

Intersubjectivity and Teaching: Analysing constraint in online and face-to-face engagement through the cybernetic lens of Ross Ashby (0314)

Mark Johnson, David Taylor, Maria Limniou  
University of Liverpool, UK

The analysis of relationality and intersubjectivity in education underlies recent critiques concerning the objectification of learning (Ashwin, 2015), the technocratisation of education (Barnett, 2013), sociomaterial approaches to online education (Gourlay and Oliver, 2013) and critical realist accounts of education which draw attention to absence and constraint (Khan, 2015; Donati and Archer, 2015). Our aim in this paper is to draw on an older tradition of examining relations through the analytical techniques of “Constraint analysis” as they were developed by cybernetic pioneer Ross Ashby (Ashby, 1965). Ashby’s Constraint analysis presents a negative epistemology which, we argue, when applied to education is necessarily intersubjective.

A psychiatrist who became a seminal figure in cybernetics, Ashby’s ideas of requisite variety, ultrastability, double-loop learning and self-organisation have become profoundly influential in education although the provenance of the concepts has become obscured. In distinguishing causation and constraint, he argued that cybernetics was a science of constraint where “the cyberneticist observes what might have happened but did not”. Modelling was a tool for exploring ideal logical possibilities; experiment gave rise to knowledge by revealing the constraints of nature that bore upon logical possibility. It is an approach which stands in contrast to better-known realist methodologies which focus on identifying causal mechanisms (Pawson and Tilley, 2002). At its heart was an attempt to understand learning as process whereby a self-organising system could become self-directing.

Beyond his epistemology, Ashby asserted an approach to measuring constraint drawn from Shannon’s Information Theory (1948). He saw Shannon’s work and his own as expressing the same basic principle: for one system to control another required its complexity to be at least as great as the system to be controlled. Often this balance requires constraining complex systems – for example, the teacher-class relationship is constrained by the rights and obligations of the classroom. Shannon explored how constraints operate within everyday communication in grammars: the general term he used to describe this patterning was ‘redundancy’ – latent rules which generate superfluous information to aid communication. Fundamentally, Ashby suggested that the background of communication – the redundancy – was more important than the foreground. So how might we analyse the background of education?

### **Categories of Constraint and their measurement**

There are clearly many constraints bearing upon teachers and learners. Beyond the personal constraints which form the hinterland of every individual (for example, personal histories, attachments, values, social class, etc), there are specific constraints which learners are subject to, including:

- The constraints of a course structure, the medium through which it operates, the timetable, the temporal dimension of lectures, assessments, discussions and presentations.

- The constraints of the social or professional environment bearing upon learners - particularly as they relate to the activities of the course.

Equally, for teachers there are a different set of constraints including:

- The institutional context of education – the need to engage students, the need to meet quality requirements.
- The constraints of scholarly discourse and academic ambition – the need to publish, maintain political position within academic environments and academic communities

As with a grammar, there are discernible patterns of behaviour which may be taken as indicative of particular constraints: from a learner's lack of engagement or plagiarised assignments, a teacher's favourite pedagogical tricks, through to verbosity (or not) in online forums, or the asking of powerful questions. What do these patterns of behaviour – by both teachers and learners – tell us about the interactions between different kinds of constraint? This question forms the basis of an analysis of a number of case studies from online and face-to-face education.

### **Constraint, Uncertainty and Information Theory: Some examples**

We present three examples from medical education with a combination of purely online engagement, blended and face-to-face courses. The analysis provides a simple way of characterising the differences between online and face-to-face interactions by considering the dimensions of constraint operating in each case. For example, in the online case, data is available concerning the patterns of student engagement as set against the formal constraints of the course (lectures, assessments, timetable). Analysis of this data reveals a “counterpoint” between different kinds of redundancy: for example, repeated themes that occur in forum discussions, particular patterns of exchange between individuals, the asking of questions, or the coordination of understanding about assessment requirements or broader rules of the course.

Whilst face-to-face engagement is less data-rich, some constraints remain similar (for example, timetable and assessments), whilst others are identifiable as part of what Alfred Schutz calls the “pure we-relation” of face-to-face engagement (Schutz, 1960) – for example, the shared passing of time through being in lectures together. There are also dynamics of transition as shifts occur between face-to-face situations with their multi-layered constraints of embodied co-presence, and online situations with more limited sets of constraints surrounding online utterances. In each case, these analysable constraints combine with latent issues of individual background, social and professional context. We suggest that some indicators of these latent issues can be determined from learner utterances and their expression of values. In each case, the constraints applied by teachers is considered, from the organisation of learning activities, through to the explanation of assessment criteria. We explore how the analysis can be broadened to embrace the constraints bearing upon the teacher.

### **Conclusions**

Ashby's techniques provide a range of analytical tools which can be used to cut through confusion which can become exacerbated through attempts to identify causal mechanisms or other forms of ‘variables-based sociology’ (Smith, 2010). By focusing on the background of education, attention is placed on relations, not individuals. By seeing differences between educational media as relational differences, we

can explore the ways in which relations might be managed according to the constraints exercised by agents within an educational medium, and make judgements about effective practices which fluctuate constraints in educational processes. Online media afford very different constraints than do face-to-face media although as yet a coherent and empirically investigable paradigm for understanding teaching and learning across any medium does not exist. Enticingly, since Ashby's constraint analysis is relational, exploring how it might overcome objectivist assessment strategies presents an intriguing challenge for future work.

## References

- Ashby, W. R. (1965) "Measuring the Internal Informational Exchange in a System." *Cybernetica* 1, no. 1
- Ashby, W.R (1956) *An Introduction to Cybernetics*
- Ashwin, P (2015) Going global: Opportunities and challenges for HE researchers, available online at <https://srheblog.com/2015/10/19/going-global-opportunities-and-challenges-for-he-researchers/>
- Barnett, R (2013) *Imagining the University*, London:Routledge
- Donati, P; Archer, M (2015) *The Relational Subject* Cambridge: CUP
- Gourlay, L. & Oliver, M. (2013) 'Beyond 'the social': digital literacies as sociomaterial practice', in *Literacy in the Digital University: Critical Perspectives on Learning, Scholarship & Technology*, eds R. Goodfellow & M. Lea, Routledge, London, pp. 79–94.
- Khan, P (2015) Critical perspectives on student engagement as 'what students do', *Presentation to 2015 SRHE conference*, available online at <https://www.srhe.ac.uk/conference2015/abstracts/0138.pdf>
- Pawson, R; Tilley, N (2002) *Realistic Evaluation* New Delhi:Sage
- Schutz, A (1960) *Phenomenology of the Social World* Northwestern University Press
- Shannon, C; Weaver, W (1948) *A Mathematical Theory of Communication* University of Illinois Press
- Smith, C (2010) *What is a person? Rethinking Humanity, Social Life, and the Moral Good from the Person Up* Chicago: University of Chicago Press