

Combining the horizontal and the vertical. 45-degree knowledge production and 21st Century learning

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Aims

1. Discuss the intellectual and political economy origins of **combinational knowledge and 45-degree learning**
2. Develop a provisional **two-dimensional framework** of combinational knowledge and 45-degree learning to create the **Organic Intellect**
3. Explore the implications of Combinational Knowledge and 45-degree learning for the **General Education Curriculum** and **Higher Education and Knowledge Production**

45-Degree Change

Transforming the world will require new knowledge from both the horizontal and vertical knowledge-worlds. The popular production of knowledge from innovative horizontal practices will be assisted by new forms of lateral digital communication and exchange, whereby citizens can find things out for themselves and exchange experiences, thereby becoming more specialist. But the knowledge world cannot simply be transformed from below; it also requires progressive forms of specialisation from technical experts who are prepared to serve a universal and progressive cause because their vertical knowledge is informed by a horizontal dimension.

(Neal Lawson, 2019)

Knowledge and learning : a relational perspective

- **Modernised knowledge and learning characterized as horizontal** - 21st Century competences and accessible education (e.g. OECD narratives).
- **Vertical knowledge seen as established disciplines** rather than as potential 21st Century knowledge.
- Absence of a **relational perspective** on the horizontal and vertical in 21st Century conditions and what this means for the curriculum, learning and knowledge production.

Elements of the 45-Degree Framework (Part 1)

1. The concept of Verticalities (V) and Horizontalities (H) originates in **Political Economy analysis of Governmental State (V) and Civil Society (H) in the Expanded Modern State**

2. **Vertical and Horizontal Dimensions** - transferred to the 'Knowledge and Learning World each dimension has a unique function – Vertical & Specialisation and Horizontal & General Understanding.

3. **45-Degree Dynamics** - at any particular knowledge/activity **Moment** there is the intersection of V and H to produce a unique combination and thus producing **Multiple Combinations** of thinking and activity located on an arc between the vertical and horizontal.

4. **Progressive and Advanced Versions** - each combination of V & H can have a progressive version, driven by the development of the advanced horizontal **General Intellect** and by research-led **Connective Specialisation**.

Elements of the 45-Degree Framework (Part 2)

5. Organic Intellect - the progressive 45-degree combinations of the General Intellect + Connective Specialisation can be understood as producing the '**Organic Intellect**'.

6. 21st Century Organic Intellectuals - combinational knowledge production and 45-degree learning is facilitated by the ethico-political mediation of Organic Intellectuals.

7. New Knowledge Frontiers – 45-degree knowledge production and learning propels the expansion of political and intellectual life in the form of New Knowledge Frontiers.

8. Human Intelligence + Machine Intelligence accelerate New Knowledge Frontiers - Combinational Learning and the Organic Intellect will be accelerated by the further combining of Human Intelligence (HI) and Machine Intelligence/Machine Learning (AI/ML).

**Verticalities/
Specialist**

Connective Specialization as advanced/progressive verticality

- Vertical knowledge is specialist and regulatory
- Verticalities can have horizontal relationships
- Challenge of infusing ethico-political thinking

The Organic Intellect

Connective Specialisation + the
General Intellect = 45 Degree
Knowledge Production
+

Mediating role of Organic Intellectuals

Arc of multiple combinations of
horizontal and vertical thinking &
activity expand Knowledge Frontiers

General Intellect as advanced/progressive horizontality

- Horizontal knowledge is social and generalist
- Horizontalities can have vertical relationships
- Challenge of creating more systematic thinking

**New Knowledge
Frontiers**

Horizontalities/Generalist

45-Degree Dynamics

- Verticalities and Horizontalities are **inter-dependent** – both contain elements of the other.
- Verticalities and Horizontalities comprise **multiple 45-degree versions** - expressed as **multiple combinations**.
- Multiple versions contain the potential of **progressive versions** of both – Vertical ('Connective Specialisation') and Horizontal ('General Intellect')

Horizontalities

- **Base horizontalities** manifested in ideological form as common sense, popular belief or everyday thinking.
- **Structured horizontalities** contain degrees of verticalities – in education (e.g. broad skills; contextualized accessible knowledge) and in more ambitious forms as general awareness (being educated) and achieving a **general intellect**.
- **Socially informed** with a sense of sharing and collectivity.
- Driven by **social, political and technological change** and relationships with verticalities.

Verticalities

Vertically structured knowledge manifested as school subjects and university disciplines.

Highly regulatory – **external** regulation from the state and **internal** regulation from academic communities of practice.

Dominant verticalities but with horizontalities – different subjects have varying combinations of vertical and horizontal (e.g. science and history)

Knowledge regions/domains have greater horizontalities; subject methodologies also have horizontalities – modes of inquiry and skills sets in a particular subject/domain.

Progressive Verticalities – Connective Specialisation

Progressive Verticalities are driven scientific and knowledge innovation of the expanded horizontal and vertical.

Expanded Horizontal - connections between forms of specialist knowledge and with the Advanced Horizontal – General Intellect

Expanded Vertical deepening by scientific and knowledge explorations to develop new abstractions

The combination of the expanded vertical and horizontal seen as
Connective Specialisation

Progressive Horizontalities – the General Intellect

Progressive Horizontalities are produced by broadening and deepening of the horizontal dimension.

Broadening - by social, ethical and educational dialogue and sharing to develop an expanded set of horizons.

Deepening - by drawing on and integrating progressive forms of accessible specialist knowledge (connective verticalities).

Progressive and expanded forms of the Horizontal can also be seen as the **General Intellect**.

Progressive combinational knowledge = Organic Intellect

Progressive Horizontalities (shared ethico-political awareness or General Intellect)

+

Progressive Verticalities (Connective Specialization)

=

Organic Intellect (progressive combinational knowledge/understanding)

This advanced and progressive form of combinational knowledge & understanding is required to develop progressive economic, social, political and cultural hegemony & to seek new transformatory solutions to global challenges.

21st Century Organic Intellectuals

- The relationship between horizontal and vertical **mediated** by **public** or **organic intellectuals**.
- Organic intellectuals are essentially **educators** who operate simultaneously at different intersections of the vertical and horizontal.
- Their vertical specialisations are driven by advanced forms of horizontal understanding – **ethico-political awareness**.
- 21st Century Organic Intellectuals **occur in multiple forms** in state and civil society – operating on any productive or educative function that helps to develop progressive state and civil society

Knowledge Expansion - Boundaries and Frontiers

- Distinction between **Knowledge Boundaries** and **Knowledge Frontiers**.
- **Boundaries** are the means of defining, differentiating and consolidating areas of knowledge (university disciplines and school subjects).
- **Frontiers** suggest a dual function – **differentiation and development** through processes of **Expansion**.
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- **Frontier Expansion** = deepening and broadening knowledge at all angles through multiple combinations, particularly involving natural science and the social sciences.

Human and Machine Intelligence as New Knowledge Frontiers

- Combinational learning and the Organic Intellect will be **accelerated** by the interfacing of Human Intelligence (HI) and Machine Intelligence (AI)
- In the Framework, technology could also act as **45-degree mediating force** between the progressive horizontal and the progressive vertical
- Concept of the **Extended Mind – individual/social relationship** in which the social is predominant – the **extension of socialized HI**
- Progressed by **collaborations** between AI/ML specialists and **knowledge producers** globally to produce New Knowledge Frontiers.

Application of the 45-Degree Framework: provisional thoughts on the Curriculum and Higher Education

45-degree curriculum

- 45-degree learning as part of an **expanded and combinational curriculum**.
- Progressive versions of Vertical and Horizontal drive innovation - **Open Subjects** (Progressive Vertical) **and Zones of Exploration** (Progressive Horizontal).
- 45-degree learning as an expansive curriculum **develops over time in differing contexts** (beyond school and into Lifelong Learning).
- Combinational learning as **expansion of current knowledge and understanding**.
- **Educators** as recontextualisers and connectors of the Vertical and Horizontal – **Educative Organic Intellectuals**

Higher education and knowledge innovation

- Distinction between knowledge functions of school and university – **more knowledge innovation in Higher Education.**
- **Universities use** mainly vertical knowledge because of research-based disciplines.
- **New knowledge formed on the 45-degree intersection** (e.g. the extension of a discipline/domain + multi-disciplinary innovation).
- Universities knowledge innovation/production also **horizontal** (deepening knowledge in relation to new conditions and by relationship to society and production).
- **More Internal regulation** – Values/ethics more horizontal/collective - they are shared

• **Boundaries and frontiers** – universities more interested in Frontiers – deepening and broadening = expansion

