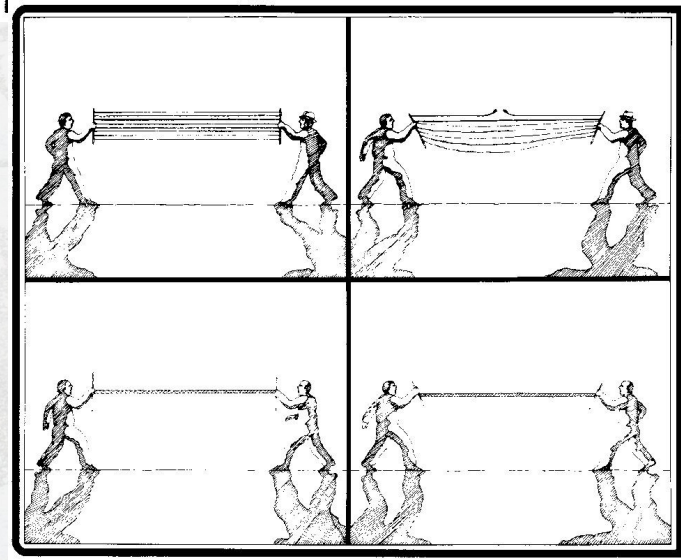
A candle flame maintains its steady size and shape because of the balance between the amounts of oxygen and fuel that are made available.

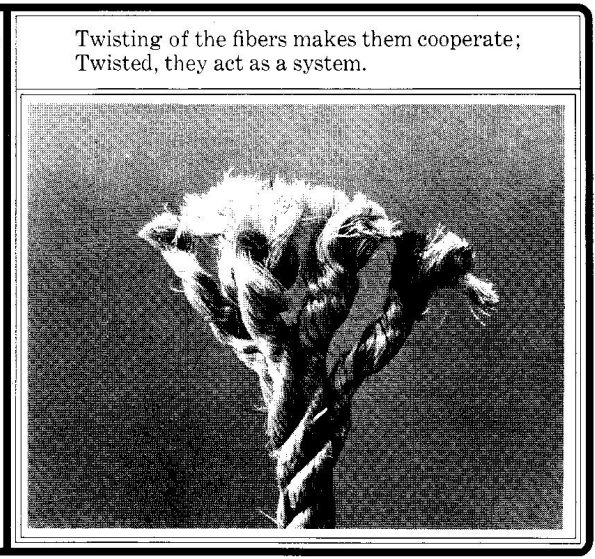
1. There are two ideas hidden in the word system: the idea of a *system as a whole* and the idea of a *generating system*.

2. A ***system as a whole*** is not an object but **a way of looking at an object**. It focuses on **some holistic property** which can only be understood as **a product of interaction among parts**.









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It is a **kit of parts**,
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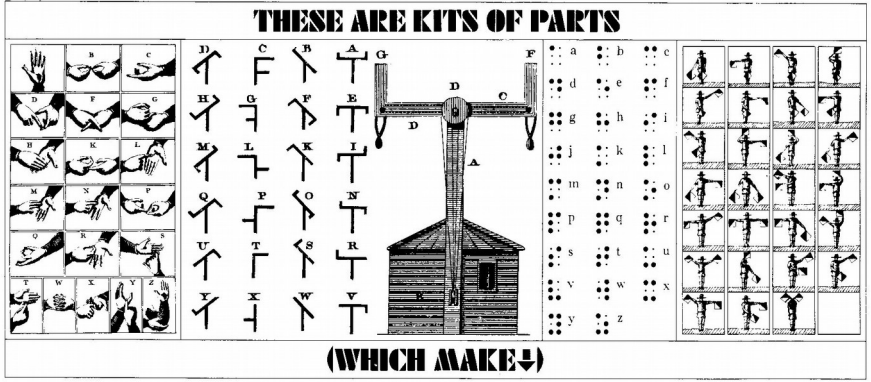
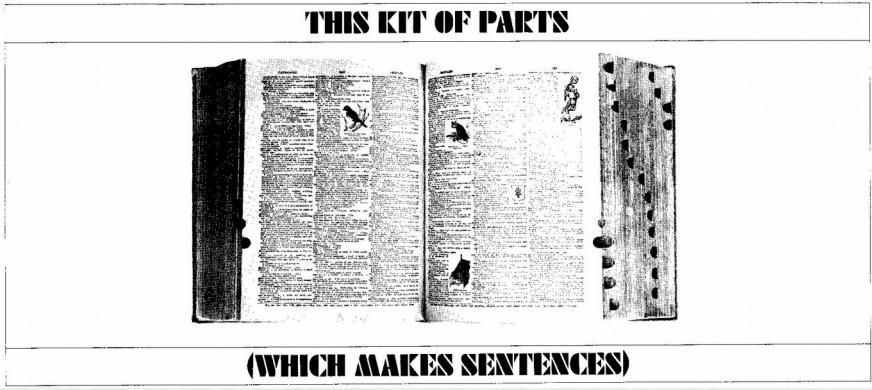
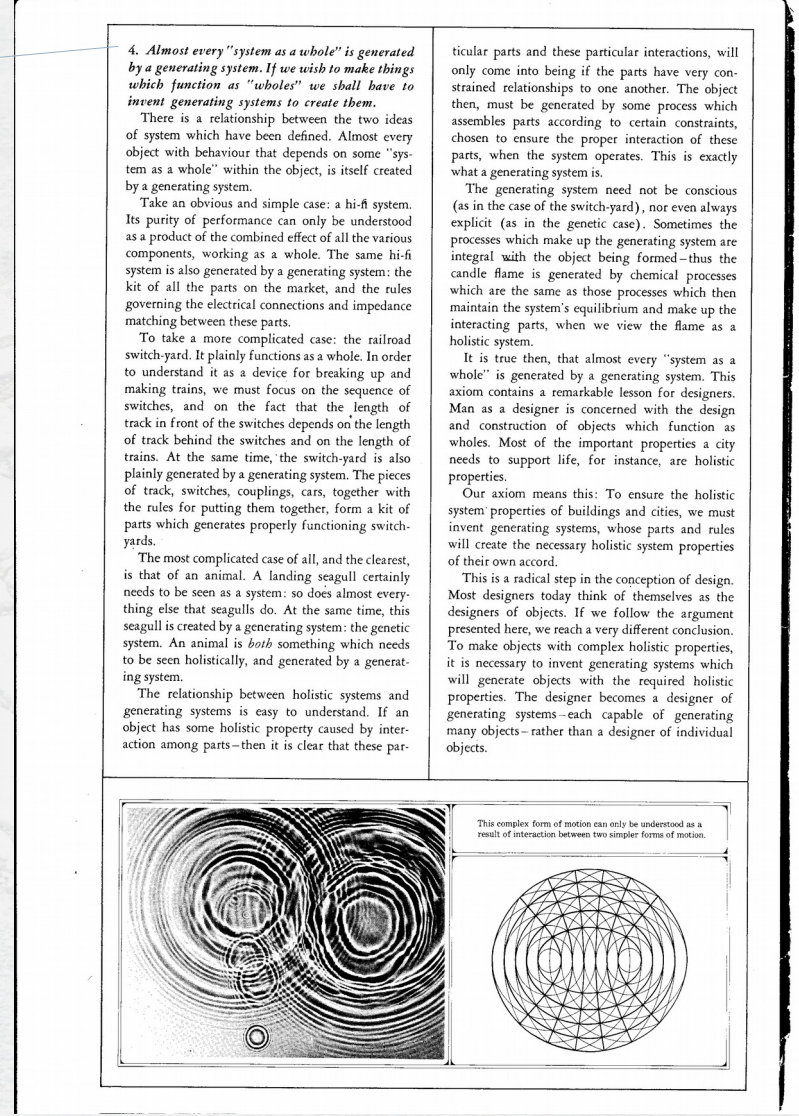




4. Almost every ‘**system as a whole**’ **is generated** by a ‘generating system’. If we wish to make things which **function as ‘wholes’** we shall have to **invent generating systems to create them**.



4. Almost every "system as a whole" is generated by a generating system. If we wish to make things which function as "wholes" we shall have to invent generating systems to create them.

There is a relationship between the two ideas of system which have been defined. Almost every object with behaviour that depends on some "system as a whole" within the object, is itself created by a generating system.

Take an obvious and simple case: a hi-fi system. Its purity of performance can only be understood as a product of the combined effect of all the various components, working as a whole. The same hi-fi system is also generated by a generating system: the kit of all the parts on the market, and the rules governing the electrical connections and impedance matching between these parts.

To take a more complicated case: the railroad switch-yard. It plainly functions as a whole. In order to understand it as a device for breaking up and making trains, we must focus on the sequence of switches, and on the fact that the length of track in front of the switches depends on the length of track behind the switches and on the length of trains. At the same time, the switch-yard is also plainly generated by a generating system. The pieces of track, switches, couplings, cars, together with the rules for putting them together, form a kit of parts which generates properly functioning switch-yards.

The most complicated case of all, and the clearest, is that of an animal. A landing seagull certainly needs to be seen as a system: so does almost everything else that seagulls do. At the same time, this seagull is created by a generating system: the genetic system. An animal is *both* something which needs to be seen holistically, and generated by a generating system.

The relationship between holistic systems and generating systems is easy to understand. If an object has some holistic property caused by interaction among parts – then it is clear that these particular parts and these particular interactions, will only come into being if the parts have very constrained relationships to one another. The object then, must be generated by some process which assembles parts according to certain constraints, chosen to ensure the proper interaction of these parts, when the system operates. This is exactly what a generating system is.

The generating system need not be conscious (as in the case of the switch-yard), nor even always explicit (as in the genetic case). Sometimes the processes which make up the generating system are integral with the object being formed – thus the candle flame is generated by chemical processes which are the same as those processes which then maintain the system's equilibrium and make up the interacting parts, when we view the flame as a holistic system.

It is true then, that almost every "system as a whole" is generated by a generating system. This axiom contains a remarkable lesson for designers. Man as a designer is concerned with the design and construction of objects which function as wholes. Most of the important properties a city needs to support life, for instance, are holistic properties.

Our axiom means this: To ensure the holistic system properties of buildings and cities, we must invent generating systems, whose parts and rules will create the necessary holistic system properties of their own accord.

This is a radical step in the conception of design. Most designers today think of themselves as the designers of objects. If we follow the argument presented here, we reach a very different conclusion. To make objects with complex holistic properties, it is necessary to invent generating systems which will generate objects with the required holistic properties. The designer becomes a designer of generating systems – each capable of generating many objects – rather than a designer of individual objects.

This complex form of motion can only be understood as a result of interaction between two simpler forms of motion.

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A hi-fi system:

- Purity of performance ← production of combined effect of all the various components
- Generating system of (i) kit of parts; (ii) rules governing electrical between parts

Railroad switch-yard:

- Breaking up and making trains ← (i) sequence of switches; (ii) lengths of track; (ii) lengths of trains
- Generating system of (i) pieces of track, switches, couplings, cars; (ii) rules for putting them together

An animal:

- Holistically (i) the landing seagull as a system; (ii) almost everything else that seagulls do
- Generating system: the seagull created by a genetic system

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The generating system ...

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Axiom:

- Almost every "system as a whole" is generated by a generating system.

To ensure the holistic system properties of buildings and cities,

- we must invent generating systems ...
- whose parts and rules will create the necessary holistic system properties of their own accord.

This is a radical step in the conception of design. Most designers today think of themselves as the designers of objects. If we follow the argument presented here, we reach a very different conclusion. To make objects with complex holistic properties, it is necessary to invent generating systems which will generate objects with the required holistic properties. The designer becomes a designer of generating systems – each capable of generating many objects – rather than a designer of individual objects.

A final word of caution. As we have already seen, a building system is an example of a generating system. It is a kit of parts with rules of combination. But not every generating system necessarily creates objects with valuable holistic properties. The generating system which makes squares out of triangles is an example. It is a perfectly good generating system; yet the objects it produces do nothing: they have no holistic system properties whatever. In the same sense, those building systems which have so far been conceived, make buildings, but they do not make buildings with any really important holistic system properties. In a properly functioning building, the building and the people in it, together form a whole: a social, human whole. The building systems which have so far been created do not in this sense generate wholes at all. While it is inherent in the generating system of an animal that the finished animal will work as a whole, it is *not* inherent in any of today's building systems that the buildings they produce will work as social or human wholes. Creating building systems in the present sense is not enough. We need a new, more subtle kind of building system, which doesn't merely generate buildings, but generates buildings guaranteed to function as holistic systems in the social, human sense.

To make objects with complex holistic properties

- it is necessary to invent generating systems which will generate objects with the required holistic properties.

The designer becomes a designer of generating systems –

- each capable of generating many objects – rather than a designer of individual objects.

In a properly functioning building

- the **building and people in it**, together **form a whole**, a social, human whole

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The outline of a pattern format was described at the chartering of the *Center for Environment Structure* in 1967

Every time a designer creates a pattern (or, for that matter, entertains any idea about the physical environment), he essentially goes through a three-step process.

He considers a PROBLEM, invents a PATTERN to solve the problem, and makes mental note of the range of CONTEXTS where the pattern will solve the problem. [….]

The format says that whenever a certain **CONTEXT** exists, a certain **PROBLEM** will arise; the stated **PATTERN** will **solve** the **PROBLEM** and therefore should be provided in the **CONTEXT**.

While it is not claimed that the PATTERN specified is the only solution to the PROBLEM, it is implied that unless the PATTERN or an equivalent is provided, the PROBLEM will go unsolved (Alexander, Ishikawa, & Silverstein, 1967, pp. 1–4).

By 1979, pattern as {context : problem : solution} is clarified as {context : system of forces : configuration}

Each pattern is a three-part rule, which expresses a relation between a certain context, a problem, and a solution (Alexander, 1979, p. 247).

We see, in summary, that every pattern we define must be formulated in the form of **a rule** which establishes a relationship between a **context**, a **system of forces** which arises in that context, and a **configuration** which allows those forces to resolve themselves in that context.

It has the following generic form:

Context → System of forces → Configuration

(Alexander 1979, p. 253)

1996/10/08 Christopher Alexander, “Patterns in Architecture”, OOPSLA ’96

Christopher Alexander’s presentation at the 1996 OOPSLA Conference was lightly edited in the 1999 article. Watching the video and reading the text, the divergences are small until 46 minutes into 63-minutes, when the text was significantly rewritten.

Pattern language is *not* for wicked problems!

coevolving.com/blogs/index.php/archive/exploring-the-context-of-pattern-languages/

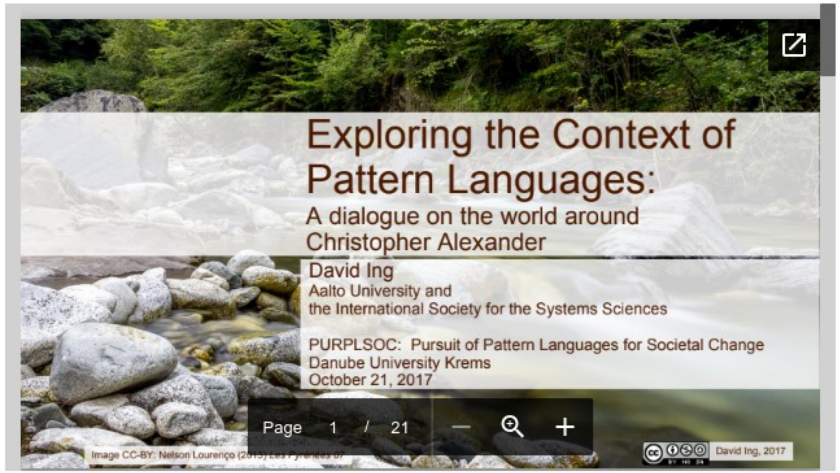
Exploring the Context of Pattern Languages

Pattern language is not for wicked problems, said Max Jacobson, coauthor with Christopher Alexander of the 1977 *A Pattern Language: Towns, Building, Construction*. In addition, the conventional definition of an Alexandrian pattern as "a solution to a problem in context" when applied to social change might better use the term "intervention", rather than "solution".

These are two of the major ideas that emerged at PurpIsoc 2017 conference last October. A 90-minute workshop was run in parallel with other breakouts.

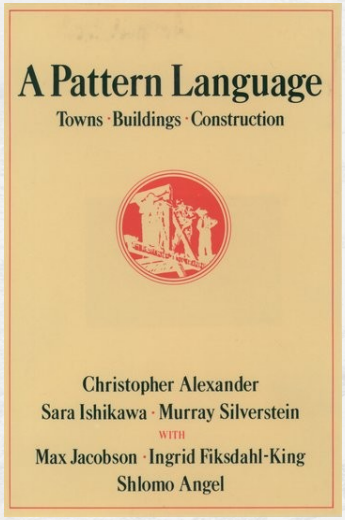
For about the first hour, vocal participants included Max Jacobson (who had given a plenary talk on "A Building is not a Turkish Carpet"), Christian Kohls (who gave a plenary talk on "Patterns for Creative Space") and Peter Baumgarnter (one of the Purlpsoc chairs).

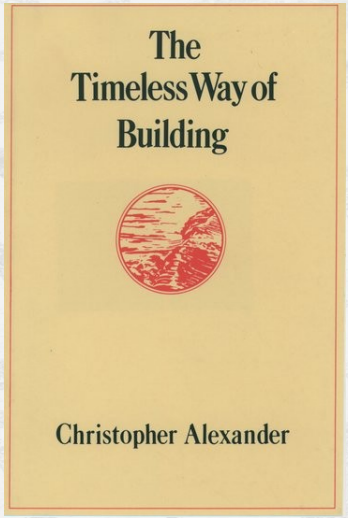
As an impetus to discussion, we stepped through slides that had been posted on the Coevolving Commons.

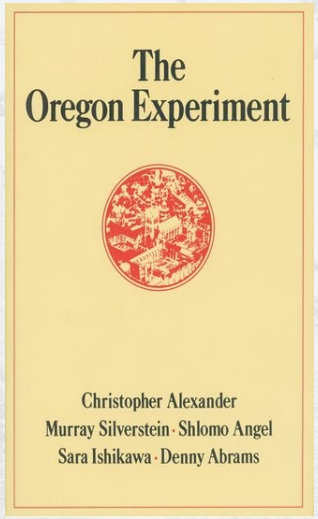


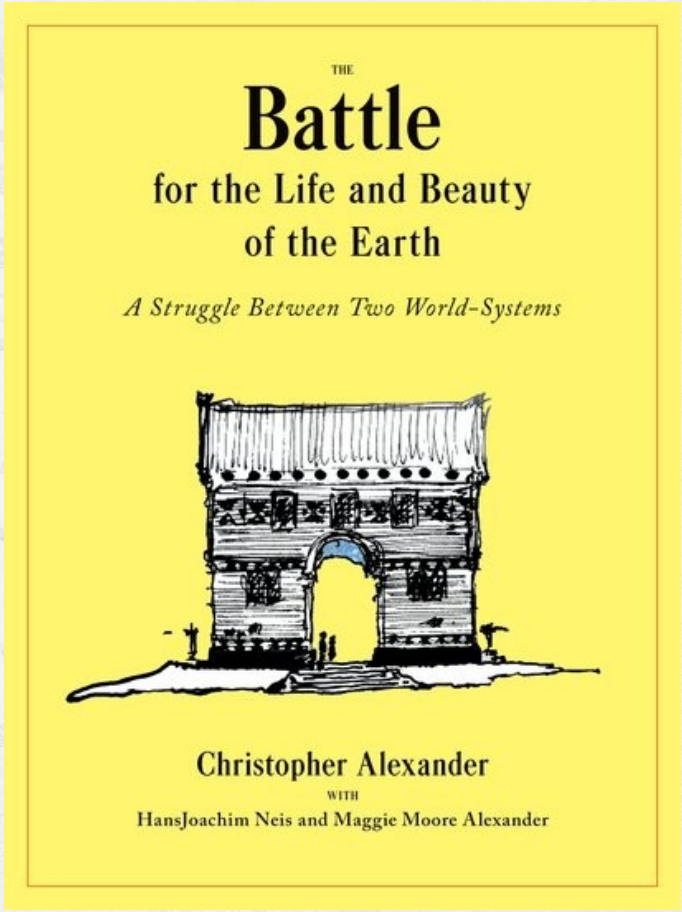
For people who would like the next-best experience to being there, the slides have now been matched up with the digital audio recording, for viewing as a web video.

The writing of 1975-1979 by Alexander was prescriptive; the 2012 is reflections on practice







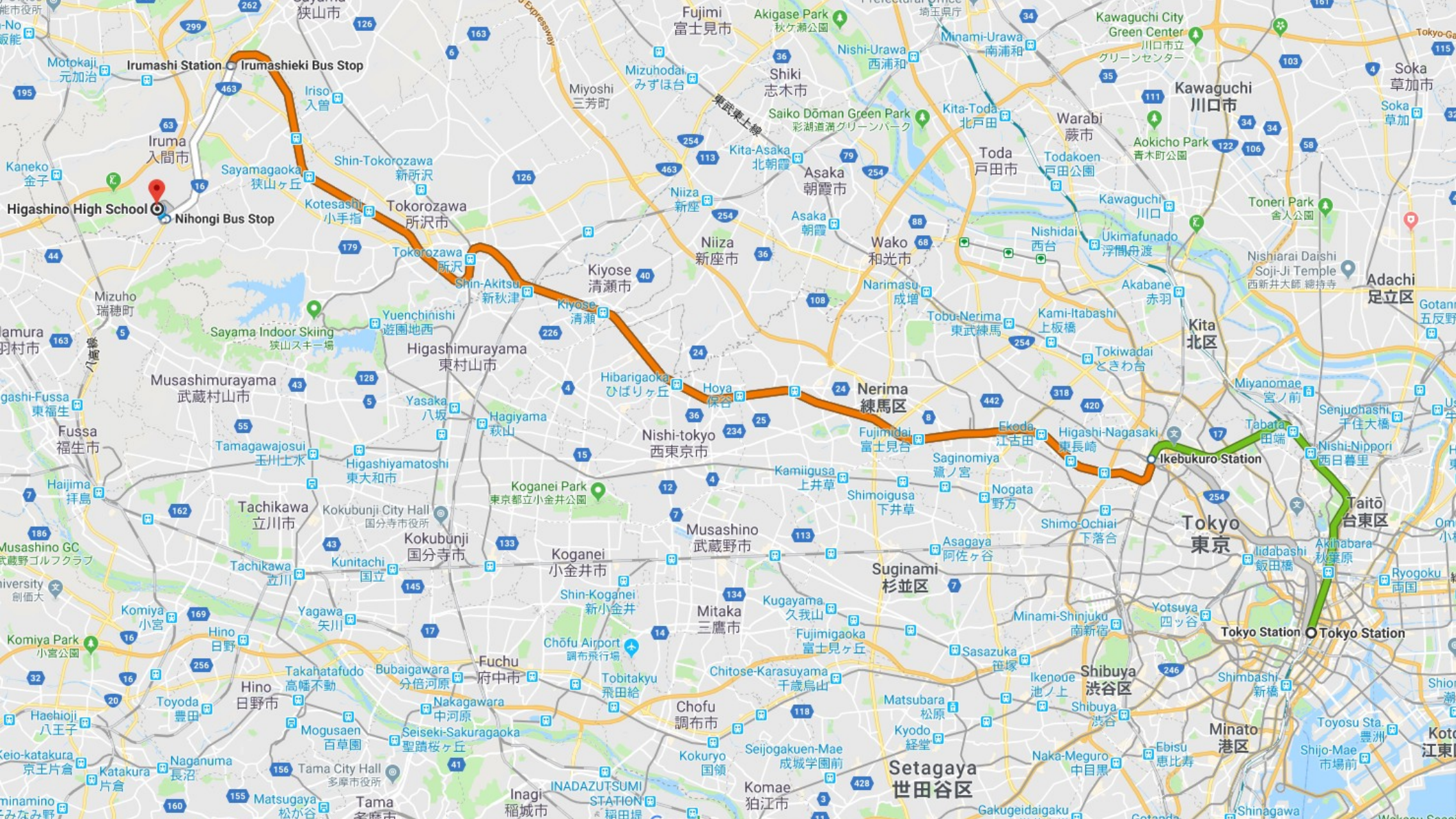


Agenda

A. Eishen School (1985)

B. Multi-Service Centers (1968)

C. Beyond Built Environments


Irumashi Station
Irumashieki Bus Stop
Higashino High School
Nihongi Bus Stop
Ikebukuro Station
Tokyo Station
Tokyo Station


(株)藤本包装
Tea store
長谷川園
(株)狭山台商事
富田ガラス店
Iruma City Museum ALIT
入間市博物館 ALIT
Higashino High School
Box lunch supplier
ランチサービス(株)
お茶っこサロン一煎
Church of Jesus Christ of Latter-day Saints
埼玉キリスト教会
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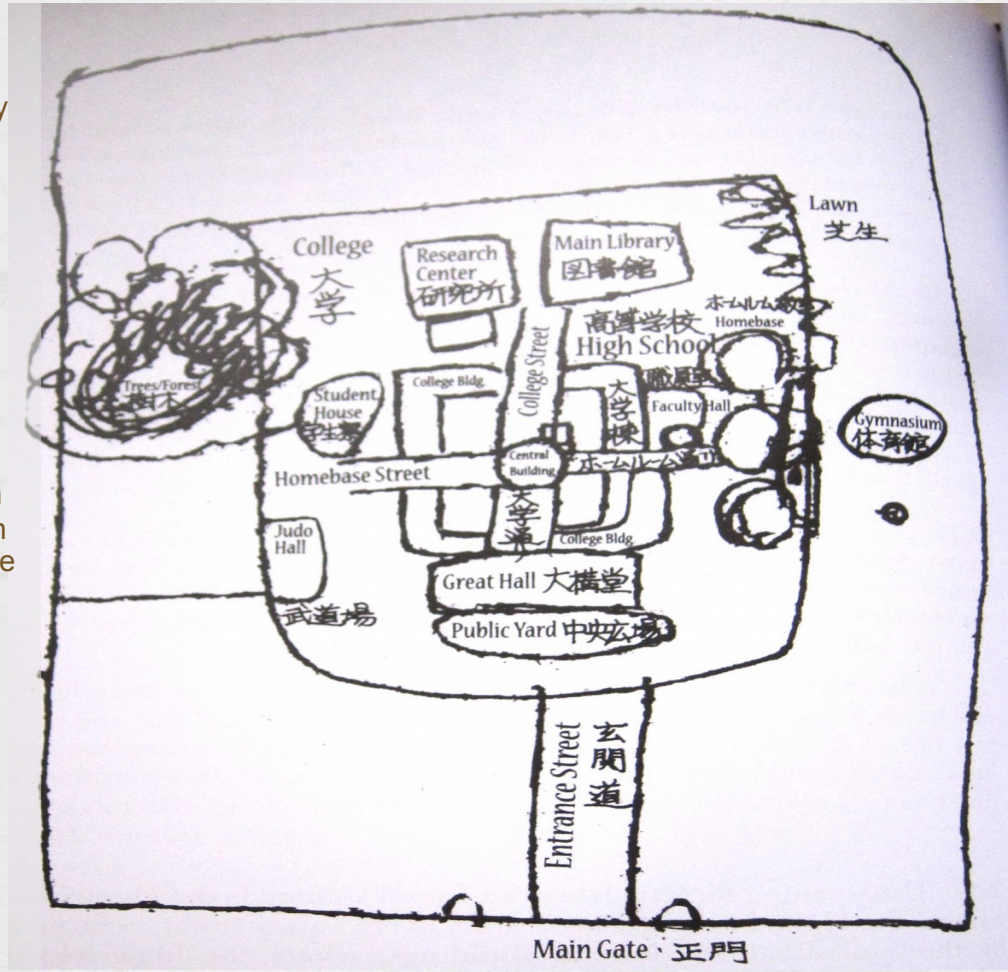
The practices employed on the 1985 Eishin project can be traced with 8 activities

1. Interview on hopes and dreams
2. Make a “poetic vision” as first sketch of a pattern language
3. Make the rudimentary pattern language physically coherent
4. Refine the language through discussions
5. Obtain approval of the pattern language
6. Renegotiate pattern language with space and money within budget
7. Find systems of centers in (i) the pattern language, and (ii) the places in the land. Combine them.
8. Adjust the site plan on the site itself (not on models)

(3) Make the rudimentary pattern language physically coherent

The Completeness of the Language: Seven Principles

- **Relationships**. Each pattern establishes certain relationships which should exist in the finished campus. The sum total of those relationships, expressed by the patterns in the language, acting together, define the possible configurations which this language generates. [p. 124]
- **Spatial**. A given pattern contains, or defines, certain spatial entities. The relationships are defined among these spatial entities.
- **Reliability**. The essence of these relationships is that they must be reliable, and true. They cannot be arbitrary relationships (as they might often be in a single person's design). They need to be sufficiently true, so that we can trust them, and would want to find these relationships present in any version of any campus that might be generated by this language.
- **Consistency**. It is not necessarily easy to define a system of patterns which is consistent. For example, if one pattern asserts a certain relationship between two entities, and another pattern asserts a further relationship between the same entities, but one which is inconsistent with the first, then that system of two patterns is inconsistent, and can only, with great difficulty, work to generate real physical configurations.
- **Inconsistency**. From time to time, two patterns which are physically inconsistent may be refreshing and life-giving. This happens because the contradiction generates vigor and opens new ideas.
- **Completeness**. A system of patterns is complete if it contains sufficient relationships to allow a well-formed configuration to be built.
- **Coherence**. A system of patterns is coherent if the relationship specified amongst the patterns tend, most of the time, to generate easily graspable mathematical configurations.



(5) Obtain approval of the pattern language [page 1 of 8]

This pattern language is a list of key centers, each of which contributes some essential quality to the campus. The list was established long before any design started. [p. 130]

The list contains 110 essential patterns, each describing a generic kind of center, and itself made of other centers. As they are defined here, these 110 key patterns completely govern and define the life of the school. Even before we have any idea about the physical configuration of the buildings, their shape, or design, or the way these centers are made real in space, it is already obvious that the school is given its life to an enormous degree, merely by this list of patterns. [p. 151]

1.	Global Character of the Campus
2.	The Inner Precinct
3.	The Buildings of the Inner Precinct
4.	The Streets of the Inner Precinct
5.	The Outer Precinct
6.	Features of the Inner Precinct
7.	Special Outdoor Details
8.	Interior Building Character

1.1	An outer Boundary surrounds the Campus.	A white, 60 cm wall serves as the based for a wooden fence. [....]
1.2	Contained by this Outer Boundary there is an Outer Precinct. ...	A second wall, far inside the first, surrounds the school itself, and forms a second zone between the first and second wall. [....]
1.3	The Inner Precinct is a densely built area where School and College have their major buildings and activities.	It is the place where the daily life of students and faculty occurs. [....]
1.4	...	...
1.5	As a whole, the Campus is given character by stone foundation walls, natural concrete walls, wood columns, ...	In addition ...

(6) Renegotiate pattern language with space and money within budget

How can something like the cost or budget be made practical?

... we finish the pattern language phase with a serious analysis of space and money. It is done right away, so that any hidden conflicts are visible, and can immediately come into the open to get resolved.

First of all, we make a record of all of the spaces and areas which were defined by the pattern language -- adding up, pattern by pattern, the total outdoor space and indoor space. In our case, the analysis showed us that the requested numbers were too large. [….]

AREAS REQUESTED BY THE FACULTY			
A. Built Space (indoor space in square meters)	**First guess requested**	**Available 73.4%**	**Renegotiated finalized**
Public Yard Buildings	**945 m²**	**693 m²**	**750 m²**
Buildings of the Tanoji Center	**7583 m²**	**5566 m²**	**5604 m²**
Cloister (research center)	**1350 m²**	**991 m²**	**1150 m²**
Homebase Street buildings	**5680 m²**	**4169 m²**	**4300 m²**
Buildings in the Outer Precinct	**2432 m²**	**1785 m²**	**1400 m²**
Total	**17990 m²**	**13204 m²**	**13204 m²**
B. Coverage of Land (outdoor space in square meters)	**First guess requested**	**Available 79.5%**	**Renegotiated finalized**
Total	**84286 m²**	**67000 m²**	**67000 m²**

Second, as the simplest way to trim all space to our available budget, we made an average percentage reduction for all items, one figure for trimming indoor space; and then another for exterior land area. Each item was trimmed by a similar (but not identical) percentage. [....]

Third, we then asked the faculty to re-allocate the spaces, keeping the same trimmed totals, in order to conform to the available resources. The rule was simple: they could increase some, but must then decrease others, so that the total areas remained as they must remain.

(7) Find systems of centers in (i) the pattern language, and (ii) the places in the land. Combine them. [page 1 of 3]

The first system consists of **patterns** created notions or entities that exist in people's minds). These patterns exist in a loose and undeveloped form in people's minds, even if they have not explicitly built a pattern language. When the pattern language *is* explicitly defined, it is more clear and makes a more powerful system which will get better results, especially because it comes from the feelings of people themselves. [p. 169]

The Most Important Centers Given by the Pattern Language

... the patterns together, geometrically … does not indicate any one arrangement on the land.

1. The **Entrance Street**.
2. The entrance street leads to a big square element which we refer to as the **Tanoji Center**.
3. This was to be the core of the college, and the center of gravity of the **Five College Buildings**.
4. Leading out from the Tanoji Center, in some direction, is **The Homebase Street**, the core of the high school.
5. **Individual Classroom Buildings** open along the **Homebase Street**.
6. The **Great Hall** and **Main Square** next to it.
7. The **Library and Research Center**, to one side. [p. 170]

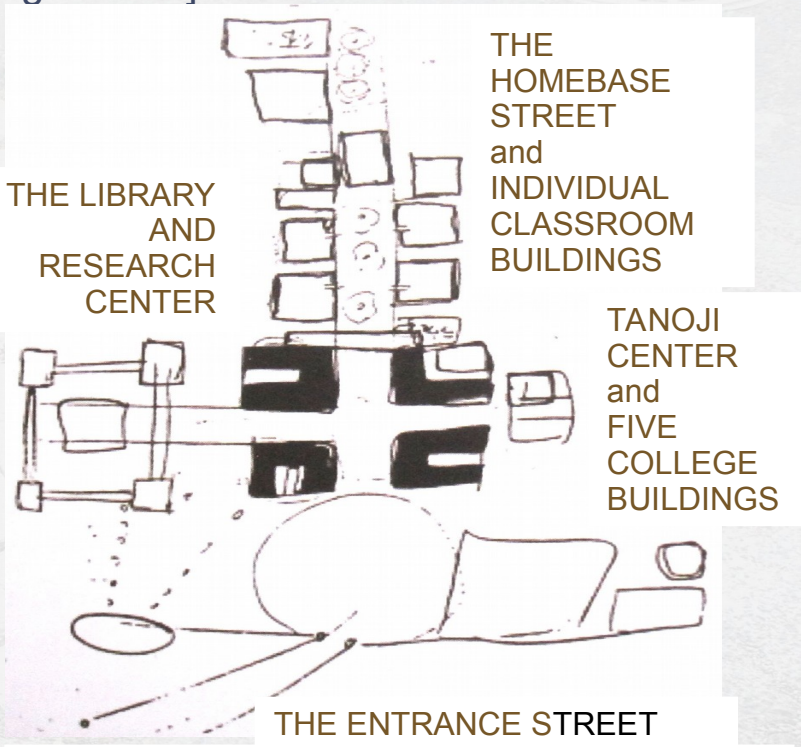


Diagram 1: Seven most important centers in the pattern language, which together give a broad conceptual picture of a possible layout that the centers can have. Not to scale.

(7) Find systems of centers in (i) the pattern language, and (ii) the places in the land. Combine them. [page 2 of 3]

The second system exists in the form of **places** on the site, discernible places that can be seen and felt on the site, if you have sufficient sympathy with the land. You can make this system explicit, by making a map of the centers, and paying attention to their structure. [p. 169]

The Most Important Centers Suggested by Land Forms

... "natural places" in the land.

1. **Natural Entrance Position**. The most important among these centers was the location of the main approach. This was in the southeast corner, partly because of a bus stop in Nihongi village, and partly because of the feeling of one's natural desire about how best to approach the site.

2. **The Ridge**, running along the south of the project site. A beautiful spot, with breeze, sunshine, view ... and a very delightful feeling. This was the high point in the site, and it was on this very point that we sat and looked and sat and talked, until we began to see what was really there to be seen.

3. **The Swamp**, where vegetables used to be grown, the low point in the terrain -- a kind of swamp -- that later became a lake.

4. **A Natural Place for Large Buildings**, a zone in the middle, running the way contours ran, from north to south.

5. **Minor Entrance Position**, the northwest corner -- a natural high spot, from which to view the site, also a natural point for a secondary entrance.

6&7. **East and West Ends of the Ridge**, the two ends of the ridge, which formed natural high points, and at each end, the feeling of a terminus, along the two ends of the ridge. [p. 171]

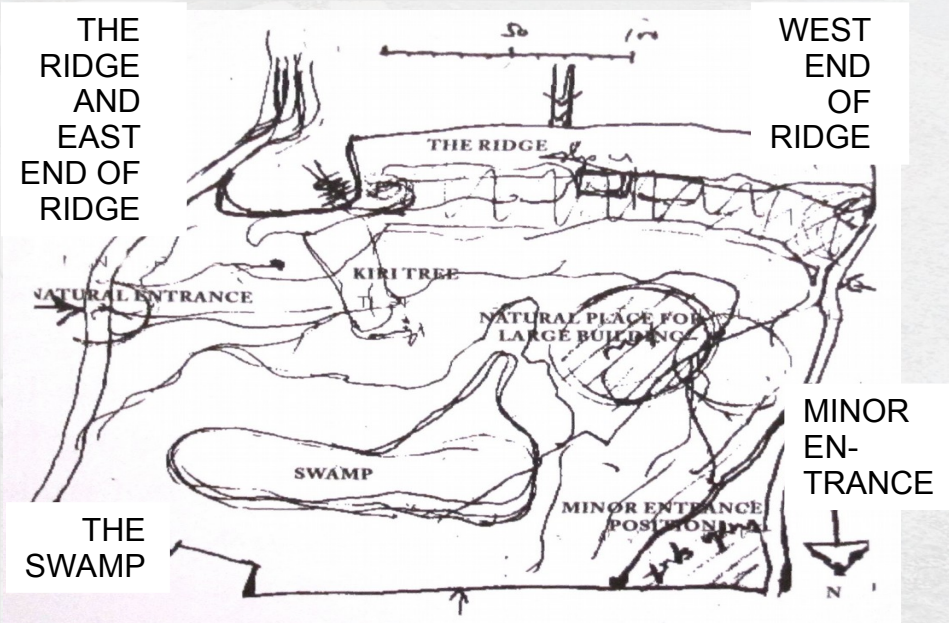


Diagram 2: The seven most NATURAL centers in the land, which, together can lead to a basic possible layout that the centers can have, in their LOCATIONS in the land.

(7) Find systems of centers in (i) the pattern language, and (ii) the places in the land. Combine them. [page 3 of 3]

... to bring these two systems of centers together. We have to hunt for a single configuration which springs from both centers, and integrates the qualities of both. We must find a way in which the system of centers defined by the pattern language can be placed, so that it enhances, preserves, and extends, the system of centers which is already in the land. It is a kind of healing process, which uses the new centers given by the pattern language, to heal the configuration of the old centers -- those that exist in the land.

... this is the single most difficult phase of the work. ... about nine months of continuous effort, to get the site plan right. [p. 173]

... after ... months of frustration, the problem did get solved.

[...] a new point emerged. The fact that the homebase street would be more powerful as an *approach* to the Tanoji Center, than as something *hanging off* it. This was hard to see, at first, because it implied reversing the main sequence of the pattern language. But when we tried it, it was clear that the sequence almost instantaneously "jelled" with the land configuration.

Instead of this:	We now had:
1) Entrance Street	1) Entrance Street
2) Main Square	2) Main Square
3) Tanoji Center (College)	3) Home Base Street (High School)
4) Home Base Street (High School)	4) Tanoji Center (College)

The small balsa-wood model of the site, scale 1:500, on which the solution finally became apparent

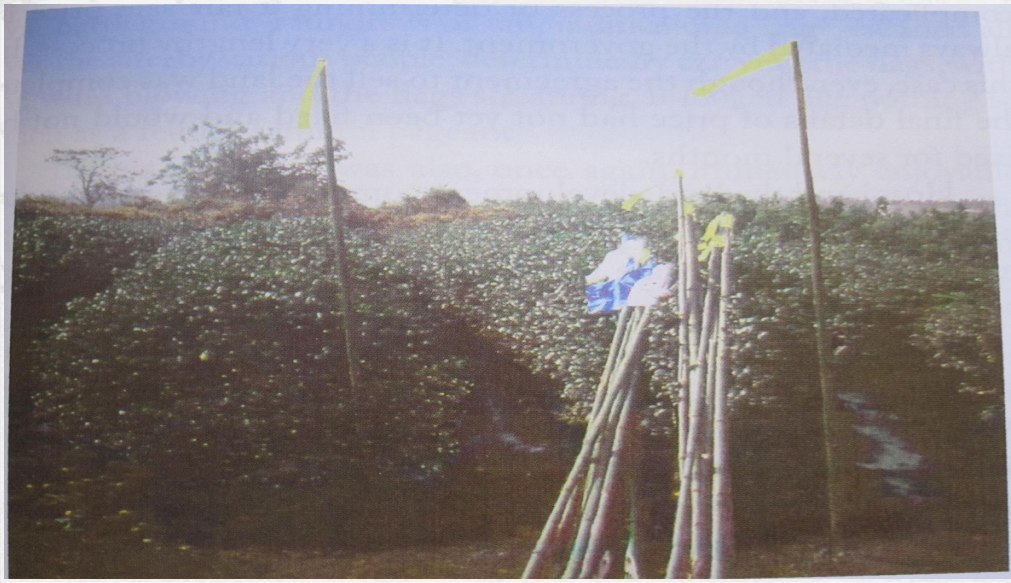
(8) Adjust the site plan on the site itself (not on models)

We have already made it clear that nearly all of our work on the site plan was done on the site itself. Whatever we did on models, we used the models as if they were site itself -- and relied on feelings that we could feel in the model, imagining that it was the site itself. This was made necessary by the huge distance between California and Japan.

As one works on a site, and the plan gradually emerges, it is necessary, of course, to leave marks -- sticks, stones, markers of various kinds -- to fix the position of the different things which have been decided. On the Eishin site... the site was covered in tea bushes. [….] A marker therefore had to be about six feet high, even to be seen at all. So we used six-foot-long bamboos. [….]. We ... tied different colored ribbons and cloths -- white, yellow, red, blue -- to the ends of our long bamboos. These were our markers -- our *flags*. [p. 180]

We had started making these flags quite early in the process. Even in July of 1982, as we began to get an idea established about the entrance position, we marked it with three or four of these flags. They looked beautiful. **And they made it possible to visualize the evolving site plan, truly, because they were real.**

When I came back to Japan after the breakthrough in November, we took about two hundred of these flags to the site, and began planning them in the ground, starting to make a realistic version as opposed to the very rough-and-ready diagram we had made so far. At this stage, now dealing with the real positions and dimensions on the land, we brought true feeling to the land itself. It was visible on the ground. [p. 181]



Colored flags, to identify various special purposes and areas on the land.

Solutions to problems come not from a pattern per se, but through generativity in the pattern language

In many problem-solving strategies, we try to attack problems directly. In doing so, we often attack only symptoms, leaving the underlying problem unresolved. Alexander understood that good solutions to architectural problems go at least one level deeper.

The structures of a pattern are not themselves solutions, but they generate solutions. Patterns that work this way are called generative patterns. A generative pattern is a means of letting the problem resolve itself over time, just as a flower unfolds from its seed:

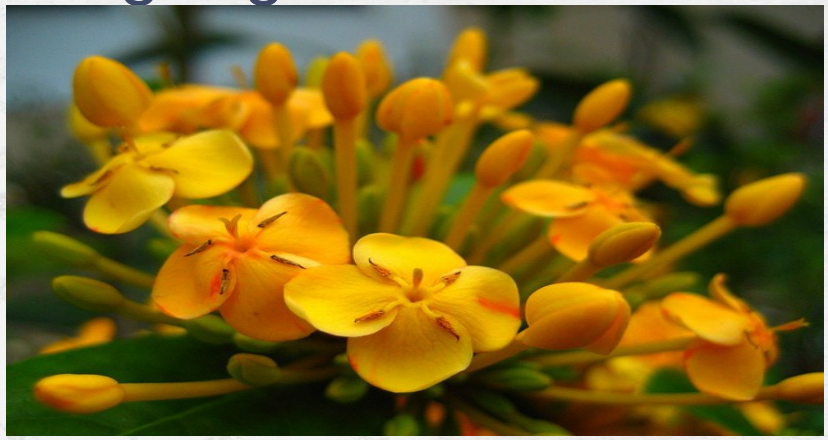


Image: Unfolding, by mrpeaches83 at https://www.flickr.com/photos/mrpeaches83/

9. This quality in buildings and in towns cannot be made, but only generated indirectly by the ordinary actions of the people, just as a flower cannot be made, but only generated from the seed (Alexander, 1979. p.xi)

An ordinary language like English is a system which allows us to create an infinite variety of one dimensional combinations of words, called sentences…. A pattern language is a system which allows its users to create an infinite variety of those three dimensional combinations of patterns which we call buildings, gardens, towns. ….

Thus, as in the case of natural languages, the pattern language is generative. It not only tells us the rules of arrangement, but shows us how to construct arrangements as many as we want which satisfy the rules. (Alexander, 1979: pp. 185 186)

Why is generativity important? First, ... most real problems go deeper than their surface symptoms, and we need to address most interesting problems with emergent behavior. Second, a good pattern is the fruit of hard work and intense review and refinement. Simple problems can be addressed through simple rules, since the solutions are more direct or obvious than we find in generative solutions. The pattern form excels an engaging the reader in generative solutions: to understand the principles and values of lasting solutions and long-term emergent behavior. Good patterns go beyond the quick fix. [James O. Coplien, Software Patterns 1996, pp. 33-34]

An *unfolding* is a process which gets you from one stage or moment of development to the next moment of development,
in the evolution of a neighborhood or in the evolution of a building

1. An unfolding is a dynamic configuration that acts to generate form.
2. An unfolding arises from the particular whole in which it is forming. It is shaped by the whole, and acts upon the whole, and causes the rebirth of the whole.
3. An unfolding is by its nature personal, and requires human input and human feeling from the people doing the work, as an essential part of its contribution to the formation of the environment.

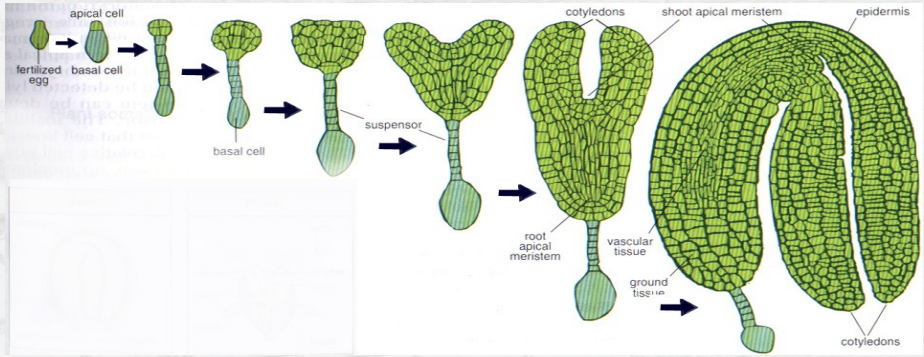
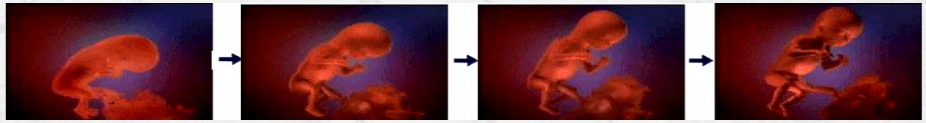
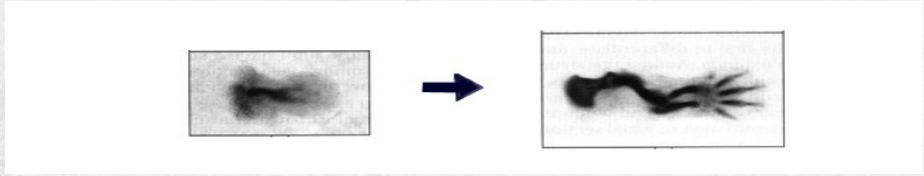


Diagram of a typical angiosperm (flowering plant) unfolding



Photographs of a human embryo unfolding



Two photographs, three days apart, of a mouse foot unfolding

It is helpful to compare such unfoldings with similar phenomena in plant morphogenesis and embryology. Both in the angiosperm shown below, and in the embryo shown beneath it, you can picture each unfolding as a limited and brief process which in the first one gradually shapes the seed, and in the second, takes the blur that is the beginning of a hand in the embryo, to the next stage of development where the hand gets its first outline fingers.

Adapted from Christopher Alexander, “What is an unfolding?” at http://www.livingneighborhoods.org/ht-0/whatisanunfolding.htm

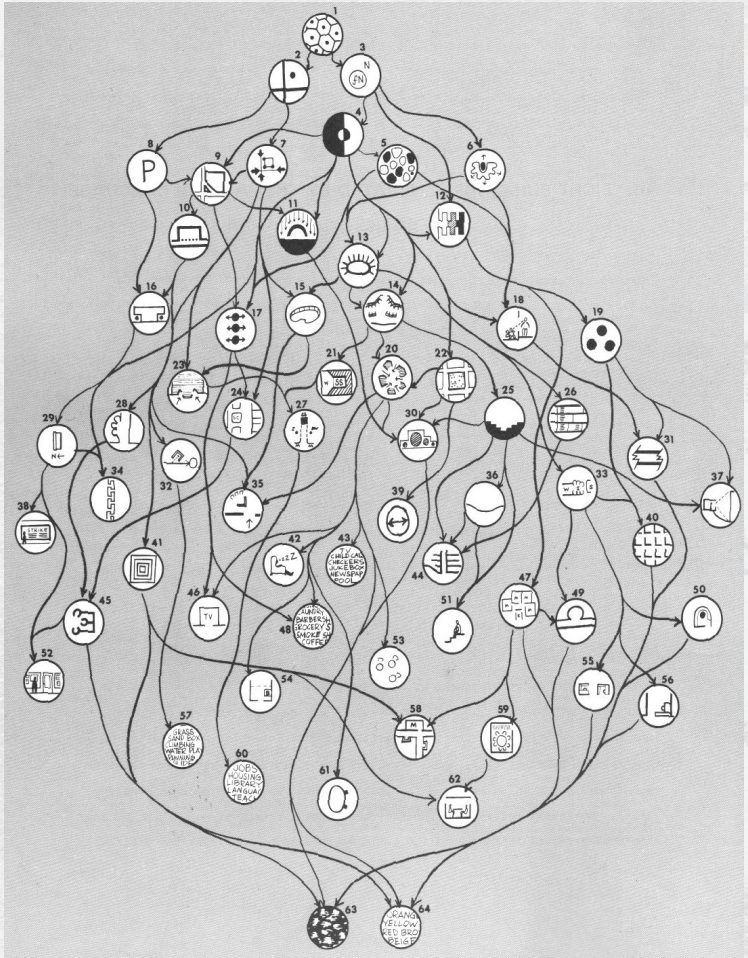
Agenda

A. Eishen School (1985)

B. Multi-Service Centers (1968)

C. Beyond Built Environments

Pattern language intends to give 3 types of help



1. It gives him the opportunity to use the patterns in the way which pays full respect to the **unique features** of each special building: the local peculiarities of the community, its special needs …
2. It tells him which patterns to consider **first,** and which ones to consider **later**. Obviously he wants to consider the **biggest ones** … before he considers the **details**.
3. It tells him which patterns "**go together**" … so that he knows which ones to think about at the same time, and which ones separately (Alexander et al., 1968, pp. 17–19).

Excerpts from three sample patterns for Multi-Service Centers

(i) Pattern name (plus headline)	21. Self-service **The waiting area contains a self-service facility, where job listing, welfare rights information and other do-it-yourself services are open, without restriction, to the public.**	28. The intake position **Intake procedures are informally handled by field workers, in a lounge setting, near the major entrance.**	32. Child-care position **The child care station is visible along the path from the entrance to the services.**
(ii) Completions of larger patterns	14. Free waiting	7. Entrance locations 10. Open to street	7. Entrance locations 10. Open to street
	◊ ◊ ◊	◊ ◊ ◊	◊ ◊ ◊
(iii) Range of contexts (physical feature, set of conditions)	Any multi-service center.	A multi-service center with field workers (block workers, contact workers, community organisers, etc.)	A child care station in any building where mothers have prolonged business (multi-service center, supermarket, etc.)
(iv) Problem to be solved (system of forces that arises)	Most service programs today effectively perpetuate the structural assymmetry of the dole …. If service programs ever hope to break the chain of poverty, this structural assymmetry … must be destoyed ….	Many existing centers create the feeling that people coming to the center are being processed, like cattle, by receptionists and intake workers. … the "intake function" will be handled on an informal basis by community organisers and contact workers ...	When small children are left off at care centers they are often extremely anxious; they feel deserted … … create circumstances under which the child decides, of his own accord, that wants to play in the center.
(v) Solution (configuration of abstract spatial relational forces)	**1. The MSC contains a *self-service area*.** **2. … contains all of the basic information required by people who need help.** **3. … in both languages.** **4. … visible from all points in the waiting area.** **5. … contiguous … with service area.** **6. … no receptionists or intake workers located at entrance ...** **7. … advice area contains at least one easily accessible assistant ...**	**… no formal intake process …** **1. … field workers, in rotation … in a conversation and interview area.** **2. The intake area should be … next to the main entrance(s) … no receptionists.** **3. … should contain one or more open alcoves, at least 7 feet in diameter, and furnished with comfortable seats.**	**The child care station should be on the path from the building entrance to the place of business, and visible from this path; and … it looks into the child care station for roughly 20 feet along its length.**
	◊ ◊ ◊	◊ ◊ ◊	◊ ◊ ◊
(vi) Completions to smaller patterns	27. Self-service progression	43. Sleeping OK	57. Child care contents

Alexandrian format and pattern #32 for Multi-Service Centers

(i) Pattern name (plus headline)	32. Child-care position **The child care station is visible along the path from the entrance to the services.**
(ii) Completions of larger patterns	7. Entrance locations 10. Open to street
	◊ ◊ ◊
(iii) Range of contexts (physical feature, set of conditions)	A child care station in any building where mothers have prolonged business (multi-service center, supermarket, etc.)
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	◊ ◊ ◊
(vi) Completions to smaller patterns	57. Child care contents

Try who+what, how+why, where+when, containing, contained

(i) Pattern label	Tapping into the grapevine	Signing in for services	Minding children
	◊ ◊ ◊	◊ ◊ ◊	◊ ◊ ◊
(ii) Voices on issues (who and what)	(a) For a client, what jobs and training are available? (b) For a neighbour, in what ways can we share and update community news?	(a) For a client, what services are available to me, now and on appointment? (b) For a parent, what do I do with my kids while I'm busy? (c) For a child, what can I do while my parent is at the MSC?	
(iii) Affording value(s) (how and why)	Displaying up-to-date news and local information, so that individuals can know ways to independently act. Adding, revising and moderating community contributions so that individual and authoritative viewpoints are balanced.	Matching client needs with MSC resources, so that holistic treatments are received. Triaging and scheduling so that urgent cases are prioritized, and wait times are tolerable	Leaving a child at a supervised play area so that whereabouts are known. Availing distractions for toddlers through teens, so that coming with parents is less of a chore
(iv) Spatio-temporal frames (where and when)	Access to information onsite MSC for clients who don't have devices, and on the open Internet for the public	On demand lookups of trending and prior MSC busy and slow periods transparently visibie onsite and on the Internet, enabling clients to adjust and/or rebook	Facilities and programs are known both to children and parents in advance of appointments
	◊ ◊ ◊	◊ ◊ ◊	◊ ◊ ◊
(v) Containing systems (slower and larger)	For municipal, regional and national agencies, are community health and social services in their jurisdictions well provide?		For extended family, schools and community workers, what personal responsibilities inhibit service engagement?
vi) Contained systems (faster and smaller)	For neighbours in mutual support, friends and family ties, who should know about news?	For friends or assistants speaking on behalf or interpreting for a client, is the situation understood?	For other parents at the MSC at the same time, would you look after my kids like I look after yours?

Minding children: who+what, how+why, where+when, containing, contained

(i) Pattern label	Minding children
	◊ ◊ ◊
(ii) Voices on issues (who and what)	(a) For a client, what services are available to me, now and on appointment? (b) For a parent, what do I do with my kids while I'm busy? (c) For a child, what can I do while my parent is at the MSC?
(iii) Affording value(s) (how and why)	Leaving a child at a supervised play area so that whereabouts are known. Availing distractions for toddlers through teens, so that coming with parents is less of a chore
(iv) Spatio-temporal frames (where and when)	Facilities and programs are known both to children and parents in advance of appointments
	◊ ◊ ◊
(v) Containing systems (slower and larger)	For extended family, schools and community workers, what personal responsibilities inhibit service engagement?
(vi) Contained systems (faster and smaller)	For other parents at the MSC at the same time, would you look after my kids like I look after yours?

Alexandrian format mapped to proposed service systems thinking

Format for service systems thinking	
(i) Pattern label	An interaction phrased as a present participle
(ii) Voices on issues (who and what)	Archetypal roles of stakeholders, with concerns and interests posed as questions
(iii) Affording value(s) (how and why)	Objects and/or events that enable modes of practised capacities for independent or mutual action
(iv) Spatio-temporal frames (where and when)	Occasions at which dwelling in issues and affordances are salient and at hand
(v) Containing systems (slower and larger)	Constraining conditions in which the pattern operates, potentially where multi-issue messes are dissolved
(vi) Contained systems (faster and smaller)	Opportunistic conditions which the pattern contains, potentially allowing ad hoc resolving of a specific issue at hand

Agenda

A. Eishen School (1985)

B. Multi-Service Centers (1968)

C. Beyond Built Environments

Index

Pattern Manual for Service Systems Thinking: A proposal for discussion

David Ing, Aalto University and the International Society for the Systems Sciences, coevolving@gmail.com

Abstract:

What is properly required to take the learning on generative pattern languages from the built environment and software development communities, to a world of service system thinking?

This position paper winds back to early days of Center for Environmental Studies, and presents an alternative view on the 1968 Multi-Service Center work, informed by 21st century developments in service systems science. The conventional format for a pattern language has settled into a three-part rule of relations between context, problem and solution. An alternative format of (i) voices on issues (who + what), (ii) affording value(s) (how + why), and (iii) spatio-temporal frames (where + when) is proposed, with a straw man example.

Methods from the 1985 Eishin campus project, published in 2012, are compared against practices that have become common in agile development.

The conceptual shifts from built environment to service systems thinking are expressed as (i) amplifications, (ii) rephilosophizations, and (iii) reinterpretations. The generation and legitimization of pattern languages is considered across a community, with a shift from publishing in books on paper to collaborating with online technologies such as wiki.

At the 2014 PLoP and the 2015 PURPLSOC conferences, the idea of extending the pattern language for environment structure into a new domain of service systems thinking was introduced. In 2016, this idea has been further developed as a baseline for further discussion.

Keywords: *service systems; systems thinking; issue-seeking; interactive value; wayfaring*

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Publications

Submitted by daviding on Thu, 10/27/2016 - 22:31

Publication Date	Publication Title	Author(s)	Form
October 2016	"Pattern Manual for Service Systems Thinking: A proposal for discussion" [view abstract and article]	David Ing	article in review for Pr the 2016 Internationa Conference
October 2016	"Curriculum Making for Trito Learning: Wayfaring along a meshwork of systems thinking" [view abstract and presentation slides]	David Ing	presentation at RSD5 Relating Systems Thir Design
	"Service Systems and the Systems Sciences"		presentation at Wuha

2016/10/28 Pattern Manual for Service Systems Thinking

Submitted by daviding on Thu, 09/29/2016 - 21:00

Authors

David Ing

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Citation

David Ing, "Pattern Manual for Service Systems Thinking: A proposal for discussion", ***Proceedings of the 2016 International PUARL Conference***.

Content

- [view/download article as DOCX] (1.4 MB, originally edited in LibreOffice 5)
- [view/download article as PDF] (2.2 MB)

Pattern Manual (1967): systems, subsystems, patterns

The environmental **pattern language** will contain **hundreds of subsystems** and **tens of thousands of individual patterns**.

Every conceivable kind of building, every part of every kind of building, and every piece of the larger environment will be specified by one or more subsystems of the environmental pattern language.

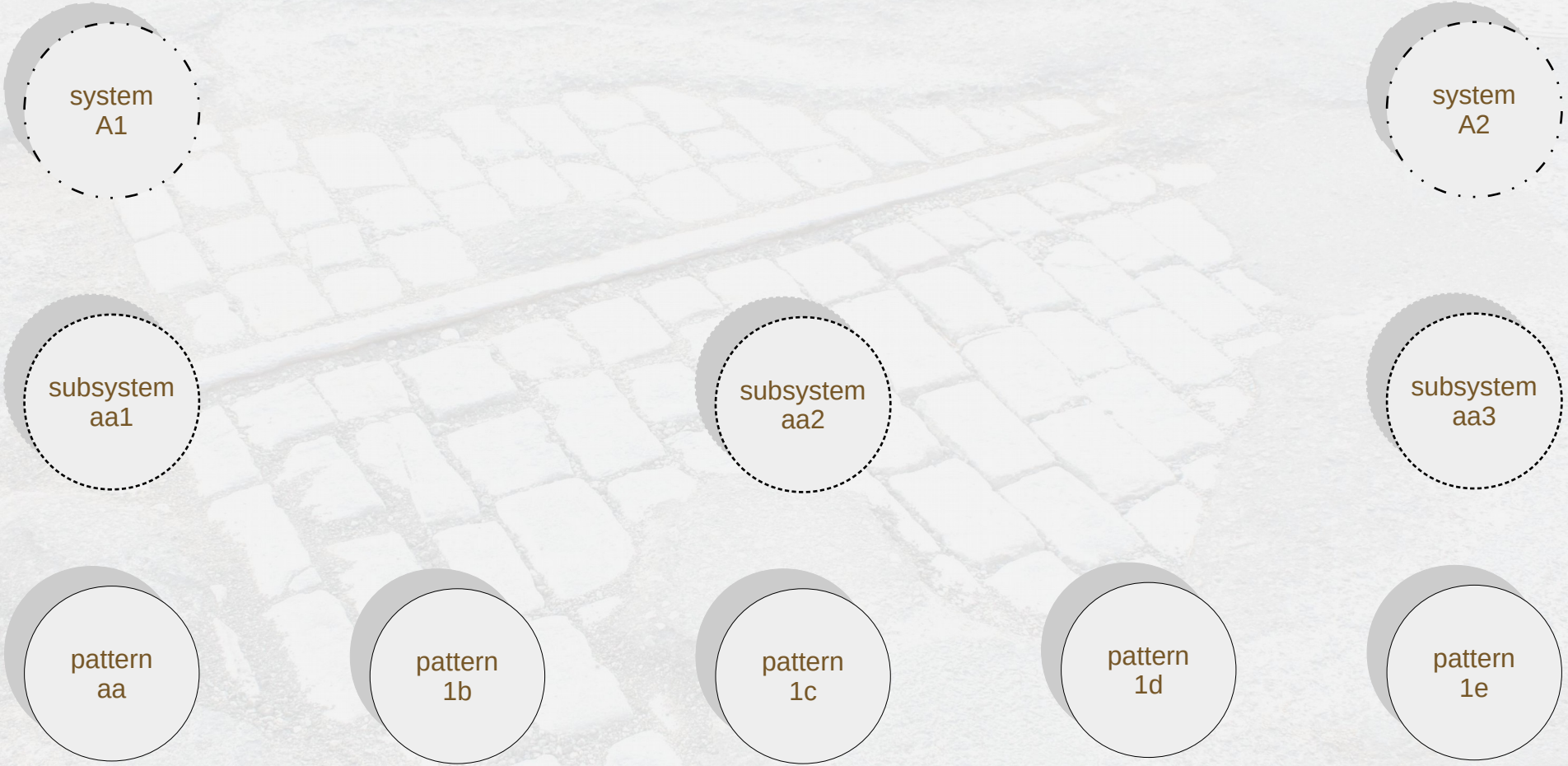
In summary:

An environmental pattern language is a coordinated body of **design solutions** capable of **generating** the complete **physical structure** of a city.

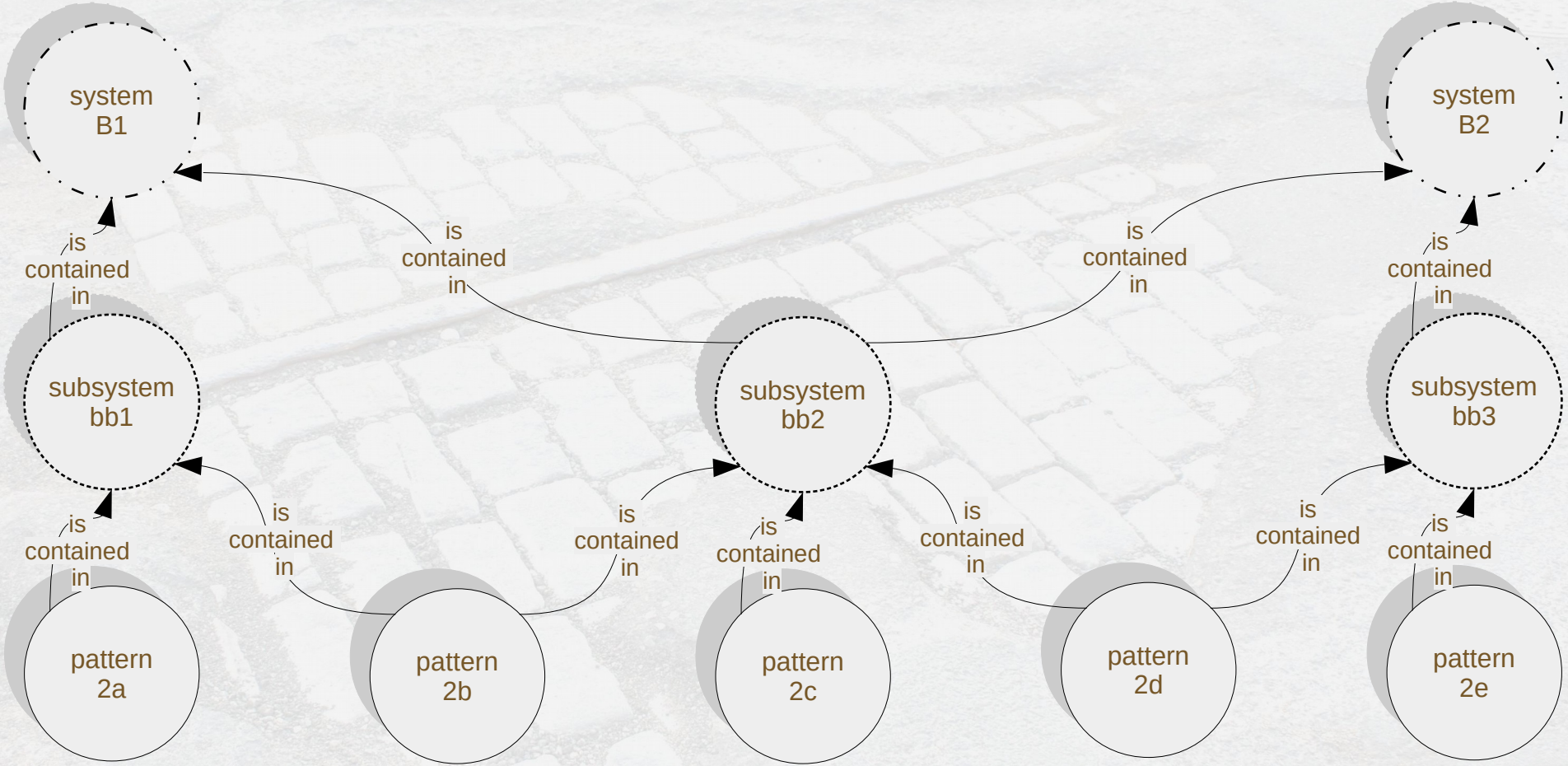
The language is designed to **grow and improve continuously** as a result of criticism and feedback from the field.

Alexander, Christopher, Sara Ishikawa, and Murray Silverstein. 1967. *Pattern Manual*. Berkeley, California: Center for Environmental Structure.

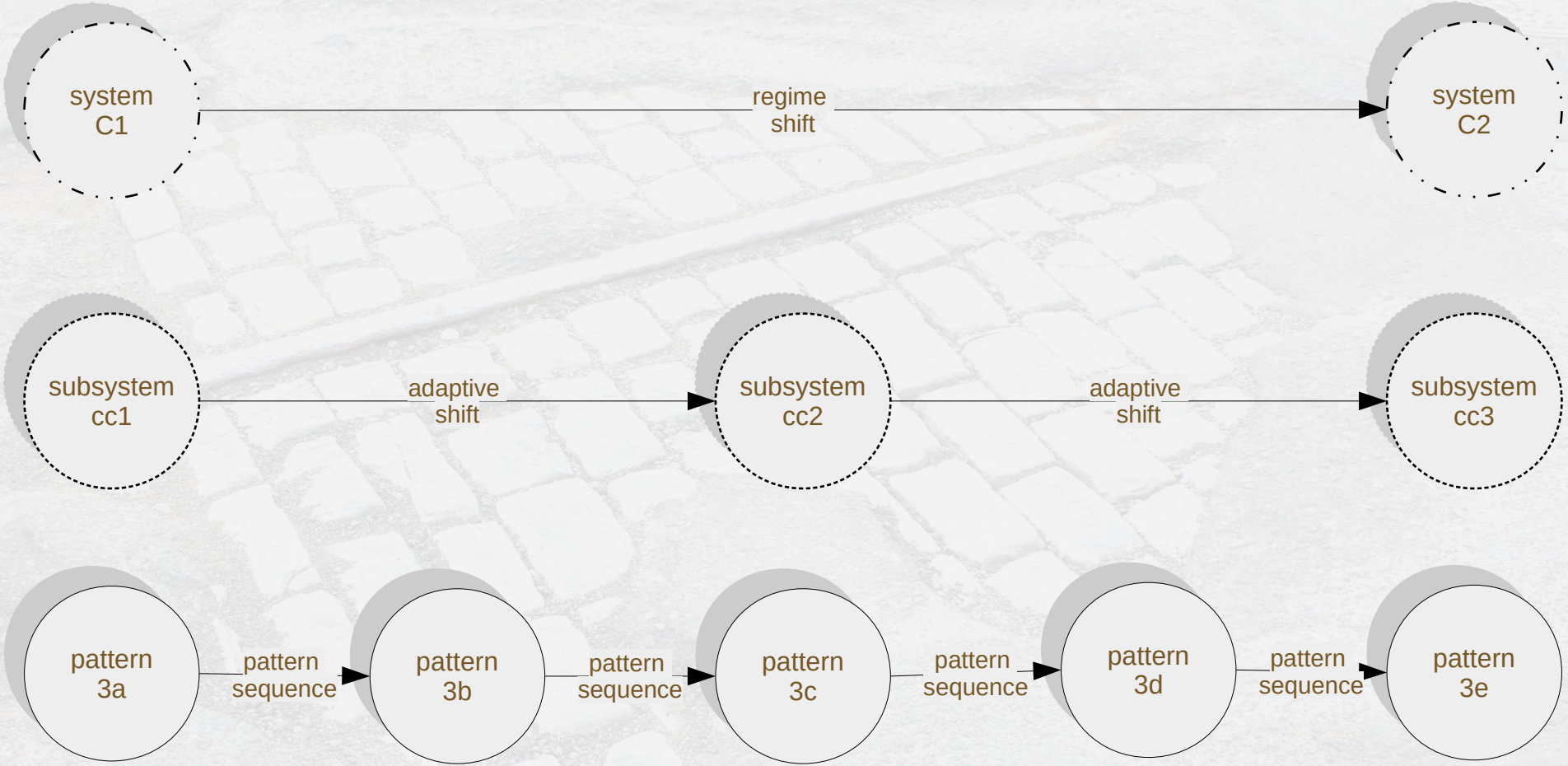
Systems, subsystems, patterns



Scales: systems, subsystems, patterns



Systems shifts, subsystems shifts, pattern sequences



Amplifications from Alexandrian to service systems thinking

1. Shared meaning on the situated	The pattern is merely a mental image, which can help to predict those situations where forces will be in harmony, and those in which they won't. But the actual forces which will occur in a real situation, although objectively present there, are, in the end unpredictable, because each situation is so complex, and forces may grow, or die, according to subtle variations of circumstance (Alexander, 1979, pp. 285–286).
2. Systems thinking and complexity	Systems generating systems 1. There are two ideas hidden in the word system: the **idea of a system as a whole** and the idea of a **generating system**. 2. A **system as a whole** is not an object but a way of looking at an object. It focuses on some holistic property which can only be understood as a product of interaction among parts. 3. A **generating system** is not a view of a single thing. It is a kit of parts, with rules about the way these parts may be combined. 4. Almost every 'system as a whole' is generated by a 'generating system'. If we wish to make things which function as 'wholes' we shall have to invent generating systems to create them. In a properly functioning building, the building and the people in it together form a whole: a social, human whole. The building systems which have so far been created do not in this sense generate wholes at all (Alexander, 1968, p. 605).
3. Method content + development process	Volume 1, The Timeless Way of Building [TWB], and Volume 2, A Pattern Language [APL], are two halves of a single work. This book [APL] provides a language, for building and planning; the other book [TWB] provides the theory and instructions for the sue of the language. This book [APL] describes the detailed patterns for towns and neighbourhoods, houses, gardens and rooms. The other book [TWB] explains the discipline which makes it possible to use these patterns to create a building or a town. This book [APL] is the sourcebook of the timeless way; the other [TWB] is its practice and its origin (Alexander et al., 1977, p. ix).

Rephilosophizations from Alexandrian to service systems thinking

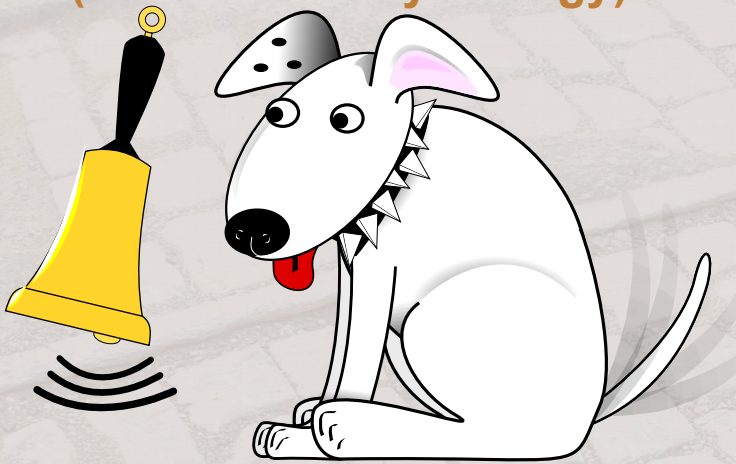
1. From structuralism to alternative stable states	• Criticism of teleology • Three types of change in biological evolution: (I) environmental change; (ii) somatic (cellular) change; and (iii) genotypic change (Bateson 1963) • Teleonomic processes through closed programs or open programs • Regime shifts (ecosystem ecology, community ecology)
2. From dwelling to journeying	• Being served over a period of time (a journey) rather than in a moment of time (dwelling)? • Heidegger world-time and time-as-ordinarily-conceived • Places existing not in space, but as nodes in a matrix of movement (Ingold 2000)
3. From semi-lattice to meshwork	• "A City is Not a Tree" focuses on physical invariants • Social relations with movement and time (e.g. gaining and losing friends) • Each person not as a point, but as a line (Ingold 2011) • Meshworks as trails of movements or growth

Reinterpretations from Alexandrian to service systems thinking

1. From problem-solving to issue-seeking	• Design is problem-solving; [architectural] programming is problem-seeking (Peña & Focke, 1969, p. 4). • Issues-based approach appreciating how values influence and impact defining problems (Rittel & Webber, 1973, p. 159). • Problem Structuring Methods (e.g. Soft Systems Methodology, Strategic Choice Approach, Strategic Optoins Development and Analysis)
2. From quality-wholeness to interactive value	• "Quality without a name" – "an objective quality that things ... can possess that makes them good places or beautiful places. (Gabriel 1996) • 15 geometric invariants, mutually-reinforcing centers • Services separating value from the outcome • Interactive value: enjoyment takes place over time • Outcomes of service systems: use-value, exchange value
3. From anti-patterns to wayfaring	• Dead patterns leak out, infect other patterns (Alexander 1979) • Anti-patterns as non-solutions; to be coupled with patterns in pairs (towards problem-solving) • Wayfaring more equivalent to piecemail growth (than transport from origin to destination)

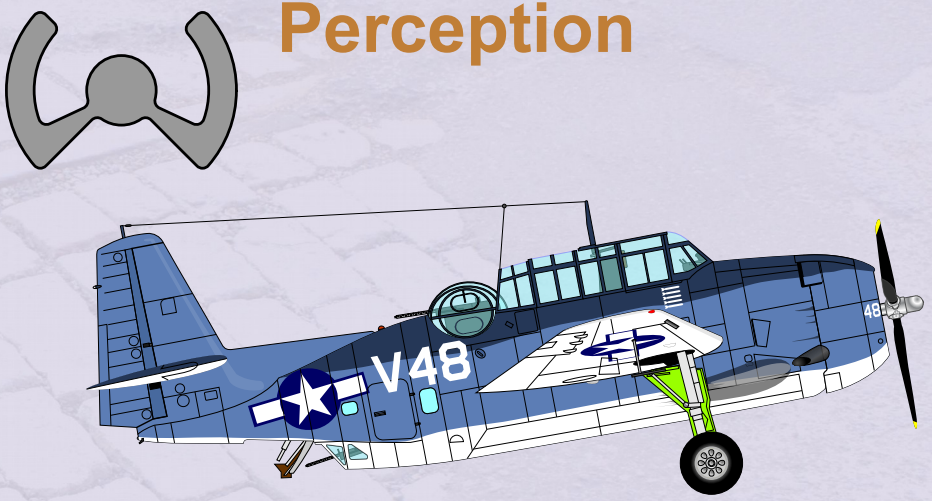
Ask Not What's Inside Your Head, but What Your Head's Inside of

Stimulus – Response
(Behavioral Psychology)



[In the 1950] psychophysics of perception … "givens" in the light to the eye could not support perceptual phenomena, but only elementary experiences such as sensations. [….] Succinctly put, the psycho-physical program was … traditional in considering perception to be a set of responses to presented stimuli (albeit "higher order" stimuli).

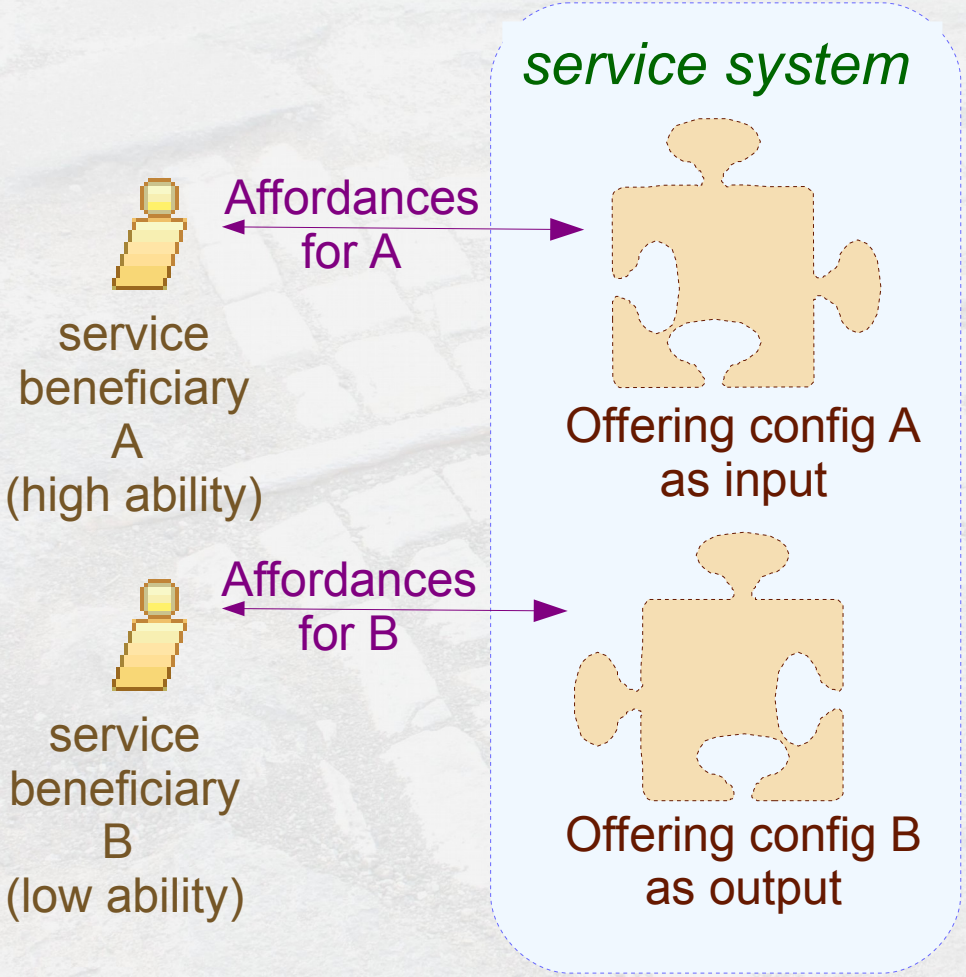
Ecological Approach to Perception



Over the last 10-15 years [James J. Gibson] has tried to develop enough theory … to demonstrate that direct perception is indeed plausible even if hordes of difficult details remain to be worked out. The … analysis of the optic array, stimulus organization, and the functional organization of perceptual systems are what Gibson oftens points to as radical features ….

William M. Mace 1977. "James J. Gibson's Strategy for Perceiving: Ask Not What's inside Your Head, but What Your Head's inside of." In *Perceiving, Acting, and Knowing: Toward an Ecological Psychology*, edited by Robert Shaw and John Bransford, 43–65.

Affordances are relational in an ecological perception



The term ***affordance*** refers to whatever it is about **the environment** that **contributes** to the kind of **interaction** that occurs. [….]

An affordance relates attributes of something in the environment to an interactive activity by an agent who has some ability, and an ability relates attributes of an agent to an interactive activity with something in the environment that has some affordance.

The relativity of affordances and abilities is fundamental. Neither an affordance nor an ability is specifiable in the absence of specifying the other.

James G. Greeno 1994. "Gibson's Affordances." *Psychological Review* 101 (2): 336–342.

Lifelines co-respond with habit, agencing, and attentionality

Habit, rather than volition:

I become my walking, and that my walking walks me. I am there, inside of it, animated by its rhythm. And with every step I am not so much changed as modified, in the sense not of transition from one state to another but of perpetual renewal. [p. 16]

Agencing, rather than agency:

Interaction goes back and forth as agents, facing each other on opposite banks of the river, trade messages, missiles, and merchandise. But to *correspond*, in my terms, is to join with the swimmer in the midstream. It is a matter not of taking sides but of going along. [p. 18]

Attentionality, rather than intentionality:

Walking calls for the pedestrian's continual responsiveness to the terrain, the path, and the elements. To respond, he must attend to these things as he goes along, joining or participating with them in his own movements. [p. 19]

Ingold, Tim. 2017. "On Human Correspondence." *Journal of the Royal Anthropological Institute* 23 (1):9–27. https://doi.org/10.1111/1467-9655.12541.

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