

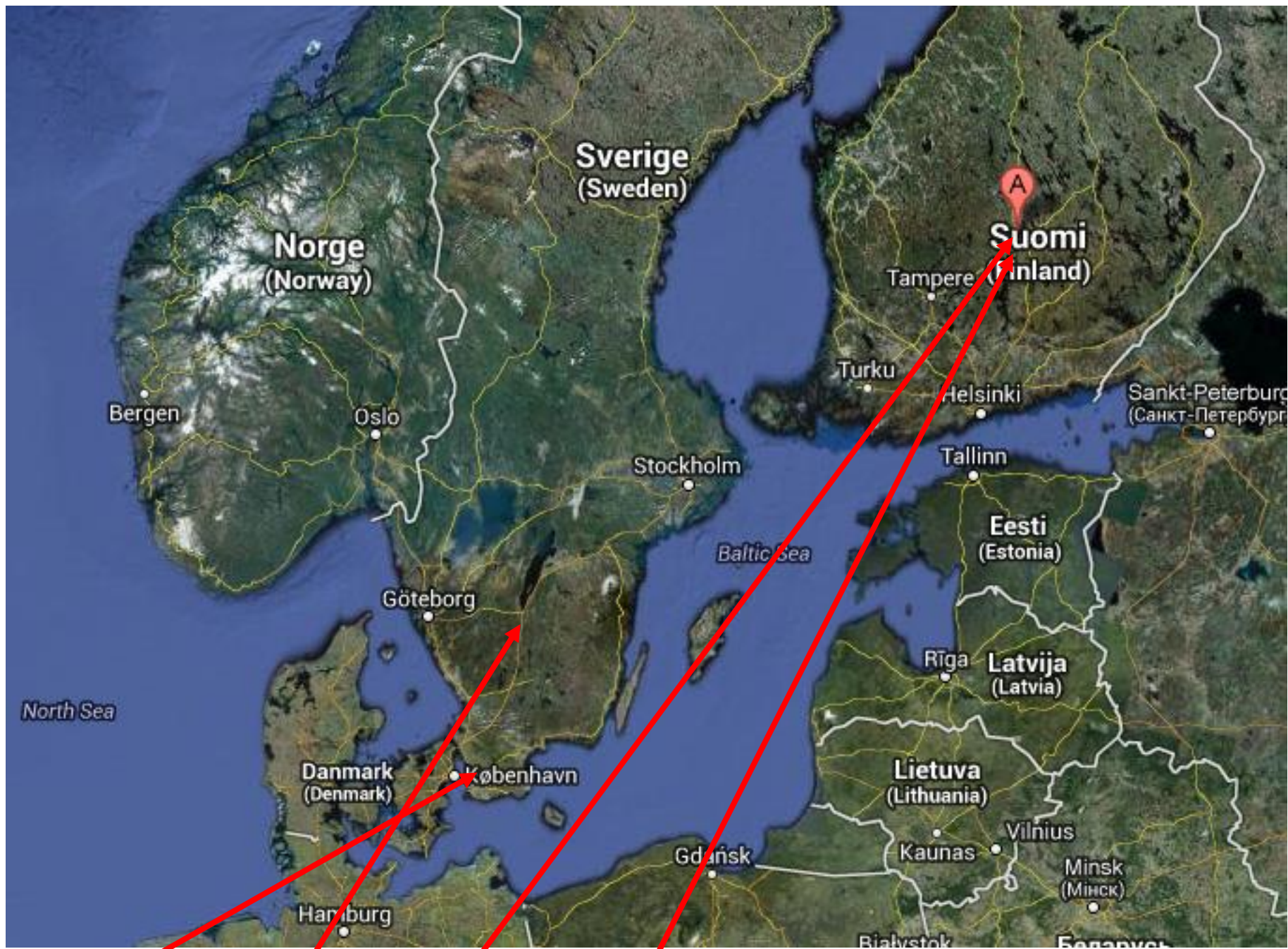
A Comparison Between the SOLO Taxonomy and the Model of Hierarchical Complexity

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Outline

- **Rationale**
- **SOLO taxonomy**
- **MHC**
- **Comparison**
- **Conclusions**

The SOLO Taxonomy (1982)

Biggs, J., Collins, K.

- **Structure of the Observed Learning Outcome**
- **Assessing the complexity in the learning outcome**

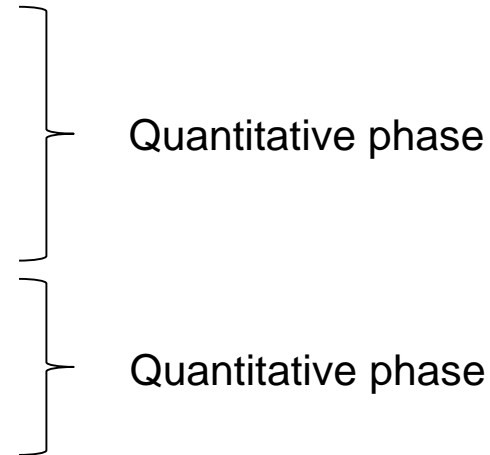
1. Prestructural: Misses point

2. Unistructural: Identify, do simple procedure

3. Multistructural: Enumerate, describe, combine...

4. Relational: Compare/contrast, analyse...

5. Extended abstract: Theories, generalise



From "Neo-Piagetian theories of cognitive development" (1992)

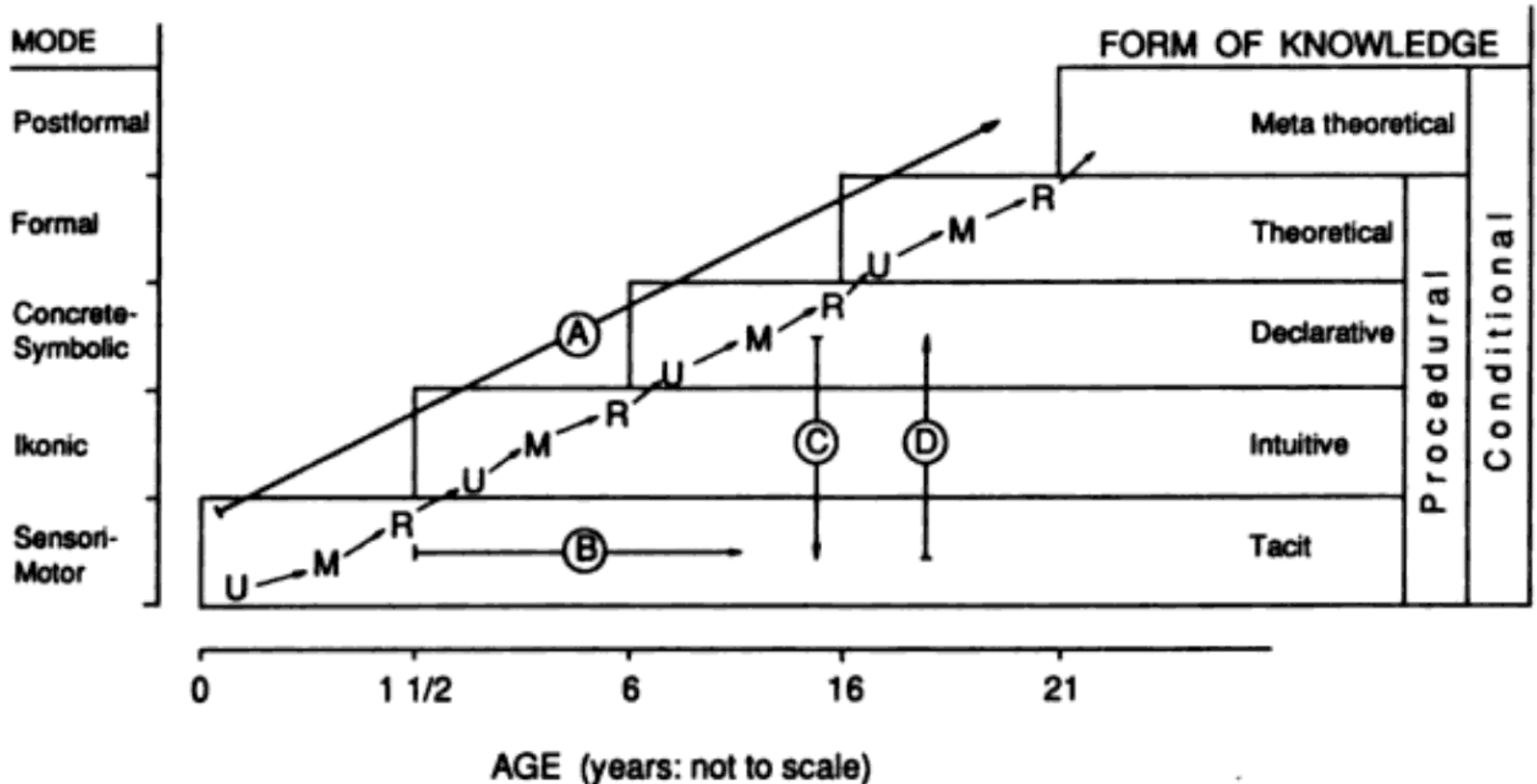
Ed. A. Demetriou, M. Shayer, A. Efklides

Chapter 2 – Modes of learning, forms of knowing, and ways of schooling

J. Biggs:

"In studying the growth of topic competences in school subjects, Biggs and Collins (1982) found a consistent hierarchical sequence that they called a learning cycle. The same pattern of learning cycle was found to be applicable to a variety of tasks and in several modes..."

Learning modes

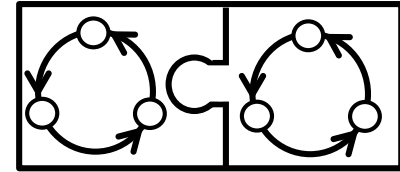


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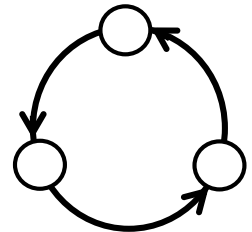
MHC: Order of hierarchical complexixty 8-12

Complexity

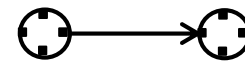
12. Metasystematic: systems are being compared or in some way coordinated



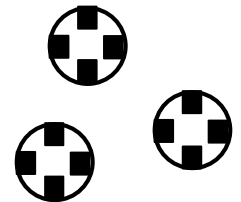
11. Systematic: several abstract variables or formal chains create a system/culture/context/ideology



10. Formal: Linear thinking with empirical or logical reasoning, cause-effect



9. Abstract: generalizations or stereotypes



8. Concrete: facts/instances/locations and simple logic

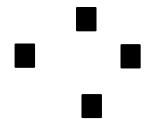


Table 2
Transition Steps in the Model of Hierarchical Complexity

Step	Relation	Name	Dynamics within Step
		The first three steps are <i>deconstructive dialectics</i> .	
1	$a = a'$ with b'	Temporary equilibrium point (thesis)	While still operating with previous stage synthesis, it does not solve all tasks. Deconstruction begins, an extinction process.
2	b	Negation or complementation (antithesis)	Negation or complementation, Inversion, or alternate thesis. Forms a second synthesis of previous stage actions.
3	a or b	Relativism (alternation of thesis and antithesis)	Relativism. Alternates between thesis and antithesis. The schemes coexist, but there is no coordination of them.
		The remainder of the steps are <i>constructive dynamics</i> .	
4	a and b	Smash ₀ (begins synthesis)	Begins extinction of the limitations of relativism's theses
5		Smash ₁ Random hits, false alarms, and misses, low correct rejections	Elements from a and b are included in a nonsystematic, uncoordinated manner. Incorporates various subsets of all the possible elements.
6		Smash ₂ More hits, excess false alarms, low misses and correct rejections	Incorporates subsets producing hits at stage n . Basis for exclusion not sharp. Over generalization
7		Smash ₃ Correct rejections and excess misses, low hits and false alarms	Incorporates subsets that produce correct rejections at stage n . Produces misses. Basis for inclusion not sharp. Under generalization.
8	a with b	New temporary equilibrium (synthesis and new thesis)	Arrives at a new, temporary equilibrium where all elements are coordinated and "settled."

Ways of comparing SOLO – MHC

- Analytical comparison
- MHC scoring of illustrating examples of the SOLO taxonomy
- Scoring of real examples with several SOLO and MHC scorers, respectively

Prestructural

Task 5.1 SOLO levels in approaches to learning question and why

The following levels of response could be observed (but, it is to be hoped, the first three responses were not):

1 *Prestructural*

‘Teaching is a matter of getting students to approach their learning.’

This response could have been written by somebody with understanding at the individual word level, but little understanding of what was discussed in the previous chapter. Prestructural responses simply miss the point or, like this one, use tautology to cover lack of understanding. These responses can be quite sophisticated, such as the kind of elaborate tautology that politicians use to avoid answering questions, but, academically, they show little evidence of relevant learning.

Unistructural

2 *Unistructural*

'Approaches to learning are of two kinds: surface, which is inappropriate for the task at hand, and deep, which is appropriate. Teachers need to take this into account.'

This is unistructural because it meets only one part of the task, defining what approaches to learning are in terms of just one aspect, appropriateness. It misses other important attributes, for example that they are ways of describing students' learning activities and what might influence them, while the reference to teaching adds nothing. Unistructural responses deal with terminology, getting on track but little more.

Multistructural

3 Multistructural

'Approaches to learning are of two kinds: surface, which is inappropriate for the task at hand, and deep, which is appropriate. Students using a surface approach try to fool us into believing that they understand by rote learning and quoting back to us, sometimes in great detail. Students using a deep approach try to get at the underlying meaning of their learning tasks. Teaching is about getting students to learn appropriately, not getting by with shortcuts. We should therefore teach for meaning and understanding, which means encouraging them to adopt a deep approach.'

We couldn't agree more. The first part is quite detailed (but could be more so); the second part is also what good teaching is about. So what is the problem with this answer? The problem is that this response does not address the key issue: *how* can knowledge of approaches enhance teaching? not *that* they can enhance teaching. This is what Bereiter and Scardamalia (1987) call 'knowledge-telling': snowing the reader with a bunch of facts, but not structuring them as required – and don't be misled by the odd connective like 'therefore'. Here, the students see the trees but not the wood. Seeing trees is a necessary preliminary to adequate understanding, but it should not be interpreted as comprehending the wood.

4 *Relational*

'Approaches to learning are of two kinds: . . . (etc.) The approaches come about partly because of student characteristics, but also because students react differently to their teaching environment in ways that lead them into surface or deep learning. The teaching environment is a system, a resolution of all the factors present, such as curriculum, assessment, teaching methods and students' own characteristics. If there is imbalance in the environment, for example a test that allows students to respond in a way that does not do justice to the curriculum, or a classroom climate that scares the hell out of them, the resolution is in favour of a surface approach. What this means is that we should be consistent.'

And so on. Here we have an explanation. Both concepts, approaches and teaching, have been integrated by the concept of a system; examples have been given, and the structure could easily be used to generate practical steps. The trees have become the wood, a qualitative change in learning and understanding has occurred. It is no longer a matter of listing facts and details, they address a point, making sense in light of their contribution to the topic as a whole. This is the first level at which 'understanding' in an academically relevant sense may appropriately be used.

Extended abstract

5 *Extended abstract*

We won't give a lengthy example here. The essence of the extended abstract response is that it goes beyond what has been given, whereas the relational response stays with it. The coherent whole is conceptualized at a higher level of abstraction and is applied to new and broader domains. An extended abstract response on approaches to learning would be a 'breakthrough' response, giving a perspective that changes what we think about them and their relationship to teaching. The trouble is that today's extended abstract is tomorrow's relational. Marton and Säljö's original study was such a breakthrough; linking approaches to learning to systems theory was another, but now both are conventional wisdom.

MHC	SOLO	
	Level	Mode
14 Cross-paradigmatic		
13 Paradigmatic		
12 Metasystematic		
11 Systematic		
10 Formal		
9 Abstract		
8 Concrete		
7 Primary		
6 Preoperational		
5 Sentential		
4 Nominal		
3 Sensory-motor		
2 Circular sensory-motor		
1 Sensory or motor		
0 Calculatory		



MHC	SOLO	
		Mode
14 Cross-paradigmatic		
13 Paradigmatic		
12 Metasystematic		Post-Formal
11 Systematic		
10 Formal		
9 Abstract		Formal
8 Concrete		
7 Primary		
6 Preoperational		Concrete-symbolic
5 Sentential		
4 Nominal		Ikonic
3 Sensory-motor		
2 Circular sensory-motor		
1 Sensory or motor		Sensori-motor
0 Calculatory		



MHC	SOLO	
	Level	Mode
14 Cross-paradigmatic		
13 Paradigmatic		
12 Metasystematic	Extended abstract	Post-Formal
11 Systematic	Relational	
10 Formal	Multistructural Unistructural	
9 Abstract	Prestructural Extended abstract	Formal
8 Concrete	Relational	
7 Primary	Multistructural Unistructural	
6 Preoperational	Prestructural/ Relational	Concrete-symbolic
5 Sentential	Multistructural	
4 Nominal	Unistructural	Ikonic
3 Sensory-motor	Relational	
2 Circular sensory-motor	Multistructural	
1 Sensory or motor	Unistructural	Sensori-motor
0 Calculatory		



Conclusions

- SOLO taxonomy and MHC can be related to and be complementary to each other
- MHC can place SOLO taxonomy and its learning modes in an AD (and more stringent) perspective which is relevant in HE
- ...