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Some reflections on a knowledge transfer strategy: a systemic inquiry

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Abstract:
This paper presents a case study of a systemic inquiry into a knowledge transfer strategy (KTS) by a division of a UK Ministry. Two main points are made. Firstly that it is possible to 'build' a generalisable form of practice as a response to experiences of complexity by initiating a systemic inquiry that fosters the emergence of a learning system. Secondly, that exploring how metaphors reveal and conceal offers scope for shifting the 'mental furniture' of participants as part of a systemic inquiry.

This inquiry proceeded with a process designed for the circumstances - there are no blue-prints. A key design aspiration was that those participating might experience a coherence between espoused theory and theory in use in relation to considering the KTS as if it were a second-order learning system. In this aim it succeeded. The inquiry suggested two sets of considerations for the design of learning systems and a potentially fruitful line of further inquiry.

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Some reflections on a knowledge transfer strategy

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1. Systemic inquiry

Systemic inquiry proceeds by enacting a learning process with those who have a stake in a situation experienced as problematic or as presenting an opportunity. The possibility of designing a systemic inquiry is open to anyone who is able to make a connection between a theoretical framework (in this case concerned with systems thinking and practice) a methodological approach and a given situation (Open University 2000). For example, Checkland (2001) argues that the enactment of Soft Systems Methodology (SSM) is an exemplar of systemic inquiry that results in changing modes of thinking. He argues that: *'It is a process in which the thinking (of individuals and groups) is shifted to a different level. It produces 'meta-thinking' – that is, thinking about how you are thinking about the phenomenal world'* and *'This mode of thinking rearranges people's mental furniture and enables plausible action-to-improve to be achieved'.*

This paper presents a case study of a systemic inquiry initiated in response to a specific experience. Two main points are made. Firstly that it is possible to 'build' a generalisable form of practice as a response to experiences of complexity by initiating a systemic inquiry that fosters the emergence of a learning system. Secondly, that exploring how metaphors reveal and conceal offers scope for shifting the 'mental furniture' of participants as part of a systemic inquiry.

2. The experience

In September 2001 I received an invitation from one of the main institutions associated with agriculture in the UK to attend a one-day 'stakeholder meeting' concerned with their 'knowledge transfer strategy' (KTS). This was a surprise as I had had relatively little to do with UK institutions associated with agriculture since taking up the chair of Systems at the Open University in 1994. Given my research experiences in this area (e.g. Ison and Russell 2000) I was intrigued by the invitation and duly accepted.

The espoused purpose of the KTS was expressed as: '*to encourage improved practice in the agricultural industry towards its sustainable development and to protect the environment from pollution*'. The KTS proposed to achieve this purpose by pursuing the following sub-aims: (i) To transfer understanding of environmental issues and natural resource management; (ii) To put backbone into what we are doing - environmental protection - to be able say what we are aiming for; (iii) To ensure land managers are using the best available knowledge to do their farming; and (iv) To change (farmer/land manager) behaviours.

My experience of the day is best described as being in a conversation that was at least 10 years out of date. This of course says as much about me as it does about those

present. During the day I made a number of contributions which were designed to elicit some reflection on the nature of the conversation and particularly the theoretical ideas that I perceived to be operating (whether explicitly or implicitly). I also expressed concern at what I perceived to be the narrow range of 'stakeholders' present. From my perspective farmers and other intended beneficiaries of the KTS were very much underrepresented. I also came to reflect on what the designers of the day had imagined its purpose to be. I wondered how they might have completed the sentence: 'Today can be seen as a system to …….?'

During the day four individuals approached me with a view to following-up some of the points I had made. This resulted in two specific invitations for further conversation and follow-up that form the basis of this paper. The first was from the organisers of the day. The second was from a person central to the development of a farmer-based R&D network based on self-organising groups in the south-west of England (Thomson, pers. comm. 2002). In the following section I outline a negotiated response to the first invitation. I also report some considerations for the design of learning systems that have emerged from this experience which I connect to my own tradition of understanding as embodied in my own research practice (Ison & Russell 2000).

2. Responding to an invitation

2.1 Design considerations
Following the initial meeting I received an invitation to make a presentation of my ideas to some of the London-based head-office staff responsible for formulating and delivering the KTS. My response was to propose an alternative to a standard presentation which I felt in the circumstances had the possibility of initiating a systemic inquiry. That is, I wanted to avoid going to London to tell people what I thought they should do! From my perspective, to have done so would have fallen into the trap of engaging in the linear, 'transfer of technology' mode of human communication (see Russell and Ison, 2000a, Ison 2000a and Fell and Russell 2000 for an explication of these ideas). Instead I proposed a process in which I spent time interviewing (listening) to some of the key managers of the KTS, the outcomes of which I would mirror-back, along with my reflections on the initial stakeholder meeting on the same day.

Kersten (2000) and Kersten and Ison (1998) report on the role of relationship building and listening in the design of R&D based on dialogue rather than debate. The process of 'mirroring-back' is described in some detail in Webber (2000). The central feature is that it is a dialogic process in which those aspects of the researcher's experience of the interviews which most take their attention are held up for consideration by participants as a basis for triggering discussion and learning. (A contrasting position would be to use the output of the interviews as a basis for presenting the facts of the situation).

My proposal was accepted. Subsequently five 20 - minute interviews were conducted followed forty minutes later by a joint meeting of researcher and interviewees (November 9, 2001). Spray diagramming was the main technique I used to record and make sense of the interviews (Open University 2000). In both the initial stakeholder meeting and during the interviews I paid particular attention to the

metaphors in use that for me revealed and concealed particular theoretical positions (McClintock 2000). The joint session lasted almost two hours. The format proposed and followed for this session was: (i) to mirror back some of the outcomes from listening to multiple perspectives on the KTS from some key stakeholders; (ii) 'mirroring back' some of the metaphors I had heard (from listening and reading project documents); (iii) Exploring some theoretical and practical implications; (iv) questions and discussion. To aid my own learning about the process design those involved in interviews were invited some weeks later to provide feedback. The questions and feedback are outlined in Section 3.

2.2 Revealing and concealing metaphors in the KTS

Metaphors provide both a way to understand our understandings and how language is used. Our ordinary conceptual system, in terms of which we think and act, is metaphorical in nature. Paying attention to metaphors-in-use is one means by which we can reflect on our own traditions of understanding. Our models of understanding grow out of traditions, where a tradition is a network of prejudices that provide possible answers and strategies for action. The word *prejudices* may be literally understood as a pre-understanding, so another way of defining tradition could be as a network of pre-understandings. Traditions are not only ways to see and act but a way to conceal (Russell and Ison 2000a).

Traditions in cultures embed what has, over time, been judged to be useful practice. The risk is that a tradition can become a blind spot when it evolves into practice without any manner of critical reflection being connected to it. The effects of blind spots can be observed at the level of the individual, the group, a organisation, the nation or culture and in the metaphors and discourses in which we are immersed. Experience suggests that often we cannot see what the problem is because we cannot identify our own blind spots. It is only when we attempt to step out of the situation (reflect) that we can begin to see it from another perspective or from another level.

Metaphors also both reveal and conceal but because we live in language it is sometimes difficult to reflect on our-metaphors-in-use. The strategy of mirroring-back particular metaphors or metaphor clusters thus holds open the possibility for reflection and learning. For example, as outlined by McClintock (2000), the metaphor *countryside-as-a-tapestry* reveals the experience of countryside as a visually pleasing pattern, of local character and diversity and of what is lost when landscapes are dominated by mono-cultures. However the metaphor conceals the smell, danger, noise and activity of people making a living. By exploring metaphors we are able to make part of our language use 'picturable' and thus rationally visible, publicly discussible and debatable as well as a psychological instrument which can be a practical resource 'with which and through which we can think and act' (Shotter 1993).

In Table 1 some of the metaphors elicited from the initial meeting, the written project material and the five interviews are clustered into three groupings. Within each some of their revealing and concealing aspects are suggested. This is not exhaustive as it is not the role of the researcher to classify and name the revealing and concealing aspects in a process aimed at triggering reflection and learning. The clusters are indicative of a small sample of the many metaphors that could have been reported. Within the spirit of 'mirroring back' and in terms of making connections with my own

traditions of understanding these have been selected. The first relates to why I experienced the conversation at the initial meeting as 10 years out of date.

Table 1. Metaphor clusters associated with the knowledge transfer strategy

Metaphor	Reveals	Conceals
1. Communication as signal transfer	*Shannon and Weaver's theoretical model in action*	*The biological basis of human communication*
'key messages as deliverable'	"	"
'farmers as knowledge users'	"	"
'advice as target-able or deliverable'	"	"
'information as relay-able'	"	"
'advice as understandable or knowable objectively'	"	"
'knowledge as transferable'	"	"
'a knowledge transfer strategy as deliverable'	"	"
'barriers to uptake of advice and research messages'	*Diffusion of innovation theory*	*The nature of networks, relationships and co-learning processes.*
2. Advice as changing behaviour	*The imperative is to change someone else*	*The ethics of practice (i.e. giving advice)*
'farming industry as able to be influenced'	"	"
'regulation as command and control'	"	"
'KTS as delivering public goods'	"	"
'KTS as an economic argument'	"	"
3. KTS as role clarifying	*Alternative possibilities for practice; and for power relationships*	*How and by whom roles will be clarified*
'advisers as service providers'		
'advice provision as able to be pictured'		
'farmers as champions'		
'regulation as self-organising (helping themselves)		
'thinking outside the box'		
'farmers (or land managers?) as environmental improvers'		

The 'communication as signal transfer' cluster reflect traditions that have become blind spots or have been subjugated, not only in agriculture but other sectors of the community. As outlined by Fell and Russell (2000) this is a legacy of the use by Heinz von Foerster of 'information' to replace 'signal transfer' when writing up the proceedings of the Macy conferences in the 1950s. Communication as information transfer is based on the mathematical model of Shannon and Weaver (1949). This in turn has been incorporated in the technology transfer and its associated "diffusion of innovations" models. Ison (2000a) outlines how Everett Rogers, in his preface to the third edition of "Diffusion of Innovations", acknowledges that "many diffusion scholars have conceptualised the diffusion process as one-way persuasion" and that "most past diffusion studies have been based upon a linear model of communication defined as the process by which messages are transferred from a source to a receiver."

First-order communication is based on simple feedback (as in a thermostat) but should not be confused with human communication, which has a biological basis. Second-order communication is understood from a theory of cognition that encompasses language, emotion, perception and behaviour. Amongst human beings this gives rise to new properties in the communicating partners who each have different experiential histories. Second-order communication reveals the limitations of the 'knowledge/knowing as commodity' metaphor and also reveals the extent emotioning and power have been ignored in considerations of most KT strategies.

Exploring these ideas enables recognition that the following claim is made from a first-order communication perspective:

"*...that is what we are coming to - a melding of computers and communications to produce knowledge.......If that pool of information, of knowledge is over there, over here we have the users, the seekers of knowledge, the needful of information. (The fact that some of them do not yet realise that they need this information or knowledge is not germane to the issue. There is a lot of education needed to show the people what is available.*"

The reference to 'education needed to show the people' sounds like a euphemism for the next metaphor cluster (Table 1), that of 'advice as changing behaviour'. It was acknowledged during the conversation that changing landholder's behaviour was the major aim of the strategy, but in reflection all those present acknowledged that despite their awareness of environmental issues they had not really changed their own behaviour. A second-order explanation of communication posits that information arises within (from the Latin *in formare*, formed within) and that knowledge is not something "we have" but "the knowledge of the other is my gift .... which arises in interpersonal relations" (Maturana 1988); and that experience arises in the act of making a distinction, it is not something external to us. These explanations based on the biology of cognition suggest that "all knowing is doing" which arises in daily life.

Within all dominant discourses there is always resistance (following Foucault); not surprisingly we can all be the repositories of seemingly paradoxical notions and thus bring forth alternative metaphors. The third metaphor cluster (KTS as role clarifying, Table 1) contains some metaphors that I considered as evidence of questioning the dominant discourse. These represented some sites of resistance to the more common metaphors found in the first two clusters (and the overall name of the strategy). For example, 'regulation as self organisation' was clearly an alternative to that of 'regulation as command and control'.

2.3 Exploring some practical implications

Based on my own learning from the interviews I suggested the following opportunities and threats were worthy of discussion and consideration for the KTS in the light of the espoused purpose. Opportunities included:

- *to move towards a facilitated model of behaviour change which is local and contextualised* (for example a key value driving those present was that they were responsible for implementing EU legislation such as the Water Framework Directive. From their perspective this was an imperative leaving no scope for systemic, learning - based approaches. From my perspective they had fallen into the trap of conflating *what* with *how*, i.e. the imperatives of the Directive were now law so the 'what' was established, but 'how' it was implemented in local

contexts was very much open. This was something that I sensed had not occurred to those present).

- the Division responsible for KTS becomes a pilot for (organisational) culture change within the revamped Ministry (this was a choice available to some divisions in recognition of a need to think smarter and work in different ways, particularly following recent controversies in UK agriculture).
- *avoiding infractions* (it became apparent in the interviews that the whole of England was in imminent danger of being declared a 'nitrate vulnerable zone' (NVZ). The imperative for the civil servants, who saw this as an opportunity, was to protect their Minister in ways that gave scope for 'innovative' action)
- *some budgets available* (i.e. resources were available but further release of money required treasury approval. It transpired that meeting treasury requirements, both real and perceived, was the key design variable for all policy initiatives).
- *realisation that the traditional approach to KT has not worked well in the past* (on reflection all those present admitted that past KTSs had not worked but that the reasons why were often lost from institutional memory because of staff transfers and lack of continuity of focus).

Some of the threats included that:
- the strategy (KTS) is swamped in a plethora of initiatives in the Public Service (in the light of BSE and foot and mouth and an inquiry into the future of rural areas this was a valid concern);
- there is a risk of over-selling the KTS strategy (i.e. making promises that could not be met - from my perspective this seemed a real possibility);
- the KTS is perceived as involving losing control (I think this was one of the main concerns of the civil servants - perhaps not as individuals but in terms of civil service culture and the likely reaction of superiors);
- the KTS is perceived as costing to much
- a new chief scientist is about to be appointed? (also a possible opportunity)
- the public good arguments are not won with Treasury (if their funding or agreement is required)
- criteria for success are not conceptualised appropriately (this too seemed possible from my perspective);

The final part of the session invited those present to consider how they might use the research results and data at their disposal in the design of one or many learning system(s) to achieve the espoused purpose of the KTS.

2.4 KTS as the design of learning systems

As I engaged with the KTS I realised that the design considerations we have used at the Open University (OU) to evolve a pedagogy (a learning strategy) for Systems course development had features which might be used in a KTS imagined as 'a R&D strategy to design learning systems'. The pedagogy we have evolved at the OU has the features described in Table 2 (Ison 2001 a, b).

My conviction that these eight considerations had something to offer was reinforced in the second conversation that followed the first meeting. This was conducted with the principal of TACT consulting who had played a major role in initiating and

overseeing the development of a farmer-based R&D (or learning) network (the SWARD project) in Cornwall and Devon. An account of the project suggested many successes but also concerns about evaluation and scaling up. The reflection, which our conversation enabled, suggested ten design features including key initial starting conditions for the project (Table 2)[1]. These features emerged in our conversation because it was not clear whether scaling up meant expansion or starting again in a new context.

Table 2. Two sets of design considerations for the design of learning systems

Eight design features of Systems courses at the Open University	Ten design considerations for the SWARD project including some key initial starting conditions
1. Ground concepts and action as much as possible in the student's own experience;	1. A perceived issue or need which had local identity;
2. Learn from case studies of failure;	2. Active listening to stakeholder perceptions of the issue/need;
3. Develop diagramming (and other modelling) skills as a means for students to engage with and learn about complexity;	3. Good staff – in this case young, motivated and proactive women;
4. Take responsibility as authors (or researchers) for what we say and do (epistemological awareness);	4. No, or very limited forms of, control;
5. Recognise that learning involves an interplay between our emotional and rational selves;	5. Proper resourcing particularly in the early stages;
6. Develop skills in iterating - seeing learning as arising from processes that are not deterministic;	6. A minimum number of initial group leaders who acted as 'key attractors';
7. Introduce other systems concepts, tools, methods, and methodological approaches so as to develop skills in 'formulating systems of interest…..for purposeful action' (an example would be my exploration of metaphors for this inquiry);	7. Scope for self-organisation around particular enthusiasms;
8. Use verbs not nouns! (i.e. verbs denote relationships and activity and are key to the process of activity modelling which is one of the main features of SSM).	8. An appropriately experienced participant conceptualiser;
	9. Some small 'carrots' for participants at the beginning.
	10. A supportive local press creating a positive publicity network.

A potential way forward for the KTS is the conceptualisation of it as a systemic inquiry that attempts to make transparent (e.g. by exploring what metaphors reveal and conceal) and possibly, rearranging stakeholders' mental furniture. A potentially useful starting point would be to consider the two sets of design criteria described in Table 2. This would involve conceptualising the KTS as if it were a learning or researching system.

What also struck me about this inquiry/reflection was how many features were compatible with the design features suggested for second-order R&D. Russell and Ison (2000b) describe second-order R&D as practice which seeks to avoid being

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[1] Dr Dick Morris, The Open University, also contributed to this conversation.

either subjective (particular to the individual) or objective (independent of the individual) because the objects of our actions and perceptions are not independent of the very actions/perceptions that we make. From this perspective problems and solutions are both generated in the conversations that take place between the key stakeholders and do not arise, or exist, outside of such engagements. Second-order R&D is built on the understanding that human beings determine the world that they experience.

3. Feedback and reflections on process issues

The purpose of inviting feedback was primarily to aid my own reflection and learning, particularly in terms of process design. It was not designed to establish cause and effect. The main points to be gleaned from the feedback provided by participants included:

1. How has the Knowledge Transfer Strategy (KTS) changed since the initial meeting? How would you account for these changes?

- 'Thinking on KT has shifted .. towards a more participatory model. This was happening before the [initial] event, but the language may not have caught up. The concept of stakeholder participation and ownership have certainly come to life as a result of discussions at [the first meeting], and afterwards.'
- 'The difficult issue is still how to ensure some degree of uptake of Government agenda, whilst still allowing real ownership and decision-making by land owners at local level.'
- 'My perception is that KTS has developed gradually but is not that far removed from where I imagined it might be. The positive factors have been the input from other stakeholders and some agreement on the issues, ownership or part ownership of the problems, and possible offers of help. The need for local issues to be resolved locally rather than centrally seems to have gelled, but with need for central guidance. Not sure whether funding fits the same bill? Use of local facilitators seem to be the way forward. And maybe slightly different models will be appropriate in different areas. I think these developments have been brought about by continued discussion.'

2. How has your own thinking/action about 'Knowledge Transfer' changed since [the first meeting] and how would you account for these changes?

- 'My own thinking has followed the above [see bullet point above]. Not sure if my views changed, ahead of or behind the rest of the group!
- 'I have become more convinced of the need for local solutions (within some central guidance), and a need to provide a local context so that farmers, landowners and others understand the state of their local environment and more clearly how their actions affect the environment, and how changes to practices could lead to improvements. We need to be honest about the costs to businesses. We have discussed brigading messages in some way such that the key organisations are seen to be in agreement - this would reduce confusion and conflict (at least in the subject areas and options for improvement that we can agree). This will need more discussion and interaction among the stakeholders. We do have some examples of multi-badging publications already.'

3. How did you experience our 'interview' conversation and what, if anything did you take from it?

- 'Interview technique was interesting - certainly appeared as "practice what you preach". Not absolutely convinced conclusions would not have been the same

without interviews - we were a receptive audience and RLI probably had a reasonable idea of where the strategy was going from [the first meeting] and our subsequent group discussions on his follow-up meeting.'

- 'A one to one is useful to identify key issues and key concerns. i.e. if there were 3 things I wanted farmers to do? What are they? So the one thing that bothers me is that we have not sought opinion or buy in from farmers etc - the very people we want to influence. We can interact with bodies like the NFU and CLA[2] - but this does not provide direct feedback. And we need to do this in the local context as well. Therefore I think some pilot activity in 1 or 2 areas would be appropriate. And all assuming we can agree a joined up message on some key activities on the farm.'

4. Do you have other feedback that you would like to provide?

- 'Silsoe[3] was the second meeting we have had with stakeholders. And we have had another meeting lasting much of one day since we met with you. Therefore it is difficult to separate out just the Silsoe meeting and the one with you - at least in terms of identifying any particular effect!'

My main reflections are that more time (an extra hour) would have been desirable for joint discussion, some of which I would have allocated to synthesising some of the interview data for the following session (as it was it was particularly rushed). I would also have liked more time working interactively through the metaphors that were elicited. Under similar circumstances I might in future try to negotiate a more explicit 'social contract' prior to undertaking such a task. I might add that other than travel expenses no fees were paid - and it is often the commissioning for payment that establishes de-facto the social contract. I was pleased that what I did was experienced as coherent with my espoused theoretical position.

4. General conclusions

This small inquiry reflects how pervasive particular metaphors (and thus theories-in-use) are in institutions responsible for environmental and agricultural policy development and natural resource management. Regardless of whether they are changing their pervasiveness is a cause for concern.   It is a concern because language and our underlying conceptions both constrain and make possible the choices that are made. Exploring what particular metaphors reveal and conceal enables a dialogue to begin about our taken-for-granted traditions of understanding. This is a starting point for triggering change in our 'mental furniture'.

In this reflection I present a mode of practice with the potential to trigger reflections on metaphors - in - use in a manner that is coherent with the theory that is espoused. I contend that the lack of coherence between espoused theory and theory in use acts as a major constraint to researching with people and the translation of learning theory into practice (Ison et al 2000). I have also tried to convey the idea that by thinking about my experience and responding to the invitation in a particular way a generalisable model of practice (systemic inquiry) is demonstrated.

What has also emerged from this inquiry is the articulation of two sets of criteria for the design of learning systems, which despite differing provenance, have features in

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[2] National Farmers Union (NFU) and Country Landowners Association (CLA).
[3] The venue of the first meeting I attended.

common. Together with those articulated by Russell and Ison (2000b) for second-order R&D this suggests a potentially fruitful line of further inquiry.

5. References

Checkland, P.B. (2001) Presentation to a joint meeting of UKSS/OUSys. OU Systems Society Newsletter, February (forthcoming). See also www.spmc.org.uk

Fell, L. and Russell, D. (2000) The human quest for understanding and agreement. In Ison, R.L. & Russell, D.B. eds **Agricultural Extension and Rural Development: Breaking out of Traditions.** Cambridge University Press, Cambridge, UK. pp. 32-51.

Ison, R.L. & Russell, D.B. eds (2000) **Agricultural Extension and Rural Development: Breaking Out of Traditions.** Cambridge University Press, Cambridge, UK. 239p.

Ison, R.L. (2000a) Technology: transforming grazier experience. In Ison, R.L. & Russell, D.B. eds **Agricultural Extension and Rural Development: Breaking out of Traditions.** Cambridge University Press, Cambridge, UK. pp. 52-76.

Ison, R.L. (2000b) Systems approaches to managing sustainable development: experiences from developing supported open-learning. *Invited Paper: Ecological Sustainability Theme, Proc. 16th Symposium of the International Farming Systems Association and 4th Latin American Farming Systems Research & Extension Symposium,* 27-29 November 2000, Centro de Extension Universidad Catolica, Santiago Chile.

Ison, R.L. (2001) Systems practice at the United Kingdom's Open University. In J. Wilby and G. Ragsdell eds. Understanding Complexity. pp. 45-54. Kluwer Academic/Plenum Publishers.

Ison, R.L., High, C., Blackmore, C.P. & Cerf, M. (2000) Theoretical frameworks for learning-based approaches to change in industrialised-country agricultures. In LEARN. eds. **Cow up a Tree. Knowing and Learning for Change in Agriculture. Case Studies from Industrialised Countries**. INRA (Institut National de la Recherche Agronomique) Editions, Paris. pp. 31-54.

Kersten, S. & Ison, R.L. (1998) Listening, interpretative cycles and dialogue: Process design for collaborative research and development. *The Journal of Agricultural Education & Extension* 5, 163-178.

Kersten, S. (2000) From debate about degradation to dialogue about vegetation management in western New South Wales, Australia. In LEARN. Group Eds [M.Cerf, D. Gibbon, B. Hubert, R.Ison, J.Jiggins, M. Paine, J. Proost, N. Roling] **Cow up a Tree. Knowing and Learning for Change in Agriculture. Case Studies from Industrialised Countries.** pp. 191-204. INRA (Institut National de la Recherche Agronomique) Editions, Paris.

LEARN. Group Eds [M.Cerf, D. Gibbon, B. Hubert, R.Ison, J.Jiggins, M. Paine, J. Proost, N. Roling] (2000) **Cow up a Tree. Knowing and Learning for Change in Agriculture. Case Studies from Industrialised Countries.** INRA (Institut National de la Recherche Agronomique) Editions, Paris. 492pp.

Maturana, H.R. (1988), Reality: the search for objectivity or the quest for a compelling argument. Irish Journal of Psychology 9: 25-82.

McClintock, D. (2000) Considering metaphors of countrysides in the United Kingdom. In LEARN. Group Eds [M.Cerf, D. Gibbon, B. Hubert, R.Ison, J.Jiggins, M. Paine, J. Proost, N. Roling] **Cow up a Tree. Knowing and Learning for Change in Agriculture. Case Studies from Industrialised Countries.** pp. 241-251. INRA (Institut National de la Recherche Agronomique) Editions, Paris.

Open University (2000a) Managing complexity. A systems approach. (T306) The Open University, Milton Keynes.

Open University (2000b) Systems Thinking and Practice: Diagramming. (T552) The Open University, Milton Keynes.

Russell, D.B. & Ison, R.L. (2000a) The research-development relationship in rural communities: an opportunity for contextual science. In Ison, R.L. & Russell, D.B. eds **Agricultural Extension and Rural Development: Breaking out of Traditions.** Cambridge University Press, Cambridge, UK. pp. 10-31.

Russell, D.B. & Ison, R.L. (2000b) Designing R&D systems for mutual benefit. In Ison, R.L. & Russell, D.B. eds **Agricultural Extension and Rural Development: Breaking out of Traditions.** Cambridge University Press, Cambridge, UK. pp. 208-218.

Shannon, C. and Weaver, W. (1949), The Mathematical Theory of Communication, Urbana, Ill.: University of Illinois Press.

Shotter, J. (1993) Conversational Realities: Constructing Life Through Language. Sage, London.

Webber, L. (2000) Co-researching: braiding theory and practice for research with people. In Ison, R.L. & Russell, D.B. eds **Agricultural Extension and Rural Development: Breaking out of Traditions.** Cambridge University Press, Cambridge, UK. pp. 161-188.