Systems Thinking through Changes:
An action learning guide for the Canadian Digital Service

Code for Canada
https://codefor.ca

Systems Changes Learning Circle
http://systemschanges.com

March 2022

Agenda

:60	:60	:80		:10	:60		:30
I. Presentation	🍴	**II. Workshop**		☕	**III. Workshop**		**IV. Read-outs**
• Welcome • *Systems Thinking* as *Systems Changes Learning* • Action learning practices as a hub + 4 spokes		• Reforming as groups • Knowing from within • Contextual influences • Diagnosing rhythmic disorders	:10 :20 :20 :30		• Prognosing likelihoods • Reordering pacing • Reflecting on progress + process (pre-retrospective)	:20 :20 :20	• Show and tell (:10 per team)

D. Post-workshop retrospective (homework)
• Summary (1 page) of paths considered and not taken, actions to be negotiated

Centered in Toronto, the Systems Changes Learning Circle originates from CSI, OCADU SFI and Systems Thinking Ontario

David Ing

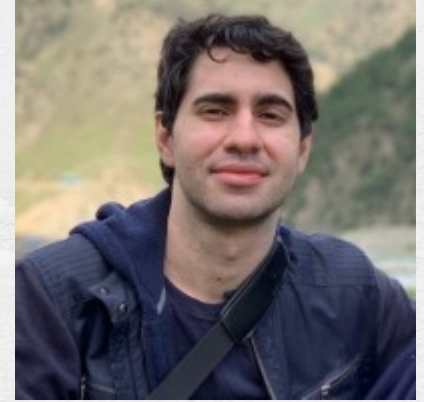linkedin.com/in/
daviding/

Dan Eng

linkedin.com/in/
daneng/

Kelly Okamura

linkedin.com/in/
kelly-okamura/

Zaid Khan

linkedin.com/in/
zaid---khan/

We will (i) start in plenary, (ii) break out into three parallel groups, and then (iii) finish by checking on progress and process

Team A	Team E	Team M
• Adrianne • Yael • Sharly • Phil C • Yedida	• Élise • Gillian • Kate • Amy • Anik • Janice	• Meghan • Tamreen • Eman • Alexa • Clémentine

Favoring 3 groups of systems thinkers, we add new contributors

Early cybernetics
Gregory Bateson (1904-1980)
Norbert Wiener (1894-1964)
Warren McCulloch (1898-1969)
Margaret Mead (1901-1978)
W. Ross Ashby (1903-1972)

Soft & critical systems
C. West Churchman (1913-2004)
Russell Ackoff (1919-2009)
Peter Checkland (1930-)
Werner Ulrich (1948-)
Michael C. Jackson (1951-

Complexity theory
Ilya Prigogine (1917-2003)
Stuart Kauffman (1939-)
James Lovelock (1919-)

Ecological anthropology
J.J. Gibson (1904-1979)
Tim Ingold (1948-)

General systems theory
Ludwig von Bertalanffty (1901-72)
Kenneth Boulding (1910-1993)
Geoffrey Vickers (1894-1983)
Howard Odum (1924-2002)

Learning systems
Kurt Lewin (1890-1947)
Eric Trist (1911-1993)
Chris Argyris (1923-2013)
Donald Schön (1930-1997)
Mary Catherine Bateson (1939-)

Postcolonial & Chinese philosophy of science
Keekok Lee (1938-)
François Jullien (1951-)
John Law (1946-)

Service science
Richard Normann (1953-2003)
James C. Spohrer (1956-)
Gary S. Metcalf (1957-)

Later cybernetics
Heinz von Foerster (1911-2002)
Stafford Beer (1926-2002)
Humberto Maturana (1928-)
Niklas Luhmann (1927-1998)
Paul Watzlawick (1921-2007)

System dynamics
Jay Forrester (1918-2016)
Donella Meadow (1941-2001)
Peter Senge (1947-)

Practice theory
Hubert Dreyfus (1929-2017)
C. Fernando Flores (1943-)
Étienne Wenger (1952-)

Systemic design
Harold G. Nelson (1943-)
Birger Sevaldson (1953-)
Peter H. Jones (1957-)

With authentic systems thinking, synthesis precedes analysis

Thinking *synthetically*
- Placing together parts into wholes

Thinking *analytically*
- Loosening from wholes into parts
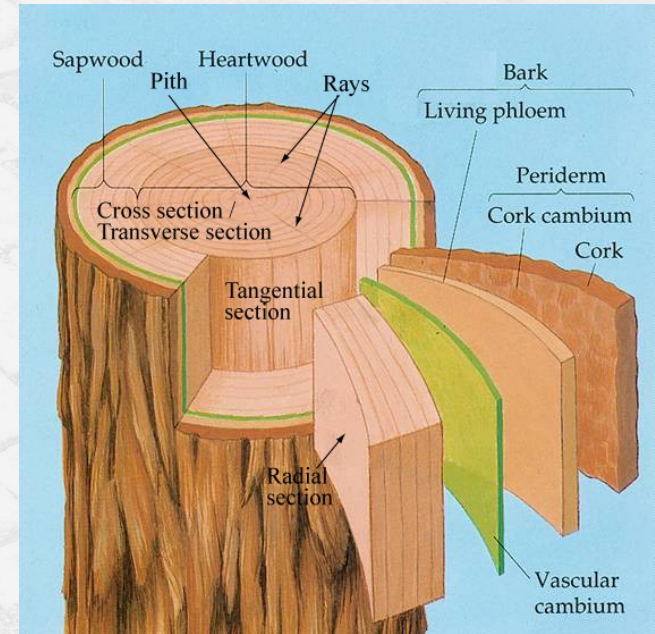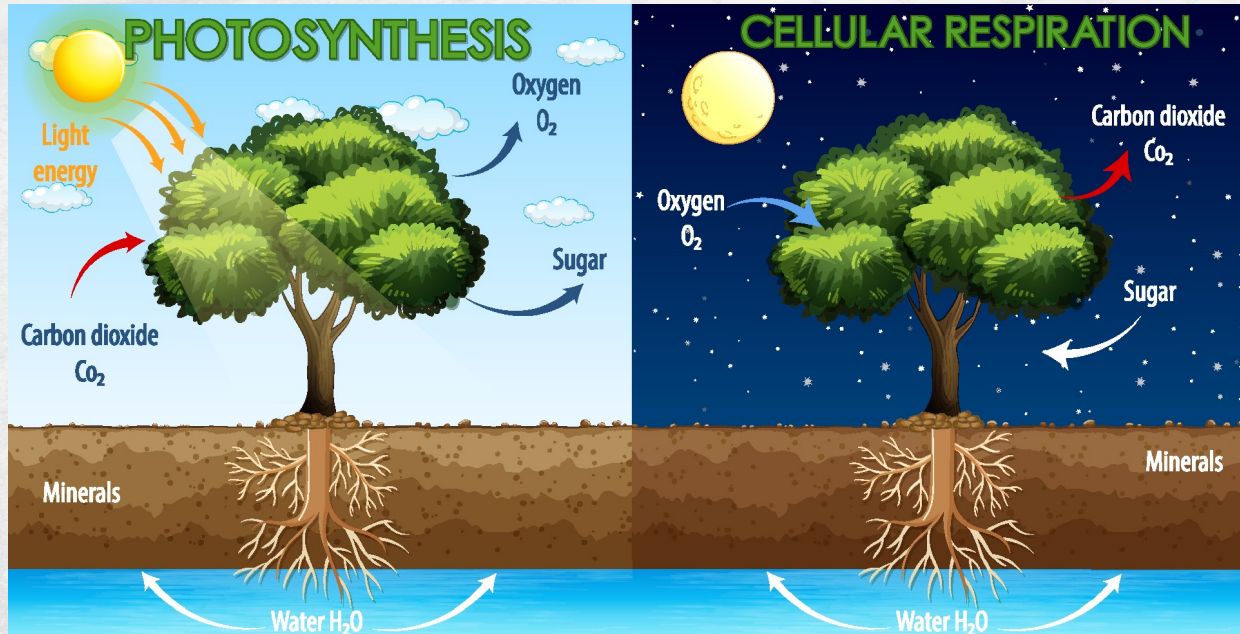
***Systems Changes Learning* adds ... thinking *dyadically* ... over time**
- e.g. the sun *waxing* (increasing in strength) and *waning* (decreasing in strength)
- Dyadic (yinyang waxing and waning) is not dualistic (e.g. sun, no sun)

Mechanisms ⇒ thinking causality. Living systems ⇒ thinking propensity

Water skiing, motion via causality
- Motorboat towing

Surfing, motion via prospensity
- Waves in the ocean
- Surfer on the board

Rhythms of a living system of interest weave into a contexture of co-related systems of influence

"Joseph Shabason at The Redeemer", CC-BY David Ing 2018

"Giom Perret at The Redeemer", CC-BY David Ing 2018
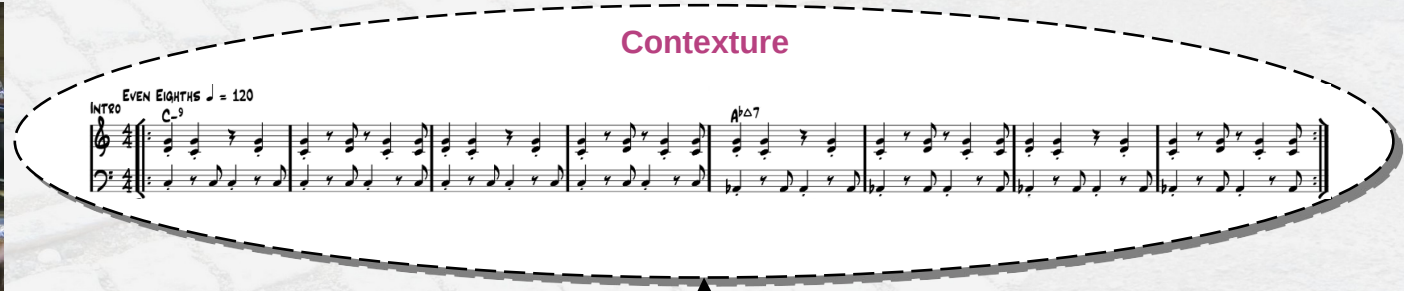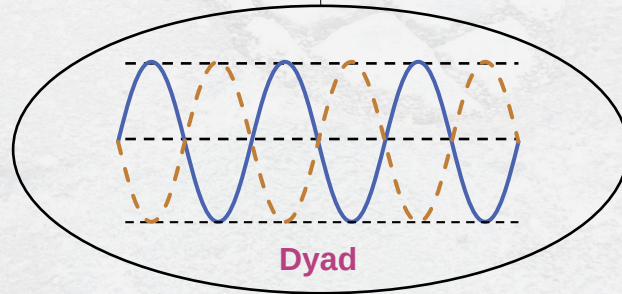
"David Occhipinti + Mike Murley at The Drake", CC-BY David Ing 2008

Contexture

consists of
(has)

Dyad

Our attention is drawn to rhythmic shift(s) in the texture, as the line of the system of interest crosses over co-related systems of influence
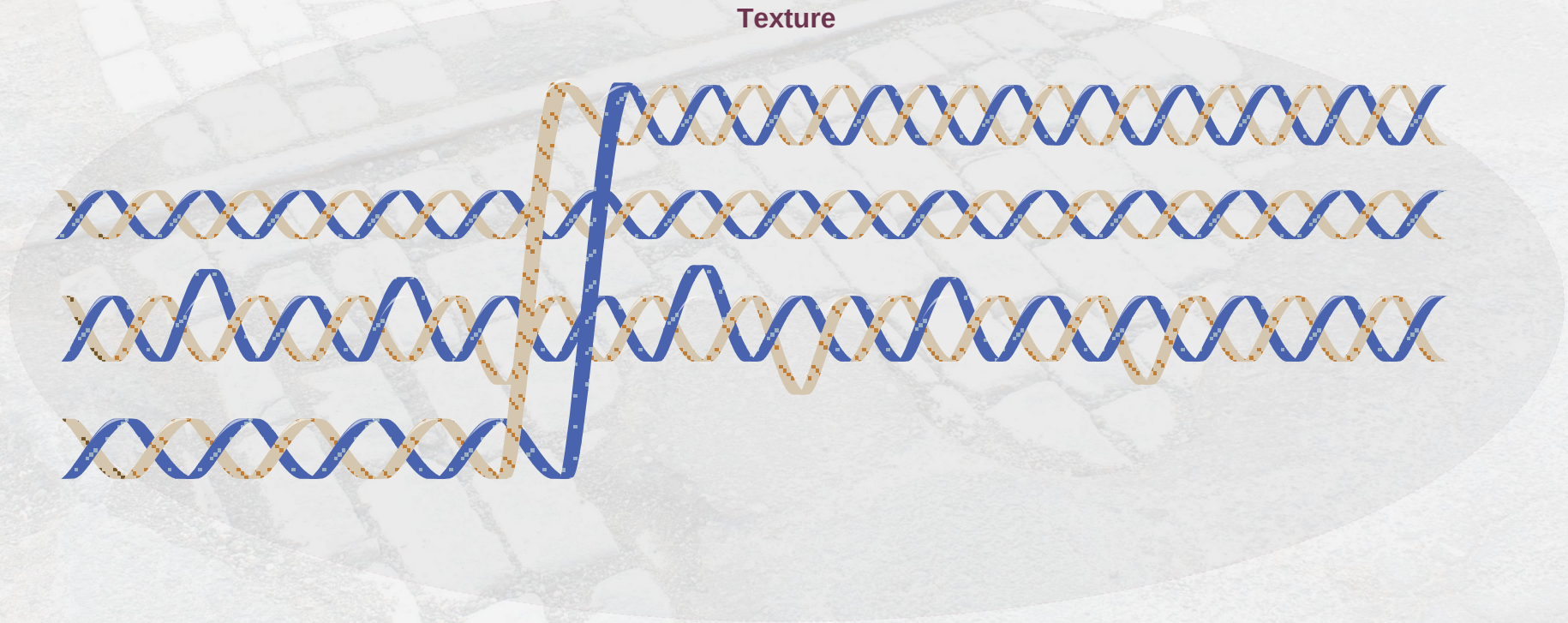
Texture

Trito-learning rolls with turbulent contexts by negotiating in worlds where proto-learning and deutero-learning break down

	Process discriminating context change over time	*Example / metaphor (groups learn to cook)*
Proto-learning (Learning 1)	Change in response correcting errors within a set of alternatives	Training on food service handling for consistency and safety (e.g. cafeteria kitchens)

Bateson, Gregory. 1972. "The Logical Categories of Learning and Communication." In *Steps to an Ecology of Mind*, 279–308. Northvale, NJ: Jason Aronson

Trito-learning rolls with turbulent contexts by negotiating in worlds where proto-learning and deutero-learning break down

	Process discriminating context change over time	*Example / metaphor (groups learn to cook)*
Deutero-learning (Learning 2)	Change in response correcting the set of alternatives	Mastering a range of food prep traditions (e.g. Culinary Institute of America)
Proto-learning (Learning 1)	Change in response correcting errors within a set of alternatives	Training on food service handling for consistency and safety (e.g. cafeteria kitchens)

Bateson, Gregory. 1972. "The Logical Categories of Learning and Communication." In *Steps to an Ecology of Mind*, 279–308. Northvale, NJ: Jason Aronson

Trito-learning rolls with turbulent contexts by negotiating in worlds where proto-learning and deutero-learning break down

	Process discriminating context change over time	Example / metaphor (groups learn to cook)
Trito-learning (Learning 3)	Change in response correcting for contexts (i.e. systems of sets of alternatives)	Competing on tv cooking challenges as teams and individuals (e.g. Hell's Kitchen)
Deutero-learning (Learning 2)	Change in response correcting the set of alternatives	Mastering a range of food prep traditions (e.g. Culinary Institute of America)
Proto-learning (Learning 1)	Change in response correcting errors within a set of alternatives	Training on food service handling for consistency and safety (e.g. cafeteria kitchens)

Bateson, Gregory. 1972. "The Logical Categories of Learning and Communication." In *Steps to an Ecology of Mind*, 279–308. Northvale, NJ: Jason Aronson

Living systems may undergo (i) systematic change or (ii) systemic change

Systematic	*Systemic*
Somatic (adaptive, cellular) change	Genotypic (generational) change
Non-living, effect-producing (allopoietic)	Living, systems-generating (autopoietic)
Reactive	Co-responsive

Systems Changes Learning centers on a hub of *knowing from within*, appreciated through a cycle of learning along four spokes

Recognizing contextual influences

consists of (has)

Reordering pacing

consists of (has)

Knowing from Within

consists of (has)

Diagnosing rhythmic disorders

consists of (has)

Prognosing likelihoods
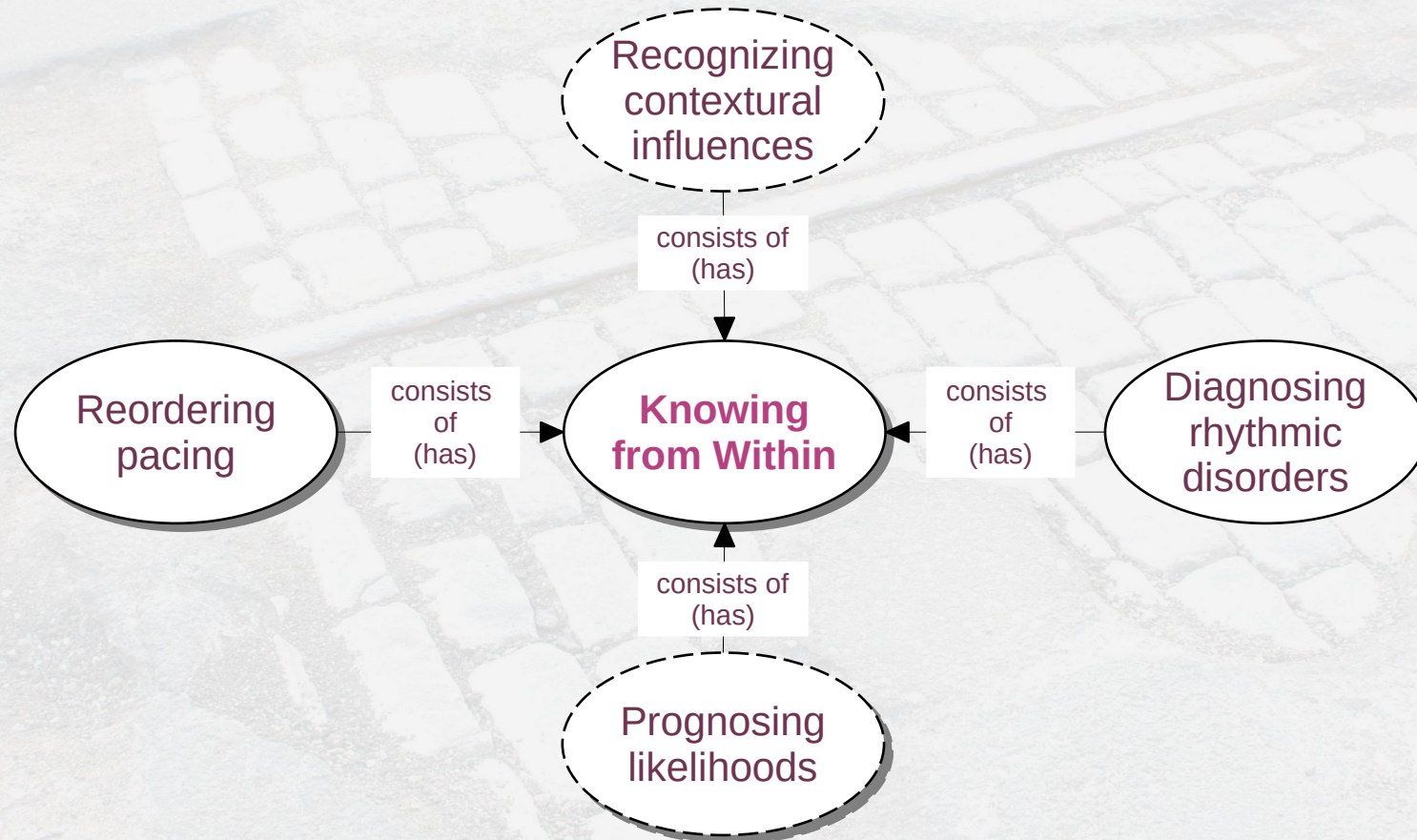
Legend:
Object Process Methodology

Essence Physical; Origin Systemic

Essence Informational; Origin Systemic

Essence Physical; Origin Environmental

Essence Informational; Origin Environmental

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 systemschanges.com, 2022

Knowing from within embodies a becoming within rhythmic shifts of a system of interest, in the synthesis of co-responding dyadic processes

Guiding questions
1. Which rhythmic shift(s) is/are most present to you?
2. Which is your system of interest, that (i) can and should know, and (ii) can adapt and/or learn?
3. Which two dyadic processes carry on synthesizing to sustain living? • Yang == working, dissipating, expanding • Yin == resting, materializing, contracting

Knowing from Within
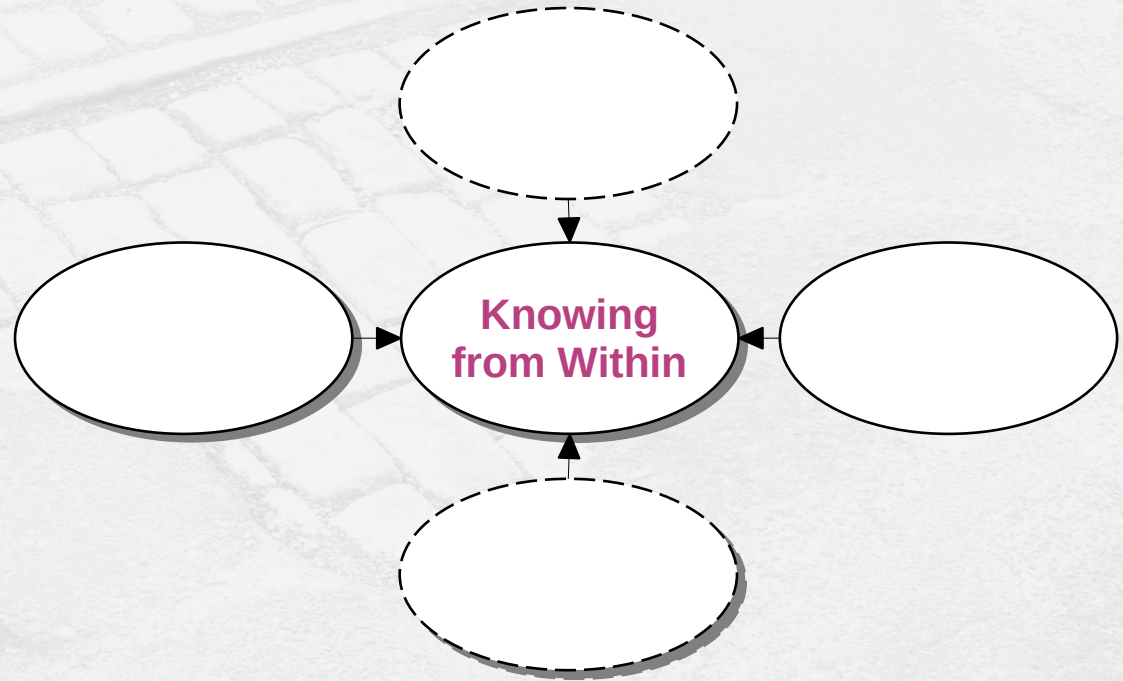
Knowing from within, example 1:
Consider a shift to pandemic working-from-home on (family) life

	Guiding questions	Knowing from within
1.	Which rhythmic shift(s) is/are most present to you?	• Residents living + working in closer quarters • Easy conveniences → resource preplanning
2.	Which is your system of interest, that (i) can and should know, and (ii) can adapt and/or learn?	• Household
3.	Which two dyadic processes carry on synthesizing to sustain living? • Yang == working, dissipating, expanding • Yin == resting, materializing, contracting	• Working (providing income) • Domesticizing (homemaking)

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Knowing from within, example 2:
Consider a shift into a software app for venue vaccination tracking

	Guiding questions	Knowing from within
1.	Which rhythmic shift(s) is/are most present to you?	• Visitors previously anonymous → tracked • Venue checking, recording names at door
2.	Which is your system of interest, that (i) can and should know, and (ii) can adapt and/or learn?	• Civic Tech? • Collaboration between volunteer technical professionals and small organizations in a region
3.	Which two dyadic processes carry on synthesizing to sustain living? • Yang == working, dissipating, expanding • Yin == resting, materializing, contracting	• Privileging access of personal records for entry • Right-to-be-forgotten after n days

Knowing from within, hint (philosophy of science, Classical Chinese Medicine): Dyadic processes make up a whole with parts that co-respond
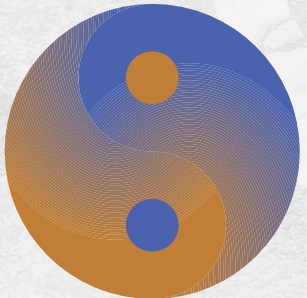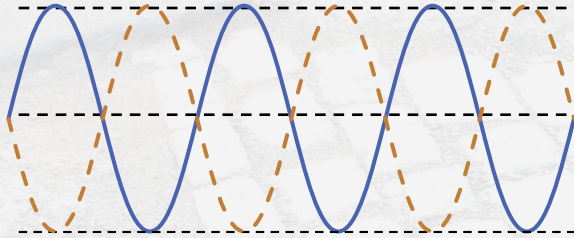
Yang	Yin
Illuminating	Darkening
Working	Resting
Warming	Cooling
Rising	Descending
Dissipating	Materializing
Scattering	Congealing
Generating	Growing
Expanding	Contracting
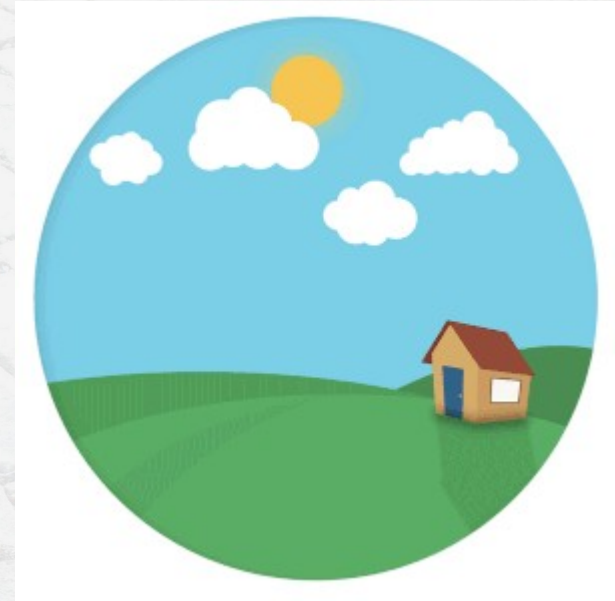
"Sunset-Sunrise" by Rick Ilovar 2021 on Dribble

Recognizing contextural influences prioritizes concerns with and by rhythms and (non-)shifts in co-responding (life)lines

Guiding questions
1. What rhythms and (non-)shifts in the world co-relate into dysrhythmia?
2. What are the systems of influence in co-respondence, and are they tightly or loosely woven together?
3. What trends in pacing, acceleration or deceleration in systems of influence are anticipated to persist?

Recognizing contextural influences

Knowing from Within
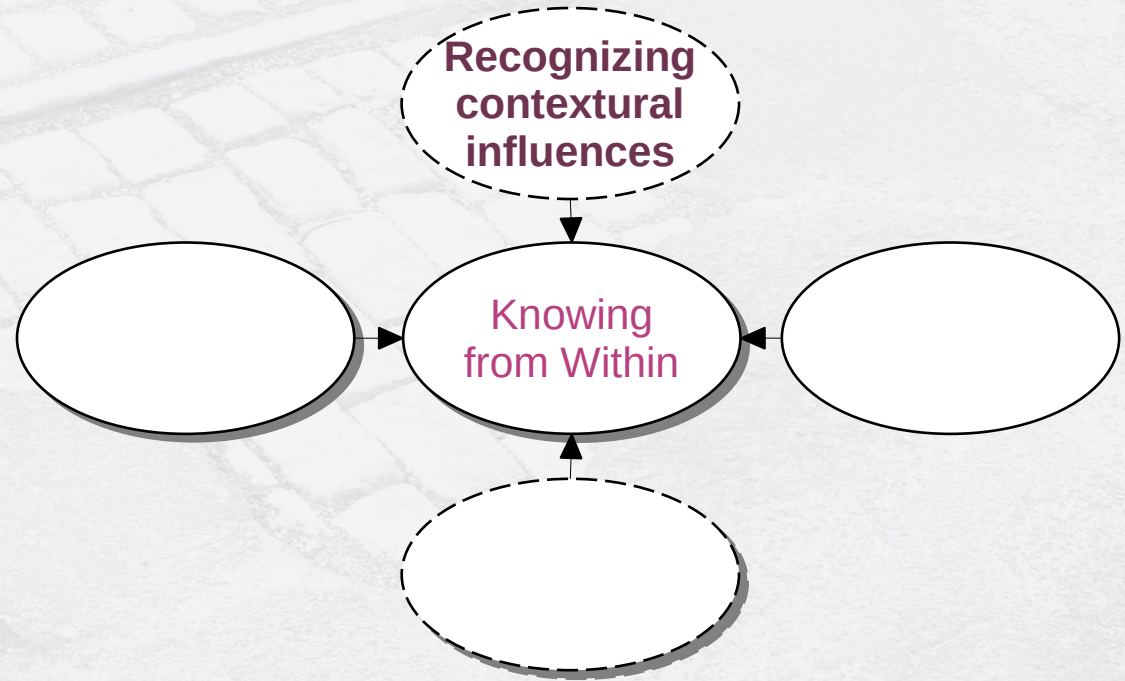
Recognizing contextual influences, example 1: Consider a shift to pandemic working-from-home on (family) life

Guiding questions	Recognizing contextual influences
1. What rhythms and (non-)shifts in the world co-relate into dysrhythmia?	• Rate of contagion ↑↓ in medical facilities • Closing/reopening of schools by government • Availability of vaccine by region, age

2. What are the systems of influence in co-respondence, and are they tightly or loosely woven together?	• Influences coupled moderately:
	  • Norms on risks to exposure
	  • Supplies availability essential / non-essential
	  • Subsidies and forgiveness offered

3. What trends in pacing, acceleration or deceleration in systems of influence are anticipated to persist?	• Public health officials monitoring peaks • Fatigue, living with endemics • Social acceptability of loosely-supervised work

Recognizing contextural influences, example 2: Consider a shift into a software app for venue vaccination tracking

	Guiding questions	Recognizing contextural influences
1.	What rhythms and (non-)shifts in the world co-relate into dysrhythmia?	• Drop in customer visits to small businesses • Non-traceability of contagious individuals

2.	What are the systems of influence in co-respondence, and are they tightly or loosely woven together?	• Loosely coupled:
		  • Adoption of smartphones
		  • Documenting vaccinations electronically
		  • Jurisdictions on data about citizens

3.	What trends in pacing, acceleration or deceleration in systems of influence are anticipated to persist?	• Persistence of pandemic or endemic? • Distaste for returns to shutdowns

Recognizing contextural influences, hint:
Concurrent changes over time and space can be placed as (i) *at hand* for directly joining, and/or (ii) *remote* engaging via intermediaries

Distant Expediting trauma emergencies	Organizing operating room teams
Local Summoning battlefield medics	Scheduling neighbourhood clinics

Urgent   *Important*

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Diagnosing rhythmic disorders entails pathology as (i) excess/deficient warming/cooling, (ii) full/empty, and (iii) acute/chronic

Guiding questions
1. Is an immediate pathology showing with (i) yang or yin, as (ii) excess or consumed?
2. Is pathology acute (brief) or chronic (long-lasting)?
3. Is the pathology trapped in a cyclical transformation?

Recognizing contextual influences

Knowing from Within

Diagnosing rhythmic disorders
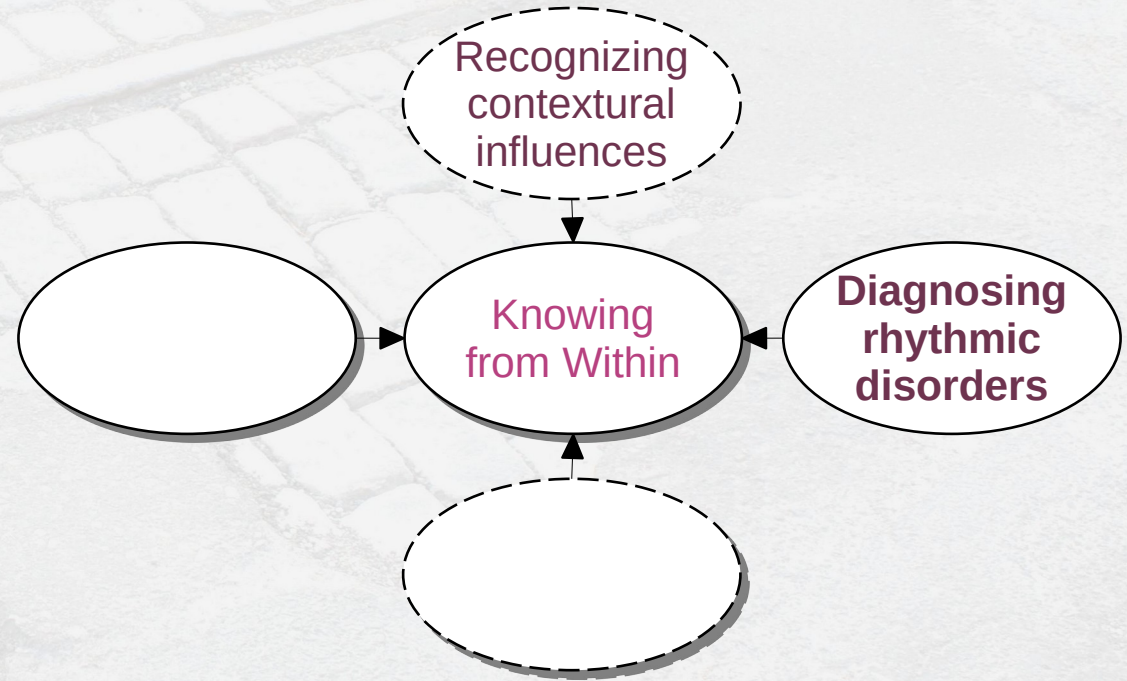
Diagnosing rhythmic disorders, example 1: Consider a shift to pandemic working-from-home on (family) life

Guiding questions	Recognizing contextural influences

1. Is an immediate pathology showing with (i) yang or yin, as (ii) excess or consumed?	• (Choose from …)
	  • Over working (yang↑ yin→)
	  • Over domesticizing (yang→ yin↑)
	  • Under domesticizing (yang→ yin↓)
	  • Under working (yang↓ yin→)

2. Is pathology acute (brief) or chronic (long-lasting)?	• (Choose from …)
	  • Acute, recoverable by taking a break
	  • Chronic, as habit becoming compulsion

3. Is the pathology trapped in a cyclical transformation?	• Over working → Under domesticizing • Over domesticizing → Under working

Diagnosing rhythmic disorders, example 2: Consider a shift into a software app for venue vaccination tracking

Guiding questions	Recognizing contextural influences
1. Is an immediate pathology showing with (i) yang or yin, as (ii) excess or consumed?	• (Choose from …) • Over privileging (yang↑ yin→) • Over forgetting (yang→ yin↑) • Under forgetting (yang→ yin↓) • Under privileging (yang↓ yin→)
2. Is pathology acute (brief) or chronic (long-lasting)?	• (Choose from …) • Acute, smartphone temporarily inaccessible • Chronic, app unreliable
3. Is the pathology trapped in a cyclical transformation?	• Over privileging → Under forgetting • Over forgetting → Under privileging

Diagnosing rhythmic disorders, general case: Conditions observed via Classical Chinese Medicine

Guiding questions	Recognizing contextural influences
1. Is an immediate pathology showing with (i) yang or yin, as (ii) excess or consumed?	• (Choose from …) • Full heat (yang↑ yin→) ⇒ expel yang • Full cold (yang→ yin↑) ⇒ expel yang • Empty heat (yang→ yin↓) ⇒ tonify yin • Empty cold, (yang↓ yin→) ⇒ tonify yang
2. Is pathology acute (brief) or chronic (long-lasting)?	• (Choose from …) • Acute ⇒ self-repair over time • Chronic ⇒ requires intervention
3. Is the pathology trapped in a cyclical transformation?	• Full heat → Empty heat • Full cold → Empty cold

Diagnosing rhythmic disorders hint:
Pathologies may be diagnosed as one of four conditions

Excess yang ~
Normal yin
(Full heat)

Excess yin ~
Normal yang
(Full cold)

Yinyang dyad
within normal range

Normal yang ~
Consumed yin
(Empty heat)

Normal yin ~
Consumed yang
(Empty cold)

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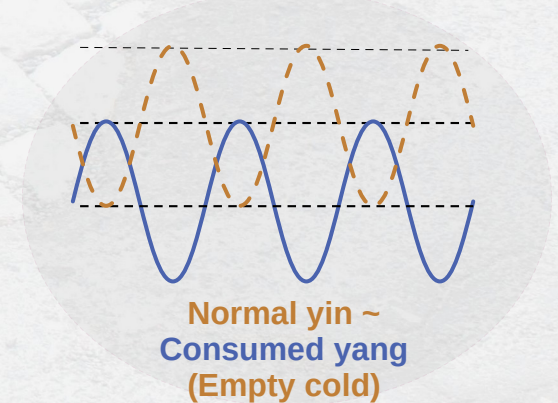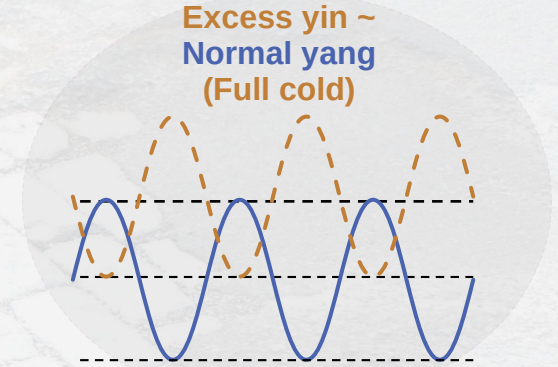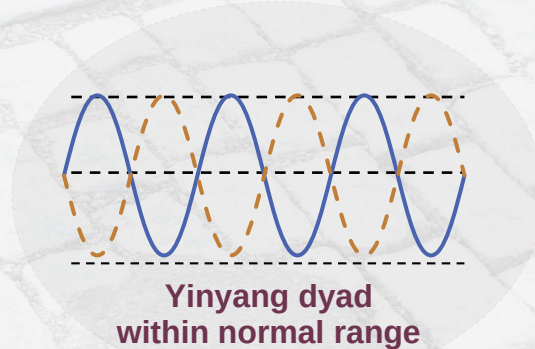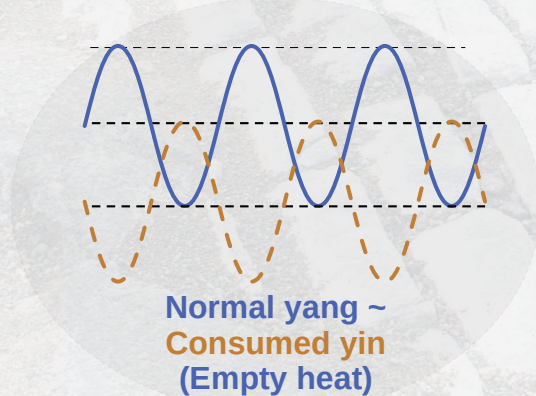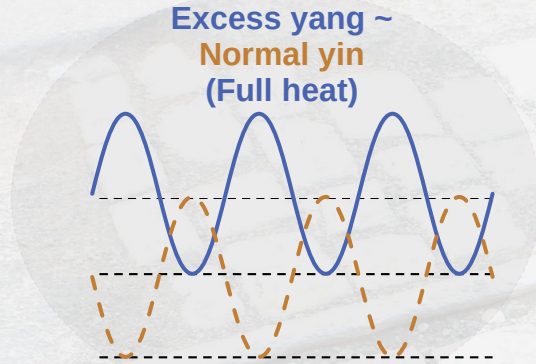
Prognosing likelihoods estimates the propensity by co-responding (life)lines in the contexture to resolve a pathology

Guiding questions
1. When in the contexture are the (i) auspicious and (ii) inopportune times in which a treatment can be paced?
2. Where in the contexture is there a propensity (i) with advantage and (ii) with disadvantage?
3. Whom are the likely (i) sponsors, (ii) beneficiaries, and (iii) disenfranchised from a treatment?

Recognizing contextural influences

Knowing from Within

Diagnosing rhythmic disorders

Prognosing likelihoods
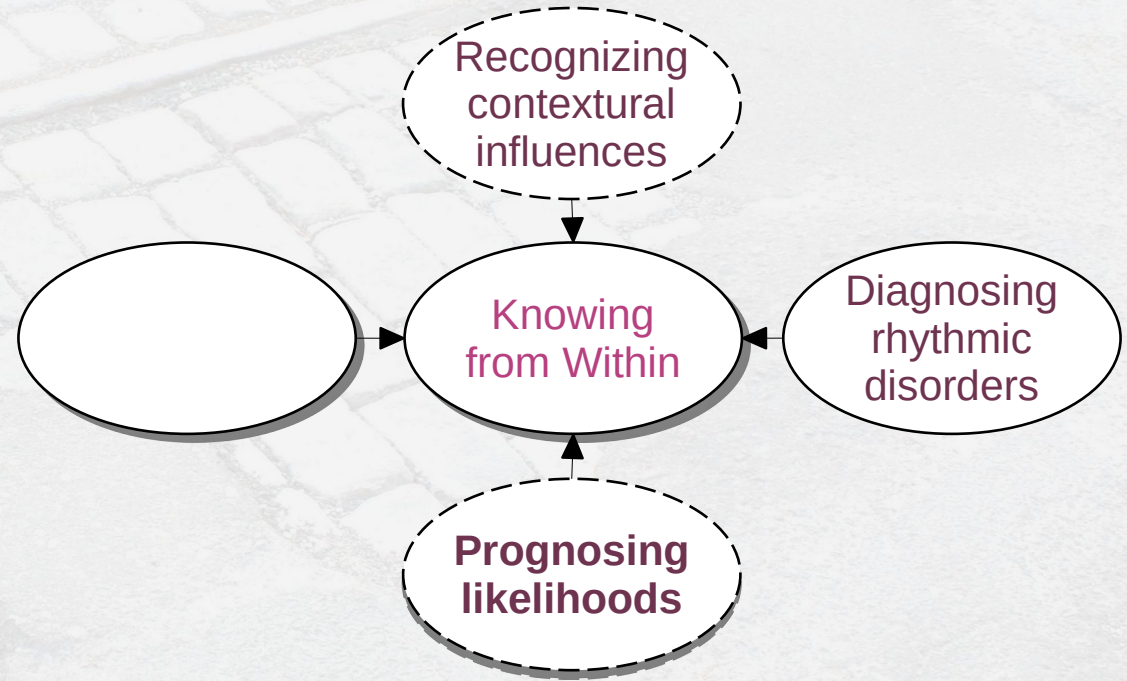
Prognosing likelihoods, example 1:
Consider a shift to pandemic working-from-home on (family) life

Guiding questions	Prognosing likelihoods
1. When in the contexture are the (i) auspicious and (ii) inopportune times in which a treatment can be paced?	• Auspicious: as restrictions are eased • Inopportune: during shutdowns
2. Where in the contexture is there a propensity (i) with advantage and (ii) with disadvantage?	• + rearranging housing or furnishings • + switching career from unfulfilling jobs • - breaking up personal relationships • - in person training, social learning
3. Whom are the likely (i) sponsors, (ii) beneficiaries, and (iii) disenfranchised from a treatment?	• Sponsors: family? • Beneficiaries: introverts, commuters • Disenfranchised: extroverts, non-careerists

Prognosing likelihoods, example 2: Consider a shift into a software app for venue vaccination tracking

Guiding questions	Prognosing likelihoods
1. When in the contexture are the (i) auspicious and (ii) inopportune times in which a treatment can be paced?	• Auspicious: as software developers have free time • Inopportune: as small businesses are too stressed to engage
2. Where in the contexture is there a propensity (i) with advantage and (ii) with disadvantage?	• + high-tech, high-touch service providers • + convenience-oriented consumers • - off-the-grid privacy-conscious individuals • - remote, low-volume operations
3. Whom are the likely (i) sponsors, (ii) beneficiaries, and (iii) disenfranchised from a treatment?	• Sponsors: trade associations? • Beneficiaries: the typical citizen • Disenfranchised: non-smartphone users, anti-vaxxers

Prognosing likelihoods hint: If they can get you asking the wrong questions, they don't have to worry about answers (Thomas Pynchon)

Type **1** error	**False positive**: finding a (statistical) relation that isn't real
Type **2** error	**False negative**: missing a (statistical) relation that is real
Type **3** error	**Tricking ourselves**: Unintentional error of solving wrong problems precisely (through ignorance, faulty education or unreflective practice)
Type **4** error	**Tricking others**: Intentional error of solving wrong problems (through malice, ideology, overzealousness, self-righteousness, wrongdoing)

Ian I. Mitroff and Abraham Silvers. 2010. *Dirty Rotten Strategies: How We Trick Ourselves and Others into Solving the Wrong Problems Precisely.* Stanford University Press.

Reordering pacing resequences disclosing of subworlds where a "new normal" is adopted and sustained as a style of coordinated actions

Guiding questions	
1.	How will skills be developed to deal with: as (i) unfolding nature, (ii) fixing problems, or (iii) making history?
2.	How will the treatment be supported or constrained by (i) slower-larger lines and (ii) faster-smaller lines?
3.	How will negotiations proceed co-responding lines towards commitments of a new texture?

Recognizing contextural influences

Reordering pacing → Knowing from Within ← Diagnosing rhythmic disorders

Prognosing likelihoods
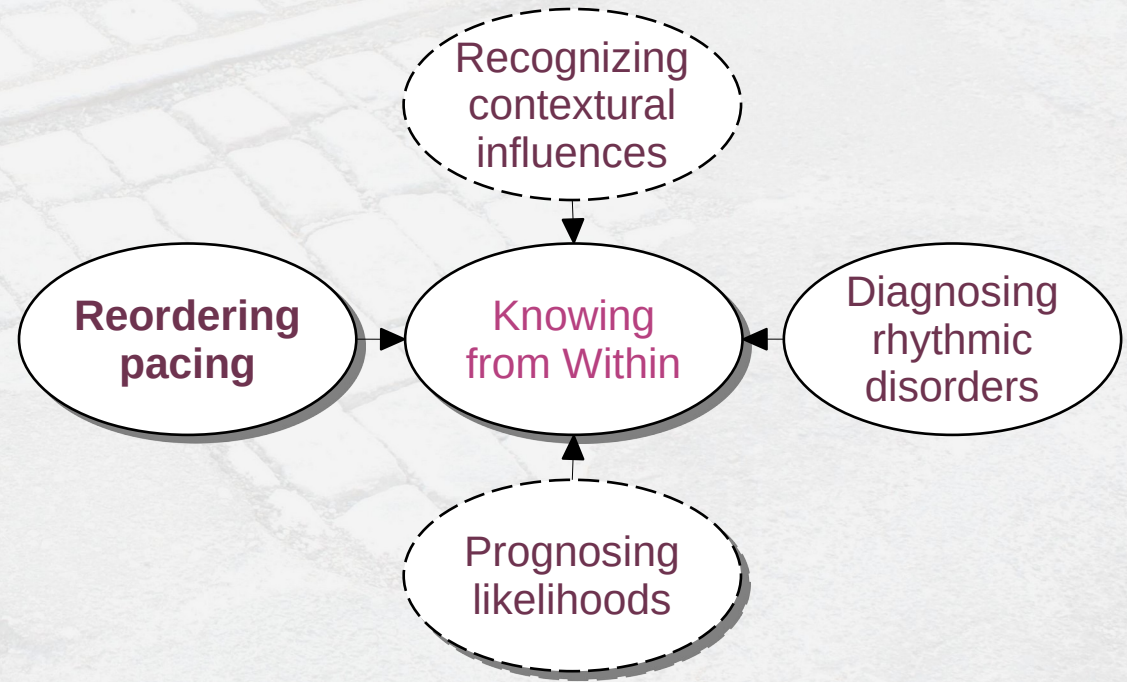
Reordering pacing, example 1:
Consider a shift to pandemic working-from-home on (family) life

Guiding questions	Recognizing contextural influences

1. How will skills be developed to deal with: as (i) unfolding nature, (ii) fixing problems, or (iii) making history?	• Fixing problems (as WFH previously uncommon)
	  • Autonomous scheduling of hours
	  • Coworking with colleagues never in person

2. How will the treatment be supported or constrained by (i) slower-larger lines and (ii) faster-smaller lines?	• Slower-larger:
	  • Infrastructural providers (broadband Internet)
	• Faster-smaller:
	  • Online ordering, ship to home

3. How will negotiations proceed co-responding lines towards commitments of a new texture?	• Increasing mobility across employers • Rebalancing parental responsibilities • Migrating away from major urban cores

Reordering pacing, example 2: Consider a shift into a software app for venue vaccination tracking

Guiding questions	Recognizing contextural influences
1. How will skills be developed to deal with: as (i) unfolding nature, (ii) fixing problems, or (iii) making history?	• Making history (standardized vaccination records lag in Canada) • App has to be easy to use by typical citizen

2. How will the treatment be supported or constrained by (i) slower-larger lines and (ii) faster-smaller lines?	Slower-larger:
	  • Institutions authenticate validity of data
	Faster-smaller:
	  • Reuse of common open source components

3. How will negotiations proceed co-responding lines towards commitments of a new texture?	• At least moral support by municipal and regional leaders • Recognition for contributors towards building and deploying the app

Reordering pacing, hint (a):
Pacing layers: slower-larger constrains, faster-smaller is ephemeral

SITE

This is the geographical setting, the urban location, and the legally defined lot, whose boundaries outlast generations of ephemeral buildings. "Site is eternal", Duffy agrees.

STRUCTURE

The foundation and load-bearing elements are perilous and expensive to change, so people don't. These are the building. Structural life ranges from 30 to 300 years (but few buildings make it past 60, for other reasons).

SKIN

Exterior surfaces now change every 20 years or so, to keep up with fashion or technology, or for wholesale repair. Recent focus on energy costs has led to re-engineered Skins that are air-tight and better-insulated.

SERVICES

These are the working guts of a building: communications wiring, electrical wiring, plumbing, sprinkler system, HVAC (heating, ventilation, and air conditioning), and moving parts like elevators and escalators. They wear out or obsolesce every 7 to 15 years. Many buildings are demolished early if their outdated systems are too deeply embedded to replace easily.

SPACE PLAN

The interior layout, where walls, ceilings, floors, and doors go. Turbulent commercial space can change every 3 years; exceptionally quiet homes might wait 30 years.

STUFF

Chairs, desks, phones, pictures; kitchen appliances, lamps, hair brushes; all the things that twitch around daily to monthly. Furniture is called mobilia in Italian for good reason.

Source: Stewart Brand. 1994. *How Buildings Learn: What Happens after They're Built*. New York: Viking.

Reordering pacing, hint (b): Obligations can be formalized as commitments to deliverable, process, capability and/or relationship

Language-Action as commitment	Commitment to a deliverable **produce**	Commitment to a process **follow**	Commitment to a capability **provide**	Commitment to a relationship **contribute**

Ing, David. 2008. "Offerings as Commitments and Context: Service Systems from a Language Action Perspective."
In *Proceedings of the 12th International Conference of the UK System Society*. Oxford, UK.

Reordering pacing, hint (b): Obligations can be formalized as commitments to deliverable, process, capability and/or relationship
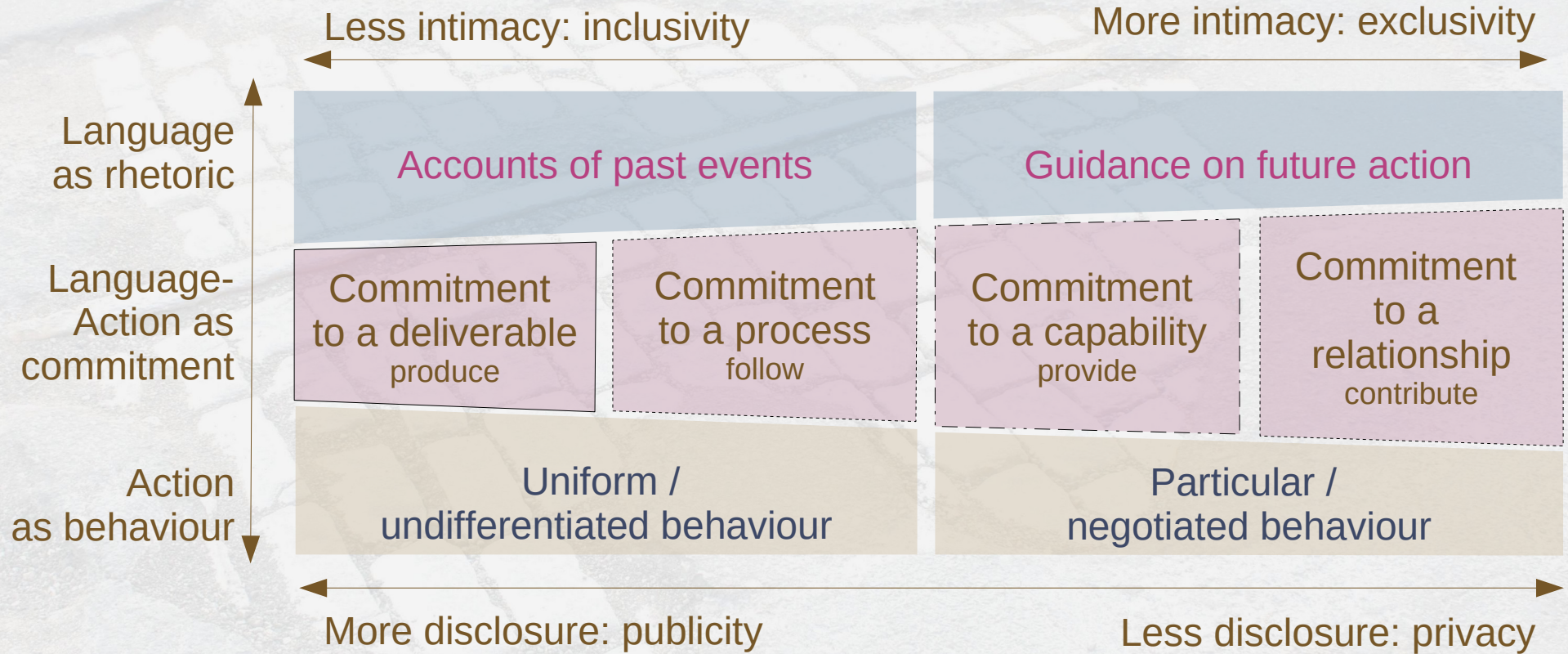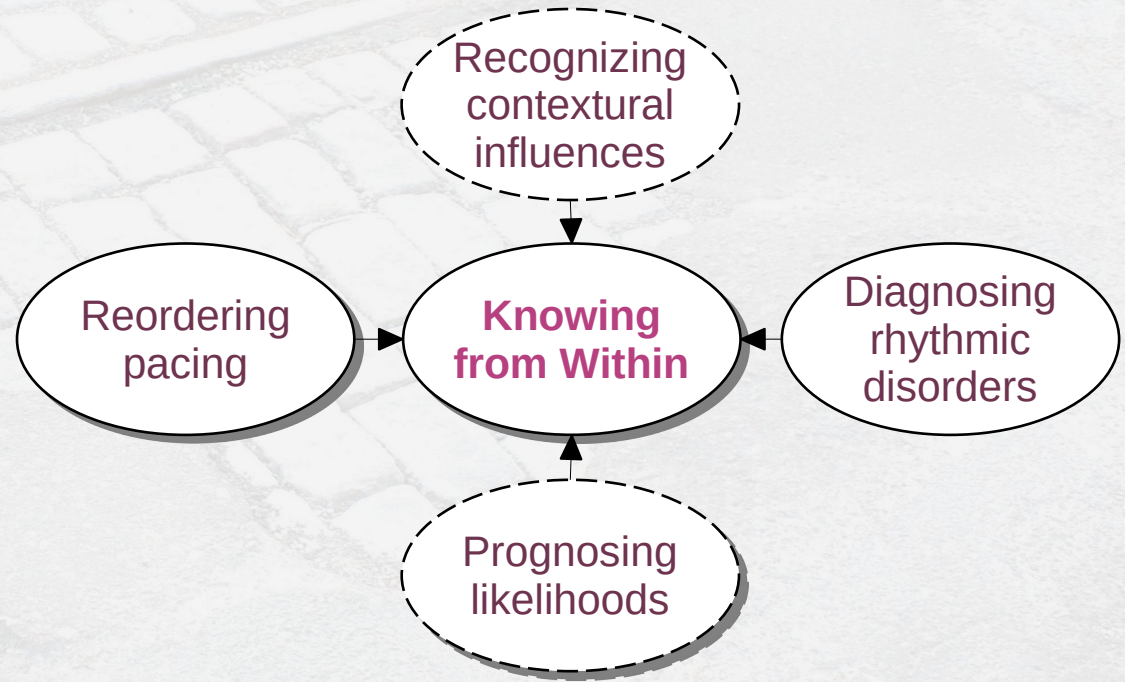
Less intimacy: inclusivity

More intimacy: exclusivity

Language as rhetoric	Accounts of past events	Guidance on future action
Language-Action as commitment	Commitment to a deliverable · produce / Commitment to a process · follow	Commitment to a capability · provide / Commitment to a relationship · contribute
Action as behaviour	Uniform / undifferentiated behaviour	Particular / negotiated behaviour

More disclosure: publicity

Less disclosure: privacy

Ing, David. 2008. "Offerings as Commitments and Context: Service Systems from a Language Action Perspective."
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Action learning is formalized through documenting joint deliberations, alternatives considered, and paths not chosen

Guiding questions	
1.	What did you collectively learn during the workshops?
2.	What more do you need to learn?
3.	Which options did you choose?
4.	Which paths did you disfavour (and why)?
5.	What actions are next?

Recognizing contextual influences

Reordering pacing → **Knowing from Within** ← Diagnosing rhythmic disorders

Prognosing likelihoods

     systemschanges.com, 2022

Agenda

:60	:60	:80		:10	:60		:30
I. Presentation	🍴	**II. Workshop**		☕	**III. Workshop**		**IV. Read-outs**
• Welcome • *Systems Thinking* as *Systems Changes Learning* • Action learning practices as a hub + 4 spokes		• Reforming as groups • Knowing from within • Contextual influences • Diagnosing rhythmic disorders	:10 :20 :20 :30		• Prognosing likelihoods • Reordering pacing • Reflecting on progress + process (pre-retrospective)	:20 :20 :20	• Show and tell (:10 per team)

D. **Post-workshop retrospective** (homework)
• Summary (1 page) of paths considered and not taken, actions to be negotiated

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