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Metaphors and Systems

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A variety of metaphors are commonly used in systemic design to make abstract concepts more concrete, externalised, and engageable-with, to enable constructs to be discussed and dealt with, and to generate new ideas. This practice builds on a long history of metaphor use in systems theory and cybernetics, and can involve a focus on language, drawing and diagrams, or physical modelling, among other approaches. However, the implications of common metaphors used in systemic design have perhaps not been elaborated and examined. This short paper proposes a discussion and activity over the course of RSD10 in which conference participants contribute and reflect on metaphors in use, tacitly or otherwise, and consider the possibilities offered by alternatives.

Keywords: metaphors, systems, design

Figure 1. *New Metaphors* (Lockton et al, 2019b), exhibited at RSD8, includes a range of metaphors which can be used to illuminate abstract properties of systems, from 'things growing on things' to 'finding a niche'.

Systems and abstractions

We know that systems don't exist. Well, we act as if they do—otherwise what are we doing here?—but we also know that the idea of a system is a construct[1], an abstraction, a fiction which helps us model, understand, and grapple with the often invisible but nevertheless important relationships between things, static or dynamic. The 'things' themselves are often (or always, depending on how radical you are) also constructs, of course. We know that "all models are wrong" (Box & Draper, 1987: 424), but we also know that we cannot avoid modelling in order to deal with and make sense of the world. We know that our system maps are not the territories themselves, but as systemic designers we are also acutely aware of the extent to which the choice of scale or complexity or degree of abstraction in our maps in some ways 'creates' or reifies that territory. A box—black or otherwise—labelled on a diagram becomes a stand-in for what it is labelled as, collapsing complexities, histories, interpretations, fuzziness, into a unit which can be manipulated, connected, treated as real. Nold's (2021) distinctions between dualist & structuralist, and socio-material & post-structuralist ways of approaching systems in design are relevant here.

Systems modelling can bestow affordances upon ideas which they perhaps would not otherwise have: they become variables to be quantified and measured and managed[2]. Whether we make distinctions between entities or treat them as the same thing, introduce hierarchies or not, and where we draw the boundaries, are all important questions. While some disciplines dealing with abstractions seem to get by through tangling themselves in exhausting linguistic and semantic games, and others tend towards tight definitions which enable even algebraic manipulation, design has a somewhat different approach. Designers (tacitly or explicitly) often work through turning imagined ideas into something real, or at least engageable-with. A gigamap or physical model of a system can enable stakeholders to point to, and discuss, abstract concepts alongside 'real' ones, just as a design concept or prototype can turn invisible ideas into something tangible that people can respond and react to.

Metaphors: from abstract to concrete

The designer's toolbox is full of methods for translating the abstract, invisible, and constructs into varying degrees of concreteness. One of the major ways in which this translation happens is through the strategic use of *metaphors*, initially often used by designers to introduce people to new things (types of product, modes of interaction) by giving us a link to something we already understand. Over time they can become so familiar that we no longer think of them as 'metaphors' any more—do we even notice the metaphorical dimensions of desktops and windows and folders and files? What about breakout rooms, the cloud, feeds, threads, forums, the net, browsers, the web, websites, or the notion of a 'site' itself? As with other kinds of models, metaphors are not the thing itself—they are always an abstraction or a concentration on some features to the exclusion of others. The choice of metaphors has implications, connotations, complications and implications—it is never a neutral choice. Nevertheless, if these limitations are borne in mind, metaphors can be used as a kind of disruptive improvisation technique for helping us think differently and reframe issues. The *New Metaphors* card deck (Figure 1) which my students and I created (exhibited at RSD8) is one approach, which has been applied to areas including robots (Alves-Oliveira et al, 2021), health decisions (Kirchner et al, 2020), and augmentative and alternative communication (Valencia et al, 2021), but there are many others (e.g. Hurtienne et al (2020), Mothersill & Bove (2019), Gero & Chilton (2019), Logler et al (2018)), working at various degrees of 'system-ness'.

While thinking metaphorically can be useful for idea generation during design processes, it is at the more systemic levels of characterising (and reframing) the systems we are in where there are perhaps more transformative possibilities. From transitions, pandemics, and climate crises to mental health and social justice, many challenges facing humanity today and in the future are complex, involving relationships and time-scales which are difficult to understand and represent in simple terms. By mapping features of an existing or familiar situation onto a new or unknown one, it can make it easier for us to grasp it more quickly, and to understand where leverage points (if that is the right metaphor) might be; or, in a less instrumental way, give us a more nuanced understanding of the system: here, different metaphors can be kinds of *lenses* for viewing or examining systems in different ways (Lockton & Candy, 2018). Exploring the metaphors that different stakeholders or participants in a system *currently use* to make sense of it—or creating tools to help express those metaphors,

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[1] It's interesting to consider that 'constructs'—and the idea of constructivism—are perhaps metaphors in themselves.

[2] Sometimes described as the reification fallacy. Scott (2019: 100) notes "our proneness to… assuming that anything that has a name must exist or have a definable *essence*".
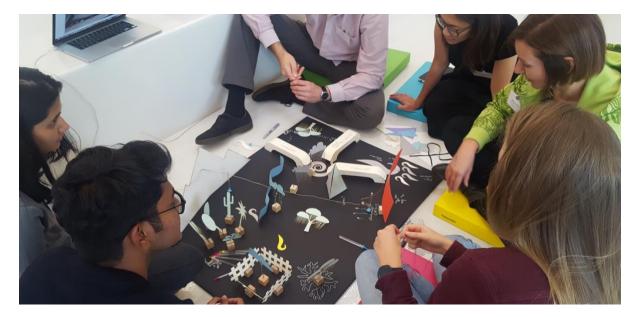
whether physically (e.g. Rygh, 2018), through methods such as drawing (e.g. Bowden et al, 2015), or through language (e.g. Inayatullah, 1998; Dudani & Morrison, 2020) can be a valuable first stage of a participatory process, and surface and reveal different understandings, experiences, and assumptions as part of perhaps conversational approaches—for example, Vink's (2017) work on the metaphors people use around design itself.

Exploring metaphors and systems

Metaphorical thinking has a long history in systems theory and cybernetics, including the cultural and anthropological approaches of Margaret Mead and Mary Catherine Bateson (1984), and the more often ecologically inspired metaphors explored by Gregory Bateson (1972) and more recently Nora Bateson (2015) (and in a quite different context by Beronda Montgomery (2021) among others). Gordon Pask (1975: 13) discussed the importance of "establishing isomorphisms", i.e. correspondences in structure between systems, making cybernetics "the science or the art of manipulating defensible metaphors; showing how they may be constructed and what may be inferred as a result of their existence". But we might think even more fundamentally: the etymology of *cybernetics* as a term itself is rooted in the metaphor of a ship's helmsperson, in the same was as *government*[3]. Table 1 shows a few metaphors in common use in systems terminology. Quite apart from the metaphor of 'playing with tensions' as the theme of RSD10 itself, within the RSD community, the diverse range of explorations of systems and how to describe, visualise, characterise, and influence change within them has included some excellent work using metaphors, analogies, and related concepts to help illuminate and communicate.

Among notable examples: Boehnert's (2018) work on the visual representation of complexity offers a vocabulary of icons representing systems concepts, many of which have a metaphorical dimension, including tipping points, stability, and path dependency. Stoyko's (2016, 2019) ambitious SystemViz Codex includes a huge variety of metaphors for properties and features of systems, ranging from parasitism and cruft to liminality, mutation, goal drift, and noise. Silverman and Rome (2018) propose "imagin[ing] by analogy" as part of their regime shift canvas; van der Velden (2017) explores how Kate Raworth's (2017) popular 'doughnut economics' metaphor applies in a systemic analysis of mobile phone lifecycles; Peter (2018) applies the metaphor component along with other parts of Inayatullah's (1998) causal layered analysis to economic systems; Snow (2018) compares how the application of metaphors from biology and metaphors from physics to economic systems inform different kinds of visual models; Ruttonsha (2018) uses the metaphors of tension, targets, traction, and embodiment to examine cities as part of a relational dynamics approach.

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[3] *Fundamentally* and *rooted* are also metaphor, even if we don't notice, as Lakoff & Johnson (1980) might have pointed out.

The 'tangible thinking' approaches taken by Rygh & Clatworthy (2019), Aguirre Ulloa & Paulsen (2017), Fass (2016), Metzner-Szigeth et al (2018), Ricketts & Lockton (2019), Lockton et al (2019a; Figure 2), and Luria et al (in press) also, explicitly or otherwise, make use of metaphors as a way to translate or reify abstract systemic concepts in forms that can be shared and in some cases collectively constructed, from topological metaphors such as landscapes (e.g. Ricketts & Lockton, 2019) to relational metaphors such as material properties (Aguirre Ulloa & Paulsen, 2017), to performative metaphorical approaches where elements change over time (e.g. Fass, 2016).

Discussion: Towards a menagerie of metaphors for systemic design

While I am wary of trying to formalise or systematise(!) the variety of approaches to metaphors and systems into anything claiming to be a 'definitive' **framework**, it seems as though it could be useful for the systemic design community to **reflect** on the ways in which we use metaphors, consciously or not, partly to **support** some **cross-fertilisation** of ideas and approaches. For example, if (as I have also done in the sentence above) we take this extract from the RSD10 conference theme, and highlight some of the metaphors used…

> "The main conference theme **explores** design and systems thinking practices as **mediators** to deal **fruitfully** with **tensions**. Our human tendency is to relieve the tensions, and in design, to resolve the so-called **"pain points."** But tensions reveal paradoxes, the **sites of connection**, **breaks in scale**, **emergence** of complexity. Can we **embrace** the tension, the paradoxes as **valuable** social **feedback** in our **path** to just and sustainable futures?"[4]

…each has consequences and connotations if we act as if they are real rather than abstractions. What are the implications for our work as designers if we use these kinds of metaphors as starting points, as opposed to others? Would our approach be different if (for example) we used a different metaphor to capture the idea described here by '**tensions**'? How does something like the notion of a **path** to just and sustainable futures fit (or not) with other ways of thinking about futures?

With this short paper, I propose a discussion, and an activity over the course of RSD10, in which conference participants contribute and reflect on metaphors in use in systemic design, tacitly or otherwise, and consider the possibilities offered by alternatives. I would then like to invite anyone who is interested to work together on exploring and making sense of the metaphors contributed, to produce a more substantial paper together which clusters and teases out some patterns and possibilities, with the aim of producing a useful reference or tool.

Table 1. A small selection of metaphors in common use in systems terminology (of course, there are many, many more)

soft and hard systems	loops	feedback and feedforward
layers (pace layers, shearing, other)	knots and double-binds[5]	leverage points
horizons and foresight	paths	frontiers
transitions	landscapes	connections
forces	emergence	networks
stability and equilibrium	black (and white) boxes	goals and targets
boundaries	circularity	steering
nested systems	maps	probing

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[4] http://rsd10.org/call-for-papers/ (accessed 24 May 2021)

[5] As I tentatively explored at RSD7 (Lockton, 2018)

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