

Complexity and Innovation Lecture, Friday 21 November, 2003. Carol Webb.

Pre-Lecture Task, Suggested Reading List, & Links.

The aim of this lecture is to introduce some key concepts from an area called ‘complexity science’ to provide additional perspectives on the dynamics of ‘innovation’ processes.

Pre-Lecture Task

A) Spend half an hour on the Internet, conducting a search on any/all of the following (NB: you may be asked to talk about what you found out during the lecture):

- Chaos Theory
- Complexity Theory
- Complex Adaptive Systems
- Complex Responsive Processes
- Self-organisation
- Emergence
- The Santa Fe Institute
- Stuart Kauffman
- Ralph Stacey
- Fitness Landscapes
- Attractors / Strange Attractors
- The Butterfly Effect
- The Red Queen Effect
- The Cambrian Explosion
- Autonomous Agents
- Cellular Automata
- Boids
- Lorenz Attractor

B) Before the lecture, aim to have at least 2 conversations with different people about something you looked up.

Make a note of any comments or personal/group reflections you have on any of the above, as I would be very interested to hear about them. Alternatively, feel free to email me about them, or anything else you come across on your web search, at c.webb@cranfield.ac.uk

I look forward to talking with you at the lecture!

Cheers, Carol.

Suggested Reading List

Don't worry, you are not expected to read all these books or to try and find all these references! However, it would be useful for you to look at the list below and choose something that either interests you, or fits with your background.

More specifically, there are a few references mentioned that tie in directly with Innovation, the title of the module of which this lecture is part. So it would make sense for you to try and familiarise yourself with the key issues to be discussed.

Where possible, details of reading materials held in the Cranfield library are provided (see grey boxes). Otherwise, all other books listed are available from Amazon.

Happy reading!

General Introductory Material

Personal Author	Waldrop, M. Mitchell
Title	Complexity: the emerging science at the edge of order and chaos / M. Mitchell Waldrop
Publication info	London: Viking, 1992
Physical descrip	380 p; 21 cm
Cranfield Classmark	530.162 WAL

Personal Author	Gleick, James
Title	Chaos: making a new science / James Gleick
Publication info	London: Cardinal, 1988
Physical descrip	352 p; 20 cm
Cranfield subject	Chaotic behaviour in systems
Cranfield Classmark	530.162 GLE

Lewin, R. (1999). "Complexity: Life at the Edge of Chaos". Chicago: The University of Chicago Press.

Gleick, J. (1997). "Chaos: The Amazing Science of the Unpredictable." London: Vintage.

Innovation

Fonseca, J. (2002). "Complexity and Innovation in Organisations". London: Routledge.

Personal Author	Stacey, Ralph D
Title	Complexity and creativity in organizations / Ralph D. Stacey
Publication info	San Francisco: Berrett-Koehler Publishers, 1996
Physical descrip	312 p; 24 cm

Cranfield subject	Organizational behavior
Cranfield subject	Complex organizations
Cranfield Classmark	65.013.6 STA

People and Processes

Personal Author	Lewin, Roger
Title	The soul at work: unleashing the power of complexity science for business success / Roger Lewin and Birute Regine
Publication info	London: Orion Business Books, 1999
Physical descrip	394 p; 24 cm
Added author	Regine, Birute
Cranfield Classmark	530.1 LEW

Stacey, R. D. (2003). "Complexity and Group Processes: A Radically Social Understanding of Individuals." Hove: Brunner-Routledge.

Lewin, R., Regine, B. (2000). "Weaving Complexity & Business: Engaging the Soul at Work." New York: Texere.

Bessant, J. (2003). "High-Involvement Innovation: Building and Sustaining Competitive Advantage Through Continuous Change." Chichester: John Wiley & Sons Ltd.

Personal Author	Bessant, John
Title	High-involvement innovation: building and sustaining competitive advantage through continuous change / [by] John Bessant
Publication info	Chichester: John Wiley and Sons, 2003
Physical descrip	246 p; 25 cm
Cranfield subject	Competition
Cranfield subject	Organizational change
Cranfield Classmark	658.624

Knowledge Management

Stacey, R. D. (2001). "Complex Responsive Processes in Organisations: Learning and Knowledge Creation". London: Routledge.

Management

Griffin, D (2002). "The Emergence of Leadership: Linking Self-Organisation and Ethics." London: Routledge.

Personal Author	Stacey, Ralph D
Title	Strategic management and organisational dynamics: the challenge of

	complexity / [by] Ralph D Stacey
Edition	4th edition
Publication info	Harlow: Pearson Education Ltd, 2003
Physical descrip	486 p; 25 cm
Cranfield subject	Strategic planning--Organisational behaviour
Cranfield Classmark	65.014.1 STA

Personal Author	Stacey, Ralph D
Title	The chaos frontier: creative strategic control for business / Ralph D. Stacey
Publication info	Oxford: Butterworth-Heinemann, 1991
Physical descrip	409 p; 24 cm
Cranfield Classmark	65.014.1 STA

Personal Author	Parker, David
Title	Chaos, management and economics: the implications of non-linear thinking / David Parker and Ralph Stacey
Publication info	London: Institute of Economic Affairs, 1994
Physical descrip	112 p; 22 cm
Series (authority)	(IEA Hobart paper ; 125)
Added author	Stacey, Ralph
Cranfield Classmark	65.012.21 PAR

Electronic access	. Full text available: 01 Mar 1999-. (Due to publisher restrictions, the most recent 12 months are not available).. Available on EBSCOhost. http://search.epnet.com/direct.asp?db=buh&jn=%227LT%22&scope=site
ISSN	1521-3250
Title	Emergence [electronic resource] : a journal of complexity issues in organizational management.
Publication info	Mahwah, NJ : Lawrence Erlbaum Associates, Inc., c1999-
General Note	Title from cover.
General Note	Journal
Other version notes	Online version of print publication.
Subject heading	Management Periodicals.
Subject heading	Organization Periodicals.

Organisational Change

Olson, E. E., Eoyang, G. H. (2001). "Facilitating Organisation Change: Lessons From Complexity Science". San Francisco: Jossey-Bass/Pfeiffer.

Sustainability & Ecology

Personal Author	Capra, Fritjof
Title	The web of life: a new synthesis of mind and matter / by Fritjof Capra
Publication info	Flamingo, UK, 1997
Physical descrip	320 p; 20 cm
Cranfield Classmark	53.01:294 CAP

Networks

Buchanan, M. (2000). "Ubiquity: The Science of History, or Why the World is Simpler Than We Think". London: Phoenix

Barabasi, A. L. (2002). "Linked: The New Science of Networks." Cambridge, MA: Perseus Publishing.

Buchanan, M. (2002). "Nexus: Small Worlds and the Groundbreaking Science of Networks." London: W. W. Norton & Company.

Allen, P. M. (1997). "Cities and Regions As Self-Organising Systems: Models of Complexity." Amsterdam: Gordon and Breach Science Publishers.

Computer Science

Johnson, S. (2001). "Emergence: The Connected Lives of Ants, Brains, Cities and Software". London: The Penguin Press.

Bentley, P. J. (2001). "Digital Biology: The Creation of Life Inside Computers and How it Will Affect Us." London: Headline Book Publishing.

Physics, Biology, and other sciences

Personal Author	Kauffman, Stuart
Title	At home in the universe: the search for laws of self-organization and complexity / Stuart Kauffman
Publication info	London: Viking, 1995
Physical descrip	321 p; 24 cm
Cranfield Classmark	573.5 KAU

Personal Author	Capra, Fritjof
Title	The Tao of physics: an exploration of the parallels between modern physics and Eastern mysticism / Fritjof Capra
Publication info	Bungay, Suffolk: Collins, 1976
Physical descrip	352 p
Cranfield subject	Quantum theory--Religious aspects
Cranfield subject	Physics--Religious aspects

Geographic subj	Asia--Religion
Subject keywords	Asian religious life related to physics
Subject keywords	Physics related to Asian religious life
Cranfield Classmark	53.01:294 CAP

Gell-Mann, M. (1994). "The Quark and the Jaguar: Adventures in the Simple and the Complex". London: Abacus

Goodwin, B. (1994). "How the Leopard Changed its Spots: The Evolution of Complexity." London: Phoenix

Goodwin, B., Sole, R. (2000). "Signs Of Life: How Complexity Pervades Biology." New York: Perseus Books Group.

Social Sciences & Philosophy

Personal Author	Capra, Fritjof
Title	The turning point: science, society, and the rising culture / Fritjof Capra
Publication info	London: Wildwood House, c1982
Physical descrip	[xxii] , 516 p: ill; 23 cm
General Note	Includes index
Cranfield subject	Science--Social aspects
Cranfield subject	Science--Philosophy
Cranfield subject	Physics--Philosophy
Cranfield Classmark	008:5/6 CAP

Byrne, D (1998). "Complexity Theory and the Social Sciences: An Introduction." London: Routledge.

Cilliers, P. (1998). "Complexity & Postmodernism: Understanding Complex Systems." London: Routledge

Useful Links

- 1) Davide Terlingo curates a web forum @ www.choreograph.net and has posted some quotes/refs re complexity
<http://www.choreograph.net/forum/showthread.php?s=f29f531f07ab5793e6a28688729337d6&theadid=77&highlight=complexity>
- 3) <http://lissack.com/writings/proposal.htm> "Complexity Metaphors and the Management of a Knowledge Based Enterprise : An Exploration of Discovery" by Michael R. Lissack
- 4) <http://lissack.com/writings/eve1.html> "Knowledge Is Not Infrastructure: Applying Metaphorical Lessons From Complexity Science"
- 5) http://www-2.cs.cmu.edu/afs/cs/project/edrc-22/project/ateams/WWW/home_page.html 'A-teams'
- 6) <http://www.herts.ac.uk/business/centres/cmc/working.htm> A list of working papers on complexity.
- 7) <http://www.ucl.ac.uk/ceacb/texthome/archives/ComplexityBiblio.htm> Another bibliography
- 8) <http://www.cbi.cgey.com/events/pubconf/1996-07-19/proceedings/chapter%202.pdf> 'An introduction to complexity' – article, PDF file.
- 9) <http://www.santafe.edu/sfi/research/indexAllpubs.html> Search engine for Santa Fe Institute's (SFI) bibliography (SFI are based in USA, established in 1984 as an interdisciplinary group to explore complexity etc).
- 10) http://www.cio.com/archive/enterprise/041598_qanda_content.html "simple yet complex" Article, re creative workforce, and looking to complexity for answers.
- 11) <http://www.plexusinstitute.com/nfindex.cfm> plexus institute - applying complexity to social and economic realms.
- 12) <http://www.plexusinstitute.com/nfindex.cfm> What is complexity science? Very simply, it is science's most recent attempt to explain how order and novelty emerge in the world.... Introductory explanation of complexity and relevance...
- 13) <http://www.psych.lse.ac.uk:16080/complexity/> complexity at LSE Uni home page
- 14) <http://www.complexity-society.com/> complexity society home page (Cranfield school of management led – I know these people but am not a member).
- 15) <http://www.irit.fr/COSI/index.php> complexity in social science web page
- 16) <http://technology.open.ac.uk/ccc/cscc/news.htm> complexity at the OU
- 17) <http://www.plexusinstitute.com/edgeware/archive/think/> Edgeware, complexity site for health care professionals
- 18) <http://www.coherence.org/> Institute for the study of coherence and emergence

- 19) <http://www.ossu.co.uk/mcn/> manufacturing complexity network
- 20) <http://website.lineone.net/~frank.smits/Masters/Essays/Module2/Module-2.htm> paper on complex view of organisations and some implications
- 21) <http://www.comdig.org/> complexity digest – subscribe to the newsletter
- 22) <http://journals.wiley.com/complexity/> Journal – Complexity
- 23) <http://www-1.ibm.com/services/cynefin/index.html> the Cynefin centre for organisational complexity
- 24) <http://www.irit.fr/COSI/training/evaluationoftools/Evaluation-Of-Simulation-Tools.htm>**
An Evaluation of Seven Software Simulation Tools for Use in the Social Sciences
- 25) <http://www.meansbusiness.com/Organizing-Work-and-People-Books/Complexity-and-Creativity-in-Organizations.htm>** **complexity and creativity in organisations** ("Complex adaptive systems have an inherent order that is simply waiting to be unfolded in real time." This kind of quote is a bit Kantian... reminds me of the film Magnolia J, life unfolding like a flower, 'you may be done with the past, but is the past done with you?')
- 26) <http://images.google.co.uk/imgres?imgurl=www.new-paradigm.co.uk/Emergence.gif&imgrefurl=http://www.new-paradigm.co.uk/culture-complex.htm&h=719&w=959&prev=/images%3Fq%3D%2522emergence%2522%26svnum%3D10%26hl%3Den%26lr%3D%26ie%3DUTF-8%26oe%3DUTF-8%26sa%3DG> see the diagram representing emergence...
- 27) <http://www.brint.com/Systems.htm> Complexity, Complex Systems & Chaos Theory Organizations as Self-Adaptive Complex Systems