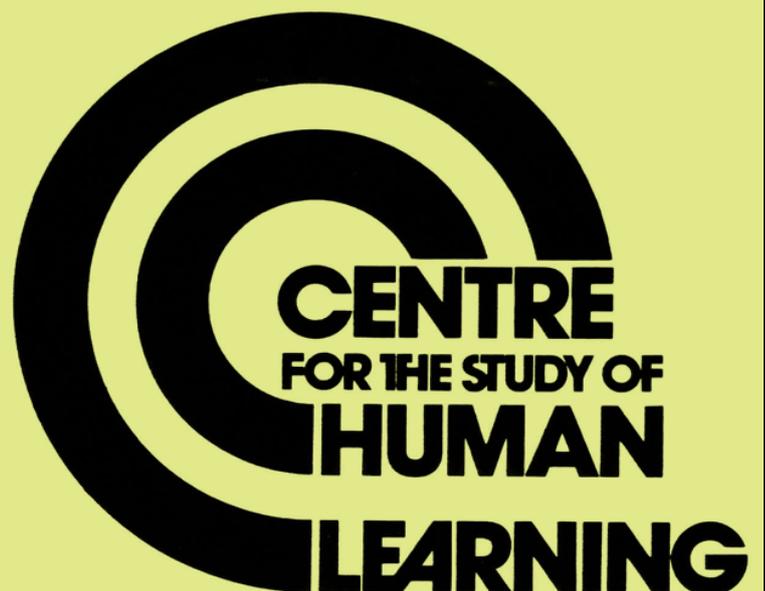# The Self-Organised Learner:
A Conversational Science for Teaching and Learning

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Conversations for Self-organised Learning

Learning-to-Learn in a free and creative way is an intellectually challenging but emotionally difficult enterprise. It involves clear sightedly using the widest range of learning resources. Most people are almost totally unaware of how they attribute personal meaning to the events, objects, activities and people in their personal worlds. Self-organisation consists in the ability to converse with oneself about one's own learning processes and to observe, search, analyse, formulate, review, judge, decide and act on the basis of such creative encounters. This involves as much feeling as thought. Unaided most people are not able to generate effective learning conversations with themselves or with others.

Experimental psychologists constructing theories in their meaning isolated laboratories have largely ignored the simple truth that it is the meaning attributed to each event, not the event itself, which influences person's reactions to it. It is the personal meaning which becomes the personal cause. Actions and subsequent events represent the 'effects' of this meaning as it plays out in a given situation: The construction of personal experience is prior activity. This process is essentially conversational. An awareness of this process demands an awareness of a meta-conversation about learning.

An individual, a pair, a group or an institution can each become the focus of a learning conversation. Such "conversational individuals" (C-indis) are each and all capable of self-organised learning

A series of conversational learning aids for reflecting on our own experience and sharing in the experience of others are systematically offered and explained throughout this report. These can be seen to build together into the solid base of an attractive conversational technology.

This technology can only be properly appreciated through demonstrations of the results of using it. The case studies described offer readers a guide for obtaining this experience. The potential of these aids has already inspired many to try them out within more progressive training schemes. The authors invite readers to evaluate their use as aids to learning within a naval context and to join them in the rewarding enterprise of developing, elaborating, refining and transforming this technology into an ever more effective means for increasing our capacity to learn. This technology can enable any individual or group to 'self-help' themselves towards achieving a greater capacity for self-organised learning. It is also flexible, adaptable and powerful enough to offer a whole new vista of opportunities to any profession or enterprise whose purpose it is to help others to learn.

Despite many strident new claims, and despite much clamouring and protestation to the contrary, most of the approaches which use terms like "independent learning", "self-paced learning", "independent study skills", "autonomous learning" and so on misrepresent what they are about. Most of them are about "successfully submitting to being taught". They are about how to accept instruction at a distance or how to rote learn some of the tricks and short-cuts which those who have already been through the system have developed for themselves. These methods may work as stop-gaps in the short term, but they have little or nothing to do with effectively taking control of your own learning destiny. These imitative techniques do not confront the issues involved in "learning from experience"; nor in continuing to learn "on the job" or "in life" once the stimulus and guidance of the teacher, the trainer or the therapist has disappeared.

Self-organised learners have the inner freedom and the skills to realistically identify the learning resources available to them, to define their own learning purposes in relation to these resources, be they naturally occurring or organised by institutions offering education, training or therapy. It is the self-organised learner who can selectively best make use of the tips and potted experience, the tricks and occasional insights which are often so initially attractive and so rapidly disappointing to the disabled or dependant learner. Self-organisation enables them to escape the dangers of;

(a) the outraged rebellion which is merely the reverse side of an over-dependence
(b) of going it alone with all the brutality and dour results of the fictional self-made man
(c) the dependant internally alienated existence awaiting all those who really do merely submit to being taught.

Constructing personal meaning in a clear sighted and a positive way and creatively negotiating shared meaning with others in the habitats of home, work, education and society is a very different enterprise to coping with and struggling though a dogmatic system of public knowledge. The ability to take better control of the direction, quality and content of our lives is central to mental health and to making the best use of educational, life and job opportunities. At a superficial level this is widely acknowledged but as yet education is only fumbling toward an effective methodology by which this can be achieved. Diminishing educational resources, Open Learning Systems, Youth Training Schemes and Retraining are challenging educators to reconsider their myths about educational aims and teaching practise. Learning creatively through personal experience has to be formally recognised, systematically studied, valued, and expertly managed.

For self-organised learning, three basic principles and seven themes need to be recognised. These are concerned with enabling personal learning and the sharing of personal meaning. The three principles are:

1. Real Personal Learning depends upon an ability to use oneself as a test bed for personal validity and viability. The construction of internal referents is primary. External criteria, normative standards, and assessment by others are secondary. Thus the quality of learning becomes defined within the person's own evaluative systems rather than judged against the criteria arrived at by 'experts'.

2. The dynamics of self-organised learning depends upon an ability to monitor the construction and reconstruction of personal meaning over time. The development, expansion, modification and refinement of our personal models of the world can thus be systematically regulated and appreciated. Inadequate monitoring leads to inappropriate models and this can be viewed as disruptions to personal growth.

3. Shared meaning. Individuals, pairs, entities capable of construct their own creative and flexible
as against public knowledge groups and institutions can adaptive, organised learning.
must be truly negotiated. each become conversational Such conversational networks thus exhibit a capacity for viability and validity and growth.

The seven themes may be outlined as follows:
In an ideal world the primary purpose of teachers, trainers, counsellors and instructors would be to enable clients to learn more effectively and to increase their capacity for learning.

This ideal purpose is often not appreciated and may be in direct contradiction to the ways in which the practitioners see their job. The more explicit and practitioner-controlled the instruction or the treatment, the easier it is for the client whilst the practitioner is present. But

the more difficult it is for such clients when the practitioner is no longer there, since they are inevitably unprepared for the need to continue learning on their own.

Special awareness raising techniques are required to help people to become more effective and self-organised learners. These techniques are designed to enable people to reflect on their expressed or unexpressed thoughts, feelings and actions as these form part of, or contribute to learning.

As they become more aware of themselves as learners people can begin to take control of their own learning. Conversational techniques are required to enable this to happen and to support and guide the learner through the processes of change.

The process of becoming self-organised is the development of an ability to conduct such learning conversations with oneself.

An important resource for learning is other people. Special awareness-raising techniques may be necessary to help people learn how to exchange experience. Networks of such creative conversations for learning can convert a pair, a group or an institution into an effective learning system. If it can reflect on its own process, it can conduct a learning conversation with itself and the system becomes self-organised.

By analogy to the creatively communicating network of self-organised learners we come round full circle to illuminate how any individual may become more fully functioning by recognising that each of us is a "community of selves". When released and free to converse with one another these selves all add to the quality of our inner life and to the effectiveness of our outer activities.

The next section elaborates on the Conversational Methodology by which self-organisation in learning can be achieved.

The Conversational Methodology
In this section we aim to set the scene for self-organised learning. We argue the need for an appropriate methodology, the emergence of the conversational entity as a core concept and the requirements of a 'personal observer' within self-organised learning. We also spell out the dynamics of a Learning Conversation and offer an overview of the tools or conversational aids which have so far been developed.

The Need for a Conversational Methodology
At first, one of the most puzzling features of psychological research is that things are not what they are claimed to be. Nine times out of ten what is designated a theory of learning is concerned to show how a teacher's (or experimenter's) actions appear to bring about changes in a learner's (or animal's) behaviour. Such explanations are theories of instruction. They are theories about how to produce impersonal learning in others. For us, a theory of learning must be concerned with how learners self organise their own behaviour and experience to produce changes, which they themselves value. This definition of a theory of person-centred learning allows us to look again at theories of teaching and/or instruction. The chief advocate of trainer-organised learning has for the past forty years been B. F. Skinner. Others such as R. Mager have developed training by objectives. C. Rogers, the originator of client-centred therapy, studied the conditions which a therapist, teacher, tutor, trainer, counsellor, coach, custodian or consultant must create, if they are to enable self-organised learning in others.

Rogers identifies "Unconditional positive regard", "empathy" and "congruence" as necessary conditions for therapeutic conversation. Rogers' approach is nearer to the spirit of this report than that of Skinner and Mager but it still falls short of addressing the learner directly. Rogers' concepts of 'flowering' and 'growth' reveals a belief that when the facilitator can produce the right conditions each and any of us will learn. But the enhancement of the capacity to learn requires more than this. It requires techniques for making explicit the person's own constructions of the world, so that they may reflect upon them.

Skinner's position is based on the assumption that psychology and training will best be served by recruiting the methods of the traditional sciences into our pursuit of an understanding of human beings. Let us designate this position the "physical science" paradigm. It assumes that the scientist theorises about other people and systematically tests, improves and develops his or her theory by carrying out experiments on them. The scientist may converse with the subject to obtain her or his good will. But the subject remains the uncomprehending object of the scientist's theories and experiments. All responsibility for explanations lies with the scientist. The subjects' explanations are merely 'verbal data'.

Rogers' position is rather different. He believes that the only valid or useful explanation of the client's experience and behaviour is that offered by the client. This is not to say that the client's initial explanations are true, but merely acknowledges them as the only valid starting point for an exploration by the client into their own process. Let us designate this a "personal science" paradigm. This paradigm is based on the belief that people must understand and thus explain themselves and that the role of the practitioner is to create the conditions in which this may happen.

A third theoretical and methodological paradigm is more suited to human beings' search for a better understanding of the human condition. This "conversational science" paradigm is based on the belief that no one can know themselves unaided; nor can they exploit their infinite potential by merely being facilitated by a non-directive practitioner. The unique attribute of people is that they can converse. They can pool their experience and even store it in some externally recorded form. They can identify individual needs. They can form into groups to formulate and pursue mutually relevant purposes. They can even invent more flexible forms of institution within which to work, play or live together.

If co-operation within pairs, groups and institutions is to form the basis for learning, for self-organised learning and for enabling people to increase their capacity for learning, then the process must be truly conversational. Conversation implies that whilst meaning is shared, each participant remains free to accept, reject and/or reconstruct the shared meanings. They can invent new meanings. All these are added to the potential for conversation.

Thus the "conversational science" paradigm recognises that each person is a separate node of personal meaning: but that people can communicate and therefore influence each other. Such influence is not one of direct "cause and effect" since each person has the potential for self-organisation. A conversational technology accepts people as full participants using their unique position as observer of their own experience. The conversational learning aids described in this report are purpose built for use within this paradigm.

The form given by George Kelly to his model of man has considerably influenced our approach. It is by its very nature content-free. It may be inhabited by any system of constructions which would constitute "a person". Indeed, we would argue that it may be

animated by any system of constructions which would constitute a living organism. The potency of Kelly's "construct system" is that it offers not only a theory but also the beginnings of an integral and systematic methodology. We have tried to develop this further into a more fully conversational methodology. To claim that Kelly's theory marks a watershed in social science comparable to Copernicus and the telescope in natural science, may not appear historically so outrageous as it now does to many contemporary psychologists. Together the theory and method (i.e. the repertory grid), contain an embryo of a new breed of aids for navigating the psyche, and for exploring and charting personal, inter-personal and social space. New content-free psychological tools can be invented and basic design principles are beginning to emerge through their practise in learning contexts. Cyberneticians and computer engineers developing expert systems and knowledge engineering are inventing new ways of representing, storing and transmitting knowledge. Our approach is concerned with developing a technology which can represent personal meaning in ways which enable reflection, review and effective transformation of the quality of human experience and performance. A major purpose of this report is to introduce, explain and evaluate within a 'high tech' Royal Navy environment, that part of our technology which has been applied.

The ~rgence of Learning-to-Learn: The Technology and the Language
For the teenager, young adult, or even mature student, learning-to-learn in a free and creative way, which clear-sightedly sees and uses the, formal educational resources for what they are, is an intellectually challenging but emotionally difficult enterprise. Most learners are almost totally unaware of how they attribute personal meaning to the displays of public knowledge offered to them in lectures, laboratories, libraries, seminars, work-placements and other job opportunities. Reading, listening, talking, writing, thinking, feeling, judging, deciding and doing are long established habits which have become so fixed and unavailable to conscious review that the learner is almost entirely a prisoner of his rigid competencies. Hence, the prevailing tendency to deal in personality or character terms with problems which inherently arise from inadequate learning skills. Self-organisation in learning consists in the ability to observe oneself and reflect on the processes of learning, and to search, analyse, formulate, review, judge, decide and act on the basis of such creative encounters. This involves as much feeling as thought. Education and Training restricts opportunities for learners to develop this capacity and prefers to view the capacity to learn in terms of some mix of nature/nurture and personality.

The C-indis and the Learning-to-Learn Approach
In the interpretation of our research work we have found that helping the individual become aware of the nature of personal learning involves a reconsideration of causality because it forces us to re-evaluate our ideas about what is prior. (What we mean by this will be illustrated in the next few paragraphs.) For the change agents this is a crucial issue since it guides the choice of entities for systematic investigation, !£ that individuals ~ be enabled to develop themselves in effective ways. Recent trends in philosophy and science give new insights into the processes of causality which influence the coincidence of events in space and time. Such insights are basic to a study of mechanisms of personal learning. Let us trace out the argument.

The struggles of Pirsig (1976)* in his pursuit of Quality lead him into two tortuous routes of thought; the subjective considerations of the idealists, and the dialectical arguments of the classical thinkers which pointed the way to an objective view of truth and to scientific materialism. Neither inspired him. The knife of subjectivity - objectivity had cut Quality in

two and killed it as a working concept. Tracing his way back to the ancient Sophists Quality emerged as Excellence - ~ relationship between man and his experience. Man is a participant in the creation of all things; he is a measure of all things. Journeying on to the 'subliminal self' of Poincare he saw Quality as a third super-ordinate entity; independent of, but related to, a dualistic subject -object metaphysical system. Quality is an event at which awareness of both subjects(s) and objects(s) is made possible. Quality is the cause, so are the effects.Quality is prior.

Taking a different but equally long and circuitous route Mary Wallock (1976) *(i) traces the development of the concept of imagination. From the romantics to Sartre, Husserl, Merleau-Ponty and Wittgenstein she argues for the universality of imagination. It is exercised by each over all experience. Imagination is prior. It is our means of interpreting the world and it is also the means for forming images in the mind. The images themselves are not separate from our interpretations of the world, they are our way of thinking of the objects in the world. We could not do one of these things without the other. We see the forms in our mind's eye and we see these very forms in the world. The two abilities are joined in the ability to understand that the forms have a certain meaning - a quality that signifies other things beyond themselves. She gives the name Imagination to what allows us to go beyond the barely sensory into the intellectual or thought imbued territory of perception.

The phenomenologists were also a source for Kelly's model of man as scientist anticipating events by constructing their replicates and testing these out by action on the world. For Kelly *(ii) (1955) making sense of the world (construing) is prior. Kelly was, in a sense a 20th century sophist, whose teachings were not concerned with static principles but with beliefs about man and his improvement. These early humanists and Kelly resolve the classical debate on causality by taking a new/old direction. All principles, truths ~ relative. "Man is a measure of all things".

A causal view of how events evolve has taken a radical turn in modern physics. The Uncertainty principle of Heisenberg and Einstein's postulation of time as fourth dimension, leading to a formal Theory of Relativity has challenged the classical approach to causality. The subjective observer has to be· taken into account in a quest for objective truth. The ancient Chinese mind contemplates the cosmos in a way comparable to that of the modern physicist, who can not deny that his model of the world is a decidedly psychophysical structure. The microphysical event includes the observer just as much as the reality underlying I Ching (Wilhelm, 1951) *(iii). The criterion for validating the meaning in an object such as the text of a hexagram is the observer's opinion that the text is a true rendering of his psychic condition. Jung (1955) *(iv) saw this coincidence of physical (objective) and psychic (subjective) events as Synchronicity; a peculiar interdependence of objectives events and the subjective states of the observers. A causal explanation must include the subject

In many senses Quality, Imagination, Synchronicity, Uncertainty and Construing are analogous descriptions of process; a process whereby the evaluation of events in a given pattern is influenced by the subject and object in a special interdependency. An awareness of this interdependency is prior.

The viewpoint which has been growing out of the work at the C.S.H.L. *(v) is that the process of creating meaning is prior. Events in the outside world themselves do not produce predictable consequences. It is the meaning attributed to the events which becomes the conversational cause. Periods of psychological coherence are the essence of conversational

exchange and we have postulated the term conversational individual C-indi as a convenient description for the achievement of meaning through personal interaction with the physical world, including other individuals. The C-indi is not the subjective entity of an apparent subject/object relationship. The C-indi extends into the human being and entails some part of the object. The C-indi is prior. For the C-indi to function he/she has to learn to become a personal observer. Pirsig in conversation with his motorcycle, a Zen archer and a theoretical physicist, are examples of effective C-indis. But ordinary mortals 'uncreative' or 'unimaginative' in the public sense, necessarily posses this faculty in embryonic form. What the C.S.H.L. is doing is inventing a new system of technology to help make the process of personal observation explicit and available for reflection, review and development.

The conversational case studies which follow in PART II show how the C-indi methodology can be applied to enable learners to enhance their capacity to learn and to become self-organised learners.

Learning, Conversational Research and the Personal Observer
In recognizing the personal observer as an important entity in learning we have then found it necessary to revise our view of what constitutes research, what defines a conversation and what learning may be.

Learning is an inference from behaviour and/or experience. It requires that the learner construct or reconstruct aspects of his reality so that meaning is attributed to new areas of experience or new meanings are attributed to old areas of experience. It also requires that the learner, sooner or later, acts on the basis of his new reality, trying out and exhibiting new or changed behaviours. Self-organisation in learning requires that the consequences of new ways of seeing reality and acting upon it should be reviewed and fed back into a more personally meaningful and viable construction of reality. Finally, it requires that whoever is drawing the inference should value the new reality or/and the consequences that accrue from new behaviours. Non-valued learning often has less acceptable names attributed to it.

Q O.
Given different values and different perspectives, learning becomes a relativistic concept. It is a change in the relationship between the learner and his situation, personal, social and/or physical. Learning is appreciated differently depending upon the psychological position of the observer. Learner, teacher, parent, employer and many others can be observers.

If educational research concerns itself with learning and the researcher/trainer defines learning in this way, then the priority of scientific objectivity becomes suspect. The pursuit of objectivity normally involves the educational researcher in a detailed control of the experimental situation. But studies aimed at increasing self-organisation require that the researcher recognise that the learner has his own point of view and needs the freedom to explore each learning situation. As the learner begins to exercise greater and more sensitive choice, so the researcher/trainer looses the capacity to insist on a rigid pre-planned design. The trainer has the choice of becoming one among a number of pre-packaged resources, or of becoming a full participant and welcoming the student as an equal but different participant into the learning/teaching conversation. Staff may opt for one or the other of these roles; they may opt to take one role in one situation and the other in another. What happens, disastrously -on occasions, is that these roles are confused and the interaction becomes neither instruction nor learning conversation, and founders in a mess of mutual misconceptions, annoyance and

frustration. The conventional educational researcher and teacher are more at home with pre-planned instruction than with conversational learning.

In studying the dynamics of Learning Conversations, a traditional view of objectivity would seem incompatible with the pursuit of self-organisation. The positions of researcher/trainer and learner are no longer entirely dissimilar. If it is acknowledged that each is an autonomous contributor to the joint enterprise, then many of the assumptions implicit in objective research, formal instruction and intuitive tutoring have to be examined and negotiated afresh before the enterprise can get underway. The Learners recognise that learning-to-learn involves them in a unique action research project centred upon themselves and their learning skills. The teacher sees him/herself as participant adviser or consultant to the learners in their project. The researcher/trainer now concerns him/herself with understanding the dynamics of this joint enterprise and in negotiating multiple criteria for exhibiting the degree and nature of the learning which is (or could be) inferred from points of view.

Action research in schools, colleges of education, polytechnics, universities and in industry, based on encouraging self-organisation in the ways in which learners interact with available resources has lead to the identification of criteria which offer rigour and validity to a science of Learning-to-Learn.

The Personal Observer as Scientist

The development of a learning-to-learn language depends upon an ability to observe, interpret and review how one learns. The process of learning acquires reality in the context of what is being learnt. Learners recognise that learning-to-learn involves them in a personally unique project focused on their own learning. In our experience reflective learning techniques aid this process. People can learn to distance themselves from the CONTENT of their own learning experiences and in achieving this, they are freed to explore and develop their learning competence. Conversational aids for talk-back are designed to achieve reconstruction of the learning even which often cannot be fully experienced during the event itself. The personal research process oscillates between structures and freedom, certainty and doubt. It depends on overcoming a universal tendency towards modes of thought and feeling and behaviour.

rigidity and habitual content-bound

Fig ……..

(lab) summarise this research process and the role of reflective learning devices. in enabling the personal observers to achieve their aims.

Learning Conversation
Conversational Method
Conversational Tools
Three Dialogues
Three Levels
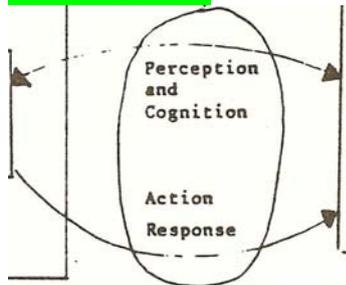TUTOR
as articulator of the learning conversation
as subject matter expert
Awareness and Review of Process
TllE PERSON AS "SCIENTIST"

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Expansion and Rebuilding of Model
The Self-Organised Learner
Personal Development Growth of Personal Meaning Development of Capacity for Learning
CHANGES IN
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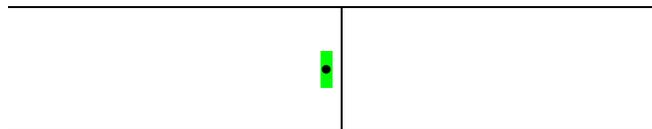nNEGOTIATE ·SOCIO HET "CONVERSE B ·FOCUS
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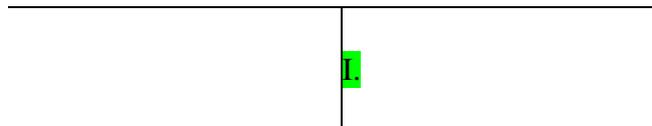
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On Constructing a Learning Conversation

It is our experience as learners, as teachers and as researchers into Human Learning that whilst the occasional lucky learner may unconsciously hit upon some successful strategies for learning, the disabled majority of learners only become more fully functioning as they learn how to reflect upon their own learning activities. In the Learning Conversation they become able to recognise, represent and thus control their own processes. They become more self-organised.

In any effective conversation, control is passed back and forth among participants as they recognise the nature of what each has to contribute. But all participants are not equal. Most

conversations are asymmetric. In the early stages of the Learning Conversation the learner provides the evidence on which the collaborative research into the nature of her or his learning is based. The manager of the conversation guides and controls it. As the learners awareness of their own processes increases the manager hands over control of the awareness raising activities to them. He or she then begins to encourage them to challenge their personal myths about their own learning capacity. The learners are encouraged to change the emphasis of their attention. The Learning Conversation moves into the next phase. They begin to explore how the learning can be improved. The manager encourages them to explore alternative models of their own processes and to develop and test in action, personally acceptable theories about how they can learn more effectively. Gradually the manager hands over control of this exploratory activity to the learner until eventually only the quality of the learner's personal investigation remains under the manager's review. The total conversation is phased to enable the learners to obtain insights which allow them to conduct more and more of the conversation for themselves. The ability to conduct most of a learning conversation with yourself is the essence of 'self-organisation'.

The process of a conversation can be distinguished and described separately from its content. The conditions for creative conversations require that an exchange is modulated through a shared understanding of how the conversation will be conducted and that this model of the process itself remain negotiable. Such conversation is rare. People value it when it does occur, but they can rarely create the conditions to make it happen. Each of us can identify our own special events in which we had this rare experience. It can be recognised by the experience of constructing, exchanging and negotiating personally relevant and viable meaning. Such creative encounters have been defined by Maslow (1963) * (vi) as those in which the criteria for appreciating them can only arise out of the experience itself. They are both self-referent and self-assessed. People may achieve such creative conversation within themselves. This is the core of self-organised learning.

The Science of Learning Conversation is the study of the conditions in which such experiences are propagated and grow. The C.S.H.L. Reflective Learning Technology attempts to create such conditions and thus increase the probability of creative personal learning. To be truly conversational, the technology of learning must allow relevance and viability to be assessed by the learner. The criteria and referents used by the learner may be challenged and renegotiated but they cannot be ignored, denied or arbitrarily over-ridden by other perspectives without destroying the sources of self-confidence and self-sustaining effort. The Learning Conversation encourages and enables the growth of this capacity for self-organisation.

The Learning-to-Learn mode of the Learning Conversation leads them into a self-diagnosis of their learning strengths and weaknesses and into conversational activities for learning, designed to help them achieve greater capacity

learning contract, learning

In its Tutorial mode it leads the learner to the formulation of personal contracts. After an attempt has been made to carry out the review leads the learners to reflect upon their systematic competence. Poor learning performance may come about in two very different ways.
(1) Learners may have wanted to achieve the contract and yet not have had the skills and competencies necessary to formulate and execute it effectively.

(2) Poor performance resulting from lack of interest leads into the Life, Relevance of Context conversation mode. Here the learner is asked to identify long-term needs and purposes and to differentiate these into shorter term recognition of the relevance or inappropriateness of the current learning contract. It is this part of the conversation which can save days, months or even years of alienation, misery and misspent effort. The Relevance conversation can identify the personal structure of a topic or a job situation and thus help learners chart their own paths to involvement in it.

Choice of specific techniques i.e. conversational learning aids to be recruited into the Learning Conversation depends upon the nature of the application. Learning Skills, learning situations and topics to be learned may all require special techniques for awareness-raising. The conversational learning aids used in conjunction with the AIC Skills Trainer represent some select examples.

Challenging the Robot
Achieving new levels in learning performance usually involves serious personal change. It involves the disruption and breaking of existing poorly organised skills and the establishment of new attitudes and personally strange ways of thinking, feeling and behaving. Many of the special techniques used in the Learning Conversation have been specially recruited and developed for such controlled interventions. But however carefully the conversation is developed the process of significant 'learning-to-learn' will always involve a "learning trough". Figure 2. We have found it is useful to talk of each learner as having a set of personal learning robots; The learning-by-reading robot, the learning-by-discussion robot, the learning on the job robot, the learning-by-listening robot etc. By "robot" we mean that each learning skill has become so automatic that it is no longer under conscious control. Such robots obviously relate to the personal myths described earlier. Special techniques are required to challenge the robot, bringing the skill back into awareness and thus available for revision and development. But the disruption of existing skills produces a drop in effective performance. The learner feels that he is getting nowhere and becomes frustrated and anxious. Part of every Learning Conversation is concerned with offering the learner support through this learning trough.

Figure .2 The Learning Trough

The Need for Three Dialogues
The conversation can be seen to contain three entwining dialogues:
i) The first dialogue serves the purpose of raising awareness of the learning process.
ii) The second dialogue offers personal support to the learner, particularly when he is experimenting with new methods of learning and feels vulnerable after having abandoned his habitually safe techniques.
iii) The third dialogue helps the learner to identify standards: in himself, in other people, and in the situation, which can serve as referents for the quality of the learning which he is attempting to achieve.

The first 'process' dialogue taps unconscious habits and helps the student to become aware of his own learning style. In most areas of activity, for example in manual skills, social skills, reading skills and management skills, people have little or no understanding of their own learning processes. Devices such as the Brunel Reading Recorder, Modified Bales interaction recorder, a video recorder, a computer-driven simulator or an operator training aid (Thomas

and Courtney, 1970) *(vii) can produce detailed records of learning behaviour. These can be used to talk the learner back through his experience. Careful reconstruction of the experience serves to raise awareness on subsequent occasions. Gradually a personal language for describing learning develops. We have found that the Kelly Repertory Grid or the Structures of Meaning technique can serve as awareness raising devices for many different tasks, from interviewing to industrial inspection, in which perception, judgement, thought and feeling are of central importance.

The second dialogue 'supports' the learner through this process of change. It is as yet largely a matter of sensitivity and intuitive understanding on the part of the manager of learning. However careful consideration of the methods of learning theorists and therapists can, when separated from their pejorative and seemingly incompatible values reveal a wealth of technique. For example the work of Carl Rogers and B. F. Skinner can together offer some indicators of the ways in which this personal support should be offered. Rogers' technique is to create a very relaxed and accepting atmosphere in which there is high regard and no evaluative comment. His studies show that this frees individuals to experiment and explore their own processes in ways that are normally too threatening for them to attempt. Skinner's behavioural reinforcement techniques enable a person to define new patterns of behaviour which they can then be carefully guided into achieving. These two seemingly disparate approaches can be variously adapted and combined to produce a powerful range of methodologies by which the individual can be freed, supported and guided into new ways of behaving. But practitioners must each explore their own resources and develop those mixes of methods which are most effective for them.

The third 'referent' dialogue aims to enable the learner to appraise his own performance, but to do so he needs to identify examples of referents which he can use as a basis for comparison. The manager of the learning conversation helps the learner to identify such examples either in outstanding performers of the skill which he wishes to acquire or as measures of quality and/or speed which he can apply to his own activities. Whatever examples the learner identifies in his environment he must remain free to use them for his own purposes. In the end, the learner comes to use his own previous performances as the basis for evaluating his improvement and should be encouraged not to restrict himself to the existing norms nor to be discouraged by the outstanding performance of more experienced people.

Conversational Entities
Learning Conversation may be conducted with a group, often just as effectively as with an individual. Sustained change often requires that the whole organisational enterprise be engaged in the Learning Conversation. A conversational entity, the C-indi, which is the locus of learning can be represented by more than one person. A shared understanding of the nature of the C-indi, (e.g. its methods for negotiating needs into purposes, its ways of planning and executing a strategy, and its mechanisms for agreeing and using criteria for evaluating its own performance) are a necessary pre-requisite for a creative Learning Conversation with it. A C-indi may be an individual person, or a working pair, it can be a group or a team, or it may be a department or a whole organisation. A Personal Learning Contract may be developed with any such C-indi. A well formulated procedure for constructing a Personal Learning Task Analysis (PLTA) both overall and into sub-tasks has been developed with explicit conversational heuristics for C-indi's of different size and constitution. This has been thoroughly tested out and as a consequence, modified, elaborated, and specifically tailored to the needs of this project.

In its entirety the PLTA starts from the Life or Context Conversation within which the C-indi's initially orientate and define themselves but the conversation rapidly moves to the Tutorial Level where experiential methods (grids, structures of meaning) can quickly identify the structure of personal and interpersonal thoughts and feelings about the topic.

The EXCHANGE GRID TECHNIQUE can be used for two people and THESAURUS pooling procedures for teams and institutions. The formulation of a learning contract coupled with an understanding of the pool of constructions of experience from which the C-indi starts are sufficient for one learning Cycle to be attempted. If learning behaviour is recorded in an appropriate form, (e.g. a modified Bales type record, or minutes of working party meetings or Track Data and Print Picture Sequences in the AIC Skills Trainer, then a review of learning performance can proceed. Should the evidence reveal inadequacies of performance from within the C-indi's own criteria for evaluation, then the learning conversation should shift to the Learning-to-Learn level. Various techniques in the experiential talk-back repertoire can be recruited for the exploration of the hierarchical structure of effective purposes. Analysis of the behavioural record yields evidence about the strategies and how these were played out in the situation. A combination of behavioural and experiential measures are available for identifying the learning outcomes and mapping them back onto the criteria specified in the original learning contract. This review should reveal any specific learning or communication skill requirements. When these are mastered, the conversation returns to the Tutorial level and the main learning activity recommences. After seven or eight Learning Contracts have been carried through a general review of the C-indi as personal scientists becomes appropriate. In this the facilitator debriefs the C-indi on the general nature of their theory building. Should they together decide on a further review, this proceeds in a similar manner with the emphasis on the activity as a whole.

The final aim of any Learning Conversation is its own decease, since the Self-organised learner gradually internalises the conversation until the C-indi is itself Self-organised, taking over all the functions of the manager of it's own learning conversation.

Tools for Enhancing the Quality of Learning Conversations
The methods which were recruited and/or developed for researching the process of Human Learning now become tools to be used in the learning conversation. These tools i.e. conversational learning aids can usefully be classified in two ways:
a.   In terms of the similarity of method employed, or
b.   In terms of their function in the Learning Conversation.
Some attempt is made in n·:", I1tp:.t; $i'i~.()f) h::r."ff'1C;f ~ otjJ4'r •. /'V! -of c.u.c!Sto annotate tools to their functions in the Learning Conversation.

In an appendix at the end of n!l ~~l~r we review these tools in terms of the methods employed. Readers may find this methodological classification useful, in relating these conversational tools to their own work.

Towards a Taxonomy of Conversational Learning Aids
In the Appendix it is pointed out that learning aids can be usefully classified in two basic ways. In that Appendix these aids were categorised into three types of tool according to lithe psychological methods employed "i.e. as tools for representing experience, tools for recording behaviour and tools for reflecting on behaviour and experience. As researchers this has provided us with a framework for selecting appropriate conversational tools. However, for users it is more useful to view the tools from within a functional framework. Here some

attempt is made to categorise the learning aids in terms of their functions in promoting reflective learning. Each has a given function in the Learning Conversation as a whole. Some of these have already been referred to in our design description of the Skills Trainer (Part I). Others are described in our design considerations for the first generation materials (Part I). At the end of Part II, the results, we offered a summary classification in terms of their functions for promoting self-organised learning. Here we attempt to elaborate on how these can be integrated into one system for promoting self-organised learning.

In Part I an argument has been developed in which personal myths about learning and consequent learning robots may be challenged within a Learning Conversation. Learners are consequently released to enhance their learning capacity and so improve their performance of a task in enduring ways.

This experience has much longer term consequences than merely improving learning performance on one given task or sub task. Learners are able to organise their own learning and thus better learn from direct personal experiences as well as

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other organised resources, in the absence of systematic training facilities.
The learning aids addressed by the Skills Trainer which have been already described represent only some of the awareness-raising tools that can be embodied in a CAL device. The Skills Trainer is already five years behind current experimental developments both at the APU and at the C.S.H.L. in this respect. In Part I we referred to the early discussions on types of learning aids to be incorporated, and we also commented on those which were omitted awaiting further technological developments. Here we take this up again in order to point towards the design considerations necessary for the development of an integrated system. We have already classified the aids which have been built into the machine into four types. These are largely aids concerned with performance in the task. The list which follows summarises all those categories of aids which can be considered to relate to raising awareness of learning the task, and to reflecting upon the process of learning. Those that are addressed by the Skills Trainer, and those that are embodied in the first-generation materials are indicated on the taxonomy at the end of Part II.

This taxonomy divides into two levels, relating to task-focused conversation and learning-focused conversation (Part II, Section 4). The case studies have shown that learning aids may generate information, but unless this acquires meaning for learners it will not aid their learning. Personal meaning is created conversationally, either as learners talk to themselves or as they converse with the 'manager' of the Learning Conversation.

A. Aids to Learning the Task i.e. Task-Focused Conversational Aids.
1. Aids that enhance feedback about task performance, possible novel forms of feedback need to be considered during performance as well as those offering an enhanced interpretation of existing forms. For example, sensitive elicitation of task definition (see later) allow criteria of performance to be specified more precisely. These in turn provide types of feedback which might be made available during performance. Such feedback devices could include information about success at each level of organisation of the task.

Other forms of feedback relate to the emotional or physiological conditions of the learner. The on-line generation of such information could in turn be used to provide possible support or process counselling, in the Learning Conversation; This can be enhanced by administering tension-reducing drugs (e.g. B Blockers such as DOPA). Work with concert pianists, actors and circus performers has already established an interesting lead in this direction. Whether it be socially acceptable to use such drugs, under medical supervision, in learning new tasks at work or in education, remains to be seen. A whole new category of bio-feedback devices can be incorporated to generate this information. These can be integrated into the 'support dialogue' about learning.

New feedback aids ~f\~J \,i{..1 e f-_ . J ·.

 a facility to specify exactly which component of the performance requires to be replayed, a facility for replay of performances within hierarchical sequences of action.

2. Aids for Eliciting and Representing Personal Knowledge and Experience about Task. Performance
Content-free repertory grids and STRUCTURES OF MEANING techniques can be used for sensitively exhibiting a personally structured view of the task, (Appendix Part I). Personal Task Analysis is another procedure which can be machine based, (Part I Section 5). The Records of Performance can themselves be used as starting points for the reconstruction of the experience of task performance. PRINT PICTURE sequences and TRACK DATA referred to in Part I, Section 5 provide such records.

3. Aids for Task. Definition
Purpose Hierarchy techniques can be used to elicit a detailed personal taxonomy of Purposes which relate to task performance. Purpose-Awareness is important for two reasons. Firstly the way one acts out a task varies with one's purpose. Short and longer term purposes link up to influence the next sequences of action. Secondly in order to check whether one has performed a task successfully, one has to check against something and that can only be one's own purposes for doing the task. Any other criteria are secondary.

Being clear about purposes is therefore important. But what does this involve? One needs to be precise about the kind of purposes that relate to one's actions. These can be related in levels of generality into a hierarchy or heterarchy. Usually statements in questions can be

organised into a pattern from specificity to generality. This can be used to guide the execution of the task.

It is important to recognise that purpose definition is not a 'one off job' which is done at the beginning of a task. An initial definition can have considerable effect on task performance but the act of performance itself influences purpose; these need to be modified,' pruned, elaborated and differentiated as one performs the task. This is part of the process of learning itself.

4. Aids for Building a Bank of Records of Performances
An easily accessible filing system can provide access to the performance of other learners, task experts or the same learner on different occasions. Similar and different scenarios i.e. starting conditions for specific types of intercept, can thus be monitored and used as a source for further learning.

5. Aids for Comparison of Performances
This needs an adequate comparative system for enabling comparisons between learner performances, for measurements of change and for comparing learner performances with expert's to evaluate success.

6. Aids for Identification of Criteria of Success
These should allow criteria to emerge from the processes generated by the performers themselves i.e. relative versus absolute and objective criteria. Means of final outcomes can thus be arrived in process terms. Such quality measures are very different in kind to the content-based criteria of traditional tests, debriefs and examinations.

7. Aids for Reflection upon Performance
Records of performance can be used for talk-back. Learners reconstruct exactly the way in which they did the task, thus providing them with verbal evidence to evaluate their increasing competence. This also increases their perceptual awareness of how they do the task whilst they are doing it.

8. Aids for Reflection upon Personal Knowledge and Experience
A Repertory Grid-CHANGE GRID Procedure coupled with a REFLECT procedure can be used to compare changes in the learners developing experience in the task over time. Whereas PEGASUS BANK can be used as a facility to store sequences of personal knowledge so that this comparison can be made successively over selected periods of time.

9. Aids for Challenging Personal Myths, Beliefs, Values and Prejudices about Learning the Task
Tools for eliciting and reflecting on personal beliefs about learning (and training) have not been incorporated into the Skills Trainer. The Raleigh study and interviews with naval personnel, including learners and instructors have demonstrated how structures of meaning and repertory grid techniques elicit "personal myths" which imprison flexible and adaptable learning. These techniques are already incorporated into existing C.S.H.L. micro computer software and could easily be incorporated into intelligent CAL systems. They have proven crucial in releasing individual learners to explore alternative beliefs and values and so invent new approaches for learning.

10. Aids for the Comparison of Learner's Knowledge with Learner's own Performance

Such aids depend on some coherent process-based model of an integrated sequence of a person's thoughts, feelings and actions. Purpose, Strategy, Outcome and Review within a hierarchical and cyclical sequence provides a preliminary process-based vocabulary for developing a language about learning the task. Purpose is often ill defined and difficult to articulate. Because of this a task is often performed in a vague and less controlled way as has been seen in the Case Studies. Learners often assume that learning is something which happens to them and it becomes a significant insight to realise that one can learn to control this process.

There may be many different strategies for performing a task. This became clear in eliciting views from instructors. A learner needs to be made aware of this, there is 'no one best way' when the process is taken into account.

The mark of good performance is to be able to : u'!~Y. one' s strategy. By outcomes we mean the results of performing the task. Broadly, these can be defined as changes which take place in what one knows i.e. thinks and feels about the task and how this relates to performance. It is as well to be as precise about outcomes as it is about purpose. If outcome remains vague then the process tends to be less controlled and this often leads to less effective achievements. It is in the end awareness of the outcome and criteria for evaluating this as part of a process that provides criteria of effectiveness. To do this, one needs to be able to measure outcome in process as well as product terms i.e. the whys's and how's of safe and effective intercept control as well as success in the final intercept itself.

Purpose - Strategy - Outcome are obviously related to each other. Purpose effects Strategy, Strategy effects Outcome and Outcome when related to Purpose, provides the measure of effectiveness. Taken together they provide a key feature of self-organised learning.

To improve learning capacity one needs to develop skills in purpose definition, generating and choosing appropriate strategies and tactics, identifying criteria for assessing outcomes. But there is one thing more. Is it necessary to stand back and Review the process as a whole; why did one choose those purposes, adapt those strategies, evaluate against those criteria? It is this operation that involves review.

Aids to Enhance the Capacity to Learn. i.e. Learning Focused Conversational Aids.
1. Aids for Reflecting on the Learning Process
Finally, the whole concept of conversational reconstruction and development and review of personal learning competence is seen as a separate and distinct activity from that of learning about the primary task i.e. intercept control. This demands a whole new level of categories of learning aids for promoting self-organisation. These we designate the learning-focused conversational aids. Each of the aids for learning the task summarised above are also important components for the development of self-organised learning. However as these take on a different perspective when functioning as agents for reflection and review of the learning process. They need to be conversationally (i.e. interactively) recruited into the practise of Learning Conversations, embodying all three levels, and each of three dialogues (process reflection and reconstruction, support through anxiety, and referents for generating criteria of success). The conversational learning aids must also meet the a priori conditions of the C-indi. They must enable the exploration of alternative thoughts, feelings and actions (i.e. provisionality) free from heavy constraints and preconditioned influences and also the testing out of these alternatives within a personal science paradigm to ascertain personal validity and

viability. This paradigm itself cannot be pre-specified in its entirety although guidance can be given in the form of algorithmic 'process' based sequences for its personal generation.

In essence such aids must embody a theory of personal learning which defines learning as: The construction, reconstruction, negotiation and exchange of personally relevant and viable meaning, and to view personal meaning as; the pattern of thoughts and feelings which are the basis of all action.

The first generation conversational materials are based on the technology and methodology for enabling learners to act as personal scientists; to reflect systematically on both their behaviour and their experience in personally relevant ways. This must be achieved within a personal contract which assumes that institutional purposes-are also primary but negotiable. To implement these conversational aids in the project the research team have offered a personal tutorial service. This serves a two-fold function; to provide expertise in conducting Learning Conversations, and to evaluate the aids as possible components of a more complex 'intelligent' machine for promoting self-organised learning.

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Simple versions of the first generation materials have already been transformed micro-computer programs. But it has been into the C.S.H.L. context

reflective learning software suite of beyond the scope of this project to test these out in the RN

On the Design of Conversational Learning Aids
To meet the requirements of the theory and practise of Learning Conversations the general characteristics of conversational learning aids have been specified and taken into account, in designing the first generation materials. Some core characteristics of such aids are outlined so that readers may appreciate the underlying features of those conversational aids described in this project.

Characteristics of Awareness Raising Conversational Aids
Minimally, these characteristics include:
Some observational record or external display of one aspect of learning. Purpose-Strategy-Outcome-Review can each be separately and integratedly investigated by means of awareness-raising tools.

A display of the learning process which facilitates effective talk-back, so that the learning event can be re-experienced.

A capacity to move up and down the levels of organisation of a skill, so that the skill can be reviewed as a coherent system.

A facility for the development of a language in which the description of behaviour and experience can be articulated in sufficient detail with such a degree of precision that a new level of awareness is achieved.

The testing out of alternatives and a system of evaluation which indicates the merits and demerits of each alternative and throws up indications of the directions in which more adequate alternatives may be sought.

A system of support which enables an individual to intensively explore the awareness and review of process.

A procedure for gradually weaning away from dependency on the tools, replacing these with an enhanced perception and language through which the learner can achieve the same effect unsupported from the outside.

Provided such characteristics are met, people engaged in learning-to-learn are able to invent specific tools to meet their individual needs. Human beings posses a tremendous capacity for learning. Our research findings in many projects show that when used 'conversationally' these awareness-raising tools can enhance learning competence by several hundred percent. In PART II some of the significant results in this present study have been described. These serve not only to further substantiate the importance of conversational methods and techniques for promoting self-organised learning: they also provide rich evidence for the formulation of additional components for a Computer-Aided Learning system. For a CAL device to be capable of addressing an improvement in the capacity to learn, it must be capable of those forms of conversational interaction described in our Taxonomy of Aids to Self-organised Learning, Awareness & the Learning Conversation.

In looking at the process by which someone learns a task it is possible to identify three stages in moving from the unconscious doing of the task (i.e. the 'skilled' task robot) to fully self-organised learning.

In the first stage of learning the person does the task by dogged practise and repetition with an implicit tactic of 'trial and error', they acquire some level of competence. Many years of such practise leads to the skilled technician. But he is totally content or task-bound.

In the second stage of learning the person stands back, observes and reflects upon the implications of their practise. Thus raising the blind trial and error method into a more rational and coherent approach to the process of doing the task. But, at this stage in the development of learning the task is still the total focus of attention. Awareness is concentrated, observing the process of doing the task and using the results of these observations to systematically experiment and improve one's performance.

At the third stage of learning, the focus of attention shifts.

At certain intervals in acting out in stages 1 and 2 the person stands back one further step, to take stock not only of how one is doing the task, but also to reflect upon the process of learning itself. It is this second phase of awareness which is the crucial trigger to total self-organisation in learning. It is this which proved so difficult (or impossible) for some of the subjects of our study without the aid of the Personal Tutorial Learning Conversations.

In stage one there is no awareness of process and therefore no possibility of conversation about learning the task. Many of our subjects found that being lead into systematic observations of themselves doing the task (stage 2) was a significant insight. This allowed them to change learning a task from a ritualistic, determined and sustained use of practise with occasional haphazard insights into systematic learning activity. The proper use of the learning aids in the Skills Trainer provided a mechanism for articulating these systematic insights. We term this the content -focused or task -focused conversation. A Learning process

-focused conversation arises in moving from stage 2 to stage 3 where the process of learning is the new content or 'task' focus for the conversation. Fig. ~ illustrates these stages.

Most learners operate within a mix of the three stages though stage one predominates. Even effective learners operate mostly at stage two, with a minimal awareness of stage three. Truly self-organised learners operate predominantly at stage three. The learners in our case studies all achieved stage three; both the naive learners in study one just barely achieved this, one of the experienced young officers in study two and both of the trainee officers in study three moved significantly in this direction.

Thus the Task debriefs used in much Skills Training Courses can be seen as potentially falling into stage 2. What is missing in this 'task conversation' is the construction of a Learning Debrief which can elevate the conversation into stage 3. This is the essence of what we call the whole Learning Conversation and involves all three levels and three dialogues referred to earlier. The Personal Task Analysis can be used for systematising the conversations about learning the task (i.e. conversation), whereas the Personal Learning Task Analysis is the procedure for facilitating the whole Learning Conversation. (i.e. process conversation).

Content conversation about the task challenges the 'task robot', often causing a temporary drop in performance on the task prior to a re-organisation of the skill and the achieved of a new level of performance. Analogously the conversation about the process of learning i.e. Learning Conversation challenge the learning robot, as distinct from task robots. This often leads to a temporary recession in learning competence whilst the learning skill is reorganised, as illustrated in Fig. 2, But it is the mechanism by which how levels of learning skill is eventually achieved.

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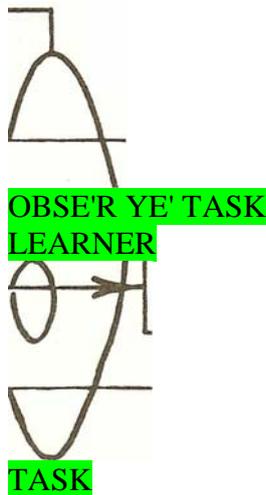
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FIG 3 THREE STAGES TOWARDS SELF-ORGANISED LEARNING

Representations of Experience and Behaviour

In our discussions on the nature of learning in Part III we have identified behaviour and experience as complementary source of information about how learning is taking place, In achieving awareness we must develop a 'language' in which to reflect upon and converse about behaviour and experience -and how these relate. Behaviour (or performance) can be represented as a series of actions or events and is best observed by someone other than the learner or by the learner later observing some record of his behaviour.

The Learning Debrief Forms are concerned with raising awareness of the processes of learning, where the P.S.O.R. procedure now refers to the learning process and where behaviour is analysed in terms of' learning events'

Towards a Fully Conversational View of Training and Learning

Our experience within this project, has enabled us to further consolidate our developing views about an integrated system of teaching and learning. Firstly it is necessary to appreciate the implications of a shift in paradigm. Once this is recognised, the various methods of teaching/learning can be related to each other within a dimension of degrees of freedom-to-learn and levels of awareness of learning the task and of the learning process itself.
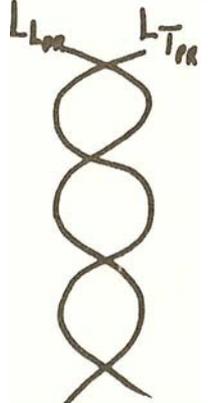
The Conversational Paradigm and Training Methods

A continuing theme throughout this project has been the need for a "conversational" approach to learning. In a more philosophical sense, the physical science paradigm outlined, in which "the scientist" studies and explains the phenomena producing "a theory" which becomes the basis of all action, pervades most of teaching and training. The trainer sees himself acting upon the learner on the basis of his theory of learning, defining the task, organising the sequence of instruction and assessing the learner's performance. The "knowledge of results" that he provides controls the "scientist/instructor" valued changes in performance and knowledge. His theory and his actions are confined within his own perspectives. Here, we are suggesting that learners are best treated as "other scientists" and not merely as receivers of instructions. The learner is himself experimenting and developing his own 'theory' or understandings both of the task and of the ways in which he is developing his skills of performance.
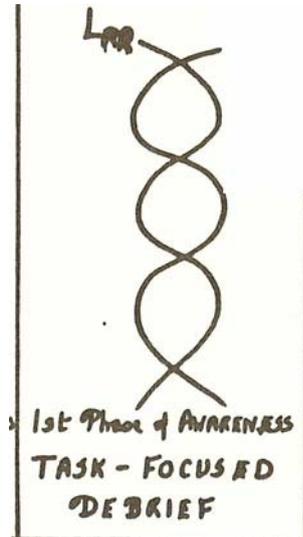
Seen in this way the interaction between instructor/and learner is a conversation between personal scientists, each of whom is constructing his own meanings (or theory) from within his observations of his own personal experiments. Such interaction must therefore be conversational in which both recognise the right of each to be independent sources of understanding. Thus, we are advocating a conversational paradigm of the training/learning activity. It is this which can transform the experience of learning.

Another way of differentiating between, methods of training and learning is summarised in Fig. Lr

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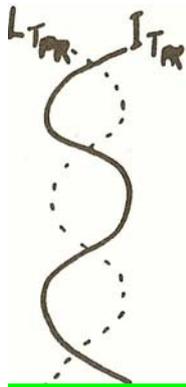(COltVU '"TlOltAl) FOIC "1i~ItHIH~· 70 - Lr~RH.

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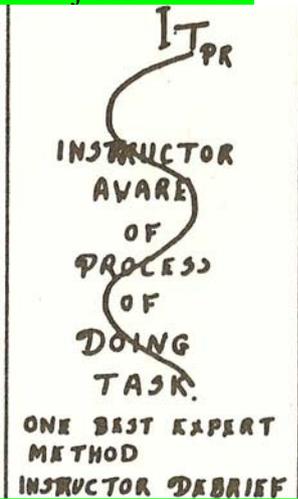OF' ",.oc.Jij~ 0 r 1)0 .N , TH £ T MK
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27.

On the right of the Figure is what we call DEMONSTRATION or "Sitting by Nellie". The expert in the task merely performs the task and expects the learner to learn from observing "her". Apprenticeship is often based on this method.

Moving to the left of the Figure we have used the term INSTRUCTION to describe the activity in which the expert adapts "her" demonstration of performance and knowledge to EXHIBIT this to the learner and thus formally teaching the learner. This method involves the instructor in analysing performance and knowledge of the task into parts or units and sequences of units. These sequences represent ways in which she feels the learner can best acquire skills in the tasks. She also provides a meta-commentary on task performance and knowledge. But the essence of this view of instruction is that the instructor not only remains task-bound but also remains totally within her view of the task and the way in which she carries it out. Variations on this method include the team of instructors sharing their experience of how an expert conceives of the task and performs it.

The next move left in the Figure takes us one further step towards conversational teaching and learning. In 'TRADITIONAL TUTORING' the tutor does try to enter into the learner's understanding. She spends some of her time encouraging the learner to exhibit his view of the task and his understanding of how he does the task. But the conversation is still task-bound and the criteria for measuring success still firmly in the control of the tutor who uses her understanding of 'where the learner is' to bring the learner step by step towards the expert's or instructor's view of the task and how this should be done.

The next move left in the Figure describes the TUTORIAL LEARNING CONVERSATION. This is the method embodied in the first generation materials. This method of teaching and learning is more truly conversational, since the tutor acknowledges the right of the learner to develop their view of the task and how this may be done. She neither insists upon, nor denies her own expertise, but sees this as a resource which the learner may use, and not as an absolute referent that fully defines the lone best method. She is concerned to assist the learner in identifying his own growing definition of the task, and his own growing understanding of how the task may be achieved successfully in the learner's terms. This is a distinctly separable function to the referent dialogue of the Learning-to-Learn Conversation. In the referent dialogue the tutor helps the learner to explore alternative definitions of the task and alternative best methods for achieving these.

Finally, on the extreme left of the Figure, the fully fledged self-organised learner is seen as someone who has learnt to internalise the skills of conducting Learning Conversations in its entirety and who therefore knows HOW TO MANAGE the levels, the dialogues and the tutoring roles for himself.

To advocate a Self-Organised Learning and Learning-to-Learn component in a course is very different from traditional instruction or even many of the most recent "study skills" exercises. Effective Learning Conversations can transform a personal capacity for learning not only in relation to the immediate content of a course but also for ever afterwards. The learner who achieves awareness of their learning processes and thus becomes self-organised inevitably retains this capacity and carries it over into the real job situation. They are the ones that truly learn from experience and can carry this over to subsequent training courses.

APPENDIX:
Tools for Enhancing the Quality of Learning Conversations

Basically there are three types of conversational tool.

A.	Tools for representing the constructions of experience.
B.	Tools for recording learning behaviour.
C.	Tools for Reflecting on Behaviour and Experience.

These will now be considered in detail.

A. Tools for Representing the Constructions of Experience

1) Methods deriving from the Repertory Grid.

a) The McQuit - FOCUS - TRIGRID sequence. This development has been a search for the optimal form in which to analyse and display a grid. Use of the grid has clarified and consolidated into a method for raising awareness of the structure of meaning hidden within it. The mirroring or reflecting process determines the criteria against which the display should be optimised:

The First of these is to preserve a clear one to one relationship between original grid responses (both the verbal labels and the assigning of elements to constructs) and the final display. The Second is to cluster or re-order the original responses to highlight the relationships between them. The Third is to devise a two-dimensional (possibly computer generated) display for conversational talk-back. The Fourth is to clarify the distortion imposed by the two-dimensional constraint. The Fifth is one emphasis displays. to use a method of display which facilitates rapid change from to another to overcome the restrictions of two-dimensional McQuit dealt with 1, 2, and 3. FOCUS uses a better algorithm for optimising on 2. TRIGRID meets the 1, 2, 3, and 4 criteria. INTERACTIVE TRIGRID optimises on 1, 2, 3, 4, and 5.

b) Interactive Computer Programs.

The DEMON – PEGASUS - ICARUS Sequence.

The original idea 0 f to use eliciting a repertory grid on-line (interactively on a computer) and the fast processing of the computer to reveal the pattern of meaning during the elicitation was originally implemented in 1968.

The original elicitation of elements, elicitation of constructs and rating of elements on constructs was soon enhanced by a commentary on 'high matches' either between elements and between constructs. This then led on to the opportunity to eliminate, differentiate or add elements; and to combine, eliminate or add constructs. DEMON embodied a host of special checks and balances whereby triadic and other modes of elicitation could be brought into operation to direct the conversation into different processes of learning, i.e. elaboration, differentiation, consolidation, etc. These developments of DEMON were not included in PEGASUS (Shaw, 1978) which concentrated on achieving a clear and simple interaction. ICARUS includes the PEGASUS and DEMON facilities and adds the grid laddering facility for the three different levels of grids.

c) Band-Sorting of Grids

A number of different methods for facilitating the hand FOCUSing or TRIGRID operation have been invented and tried over the past fifteen years. Some were demonstrated at the previous Congresses in Oxford and Utrecht. The current version of hand grid sorting is available as a kit.

d) DOUBLE DEMON - PEGASUS-1WiK - THESAURAS (A)

The interactive programs have all had the facility for using a stored grid (or bank of elements and constructs) as an additional resource.

ICARUS and THESAURUS (A) offer the group opportunity to develop an ongoing conversation in which each member of the group can use all its resources to enhance and elaborate their own understanding. The program can then option is the client's) group resource •
 (and the incorporate their understanding non-redundantly into the

e) EXCHANGE
The conversational exchange of elements and constructs enables two people to explore the nature of their understanding and to identify areas of agreement and disagreement. Negotiation is systematically facilitated by this technique. (Mendoza, 1970), (Thomas, 1979).

f) POLE MAPS, PAIRS, DIFF, COBE, COMPABE, SOCIO GRID, THESAURUS (B), CHANGE GRID,.
These techniques allow grids to be compared and contrasted. (e.g. Pole Maps one another). The similarities and/or that highlight certain aspects of the are designed to achieve different types of grid comparison
The different programs. reveals how construct poles entail difference are displayed in ways comparison.

g) POOL, BEFlHE and COHCKliSUS FKAHE
These techniques are designed to systematically use the verbal labels of the individual elements and constructs from a group as conversational resource. This resource is transformed by further categorisation and cross-referencing into a non-redundant, all inclusive, hierarchical language. The group can then use this to explore areas of understanding and misunderstanding and areas of agreement and disagreement.

2. Methods Deriving from Structures of Meaning
The Structures of Meaning technique was first developed in the early 1970's to overcome the problems created by a too rigorous insistence on bi-polarity.
a) Flow Diagram of the Text
Any meaning which is transmitted in linear form, such as a piece of writing, a lecture, a conversation etc, can usefully be analysed and represented to display the structure of meaning hidden within the linear spatial or temporal sequence. The complete sequence is broken up into smaller items, each of which have some integrity as separable items of meaning within the whole. These items are then categorised and the relationships between items are noted. The original sequencing, the categorisation and the relationships between items are then displayed in the form of a flow diagram, e.g. the flow diagram of this paper in Figure 4.

This technique for displaying the structure of a resource has been used very successfully both as an experts guide to the resource, or as a technique with which different users can express their own individual understanding. The sharing of a common system of representation makes comparisons between different people's flow diagrams of the same resource relatively simple and unambiguous.

b) General Structures of Meaning
The constraints of categorising and sequencing within a larger whole can be restricting to the exploration of a person's construction of experience. The general Structures of Meaning technique allows the individual to define the type of item which they will use in any elicitation. For example, a manager attempting to explore his model of the management process might list different activities which constitute his day as the items to be explored and

organised. Whereas a student after a lecture might 'define his items as 'anything which went on in my head whilst the lecture was delivered. Whatever the class of item introduced, they can be successively sorted to uncover the enduring relationships between them. A two dimensional pattern of items expressing these relationships can then be constructed. Levels of structure emerge as items, clusters, and clusters of clusters are identified. An interactive three-dimensional computer program is proving very successful in facilitating this form of intuitive hierarchical cluster analysis. Much of the literature on networks, hierarchies and methods of pruning networks into hierarchies has proved useful in expanding our ideas about the forms of structure which are most useful for different purposes, materials and situations.

c) Relationships between Grids and Structures of Meaning

Much effort has been spent in exploring the advantages and disadvantages of different forms for representing structures of experience, as discussed/published in the proceedings of the Oxford Congress. One fruitful method has been to consider the similarities and differences between elements, scaled on to constructs, item of meanings placed in a structure formal logic and structures of language as alternate representational forms. Zadeh's (1975) fuzzy logic and Ron Atkin's (1974), Q-Analysis have been used in experimental work which may eventually develop into a new general syntactic of forms of representation. Currently the THESAURUS (C) suite allows us to move backwards and forwards between these alternate forms of representation to produce a heterarchically organised THESAURUS of meaning. The contents and organisation of this may of this language have derived from one individual, a couple, team group or institution as a whole.

B. Tools for Recording Learning Behaviour

Our extensive experience with recording reading behaviour and our explorations into the recording of behaviour in many other learning modes has led us to the development of many other behavioural techniques. As tool-makers we have explored the nature of behavioural records and their analysis. We have asked what forms can best contribute to a reliable and valid reconstruction of the total activity (Experience and Behaviour) of the learner? We have used the ubiquitous video recorder to aid for example: Air traffic intercept controllers to evaluate the quality of their debriefing after a practise sortie; University staff to reflect on the nature of their teaching; Language students to reflect on their strategies for learning a language and a chef to reflect on his skills.

However these records of behaviour are used to allow the learner to carefully reconstruct the process of learning in their own terms. This means that they invent their own category system and reconstruct the meaning of the event without recourse to the usual potted normative systems of analysis offered by micro-teaching and social skills training. Recent developments include the computer control of the video for rapid defining and categorising of items and for structured access to this behavioural resource. Other techniques analogous to the Reading Recorder and the Selected Access Video include pen-recorders linked to cassette players to monitor listening skills and a flexible time and quality recording aid for use in industrial production training. The TRACK DATA log and PRINT PICTURE sequences of the AIC Skills Trainer developed by the APU represent analogous behavioural aids to learning.

C. Reflecting on Behaviour and Experience

The essence of helping someone to become a more effective personal scientist consists in enabling them more fully to relate not only the content but also the ongoing time-structure of their experience to the consequences of their behaviour. Techniques based on the CHART algorithm aid talk back of this. Special developments of the repertory grid such as the

PERCEPTUAL GRID or the VALUES GRID can be used to diagnose problems which a learner may be experiencing in the development of complex skills and competences. Non-viable perceptual organisation is often impossible for the client or the practitioner alone to identify. The client has no way of knowing how otherwise to perceive. The practitioner cannot identify perceptual organisation. Only through controlled conversation between client and practitioner can new perceptual organisation be achieved through the observation of behaviour alone. Emotional blocks can often be revealed by a value grid, Kelly's metaphor of behaviour as the 'experiments of the personal scientist' is initially useful but can be misleading. It is here that insight into the nature of personal science is crucial. Some personal artists paint with a broad brush and their behaviour can best be seen as an attempt to test out the effective validity of the whole picture rather than carefully examining some detailed hypothesis. In talking a learner back though a learning experience it may be necessary to iterate their reconstructions several times before they (or you) become aware of the key components in their personal scientific method or style. When this procedure is coupled with the negotiation of their experiential model of themselves as learner one can often move very rapidly to new levels of learning performance.

In Part I the authors' own progress as personal scientists has been charted from a physical science paradigm to one of conversational science. This has required us to acknowledge the 'experimenter effect' as living evidence of the reality of 'conversational effects' even when the scientist does not foresee nor acknowledge them. It is our contention that each self-organised learner must move towards a similar conversational paradigm if they are to become fully functioning.

THE C.S.H.L. REFLECTIVE LEARNING TECHNOLOGY
List of Content-Free Tools
(Available as Paper and Pencil Kits and/or Computer Programs)
CONVERSATIONAL REPERTORY GRID SUITE
FOCUSED Grid, CHANGE Grid, EXCHANGE Grid, PERCEPTUAL Grid, SELF-ASSESSMENT Grid, SOCIO Grid, CONSENSUS FRAME Grid, PEGASUS.
STRUCTURES OF MEANING SUITE

Reflecting on a Topic, Strategies of Hemorising and Recall, Reviewing Learning, Two Person Exchange, Learning from an Expert, Learning from Distance Resources, Flow Diagram - A Special Case.
THESAURUS SUITE
POOL-Items of Experience
REFINE - Get rid of redundancy
CONSENSUS FRAME - Agreement and Disagreement for Pairs, Sub-Groups and Whole Groups.
SOCIO NET - Who thinks like Who
PERSONAL LEARNING TASK ANALYSIS Suite
TALKBACK and DEBRIEF PROCEDURES: Reflection and Evaluation of Personal Learning; Small Group Evaluation.
RECORDING LEARNING BEHAVIOUR
The Brunel Reading Recorder - Computer driven video analysis The Brunel Writing Recorder - Computer driven video analysis The Brunel Listening Recorder - Computer driven video analysis The Computer controlled Selective Video Recorder
CHART SUITE
This CHARTs the process of a Training Course, a Learning Activity, or a Process at Work.