

Spaces of variation in understanding uncertainty and legal reasoning: extending understandings of transformation, irreversibility and liminality in coming to understand threshold concepts

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Promoting excellence in higher education

Aims of this paper

Using phenomenography and variation theory to understand:

- the nature of transformation in coming to understand two threshold concepts:
 - ‘Uncertainty’ in Physics
 - ‘Legal reasoning’ in Law
- why this transformation might be irreversible
- what might be happening in the liminal space as students go through the portal

Structure of the presentation

- Describing threshold concepts
- Describing phenomenography and the structure of awareness
- Examples of using phenomenographic research to describe transformations
- Variation theory
- Examples of using variation theory to explore what might happen in the liminal space

Threshold concepts

- Troublesome: often difficult to understand because a disciplinary understanding is alien or counter-intuitive
- Transformative: understanding the concept results in a shift in perspective on the subject
- Integrative: exposes hidden inter-relatedness in the subject/discipline
- Irreversible: unlikely to be forgotten. May 'forget' what it was like not to understand.
- Bounded: may constitute a boundary between conceptual areas or disciplines

- How do transformations in understanding come about?
- Why are they likely to be irreversible?

Phenomenography and awareness

- phenomenography is a research approach aimed at describing *qualitatively different* ways of experiencing phenomena
- a way of experiencing a phenomenon corresponds to awareness of a particular structure - a pattern of aspects - that constitutes a particular meaning

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- to become aware of an aspect of a phenomenon, we need to discern variation related to that aspect

Examples from an ALTC study

- Focus on two disciplines: Law and Physics
- Collaboration between disciplinary and educational academics to identify threshold concepts:
 - Legal reasoning in Law
 - Uncertainty in Physics
- Phenomenographic interviews with first year students:
 - Law: 22 interviews from three universities
 - Physics: 25 interviews from four unis (Physics)

Understandings of uncertainty

- A: a *formula* that is applied to experimental measurements
 - B: an *error* in measurement to be removed
 - C: a *limitation* of experimental conditions or controls that should be minimised
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- D: an *inherent feature* of scientific measurement
 - E: an inherent feature of measurement that *needs to be communicated*

Understandings of uncertainty: the nature of the thresholds

	Noting patterns in data	Separate interpretations of aspects of uncertainty	Integrated interpretation of uncertainty within the 'experimental context'	Integrated interpretation of uncertainty in broader contexts
(pre-understanding) Data is variable	0			
A formula applied to experimental measurements	procedural aspects	A		
An error in measurement to be removed		B		
A limitation of experimental conditions or controls		C		
An inherent feature of scientific measurement and experimentation		conceptual threshold	D	
An inherent feature of measurement that needs to be communicated				E

Understanding A: focus on formula applied to measurements

Uncertainty, I think it covers the range of values that you've got in your experiment. So if you get your line of best fit and then you do your uncertainty box, is there an uncertainty box or an error box, no, I don't know, uncertainty box. I don't know, I've forgotten. ... so uncertainty is, I suppose it's how much it deviates from the line of best fit, up and down, and we could have some error. Oh, I don't know, okay. I'm confusing myself now.

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- The student has entered the liminal space

Understanding E: An inherent feature of measurement that needs to be communicated

Transformation in the structure and focus of awareness

I think it [uncertainty] is probably even more important than the value itself because anyone can come up with the value but if you can say the uncertainty then it is useful because another scientist can take that value ... or use it in another experiment and use it with confidence and *allow for the fact that it has that uncertainty*. ... you can *build more knowledge* on top of it. ... It *tells other scientists how useful that number is* or how reliable it is and thus how useful it is.

Understandings of legal reasoning

1. a formulaic process for predicting a legal outcome;
2. an *interpretive process of arguing* for an outcome serving the *needs of the client*;
3. a dynamic, responsive and innovative process for allowing the existing law to *reflect changes in society*; and
4. a means by which *law can be changed* for the good of society, where it is necessary to use the law as an instrument to effect social change.

Understandings of legal reasoning

	1. A formulaic process for predicting a legal outcome	2. An interpretive process of arguing for an outcome that serves your client	3. A dynamic, responsive and innovative process for developing the law to reflect changing society – lead/support	4. Law as a tool for change. Recommendation to Parliament
Nature of the rule / law in legal reasoning	Rigid; completely clear (Accept the rule. Only the facts can be in dispute / argued)	Manipulable / Flexible Interpretable (Challenges the rule) Facts & rules can be argued	Changeable – Dissents, exceptions; (Change the rule)	
Purpose of legal reasoning	To correctly predict the outcome (Adjudicate)	To produce the best outcome for your client (Advocate)	To produce the best outcome for society (Change agent)	
Role of HIRAC / ISAACS	It <u>is</u> legal reasoning	It is a tool for aiding legal reasoning	It is implicit / evident in legal reasoning	
Value of the logical and consistent nature of legal reasoning	To be able to predict accurately. Comfort with predictability of law.	To treat people equitably Discomfort—will outcome be just; will I do the best/right thing.	Greatest good for greatest number	Imperfect. Comfort with unpredictability of law
Purpose of reading the law (for students)	To learn the rules (See example of LR)	To look for ambiguity and use it for your argument	To observe legal reasoning in action [?]	

Level 1: A formulaic process

“ (Legal reasoning is) a formulaic process for predicting a legal outcome.”

“Legal reasoning (also) consists very much of problem solving, the ability to give solutions to a client who presents something before you and working out ways and recognising problems along the way”.

Transformation to level 2: an interpretive process

“I just had this naïve idea when I first came to law school that we lived in a perfectly just society. Where, if something had been done wrong to you, you had been the recipient of some sort of injustice, that it would be remedied. Whereas now, my idea of the law has completely changed. Obviously, *the element of persuasion* has come in. The element of *interpretation*. Just the fact that *there’s no set way*, there’s no certain way that the law will apply to a situation.

How the law applies to the situation depends on how it’s argued by the lawyers. Then, how well you influence or persuade the judge.”

- What is necessary for this transformation to come about?
- Variation theory argues that this requires experiences of variation related to the critical aspects of the new understanding

Variation theory: what does it take to experience a phenomenon in a new way?

- *Contrast* between each aspect and other aspects of a dimension of variation;
- *Separation* of each aspect from other aspects, which implies that the aspect to be separated needs to vary while others remain invariant;
- *Generalisation*, by experiencing multiple appearances of each aspect;
- *Fusion*, in which all of the critical aspects of a particular way of experiencing are experienced simultaneously. Marton et al (2003) maintain that experiencing the aspects separately and then fusing them is likely to be more effective than never separating them.

Exploring transformation to level 2

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Interpreting the transformation using variation theory

The transformation can be described by the experience of patterns of variation in the aspects of level 2 eg:

- The rule/law - factual vs open to interpretation
- Outcome - predictable vs subject to persuasion
- The relation between Law and Justice - fixed vs uncertain

- Also, variation in awareness of the student's perspective on the Law - can be uncomfortable

Implications

- The nature of transformations - highlighted by qualitative differences in understanding
- Irreversibility of transformations
 - the student can't go back to being 'naïve'
- Liminality
 - Complexity of the patterns of variation needed to become aware of the critical aspects of the new understanding
 - Need to fuse aspects and generalise awareness in different contexts
 - Awareness of variation in some aspects is emotionally challenging

Conclusions

- Phenomenography can be useful for illuminating the nature of transformations - the aspects of awareness that are transformed
- Variation theory can be useful for illuminating why crossing thresholds is irreversible and what happens for students in the liminal space