

Lloyd Fell, David Russell & Alan Stewart (eds)
[Seized by Agreement, Swamped by Understanding](#)

The Dance of Understanding

Lloyd Fell and David Russell

- [Abstract](#)
 - [Physiology and Behaviour](#)
 - [Languaging](#)
 - [Experiencing and Explaining](#)
 - [Autopoiesis and Structural Coupling](#)
 - [Physiological Coherence](#)
 - [SensoryEffector Correlations](#)
 - [Structural Coupling and Quality of Life](#)
 - [Behavioural Confidence](#)
 - [Emotioning](#)
 - [Understanding Realised](#)
 - [Understanding in Daily Life](#)
-

Abstract

We subscribe to the view, expressed by Maturana and others, that a satisfying experience of understanding does not result from invoking objectivity, the truth, or a compelling argument, to achieve agreement by the force of reason, nor from a process of information exchange, but from some other qualities of the biological interaction itself. We find a simple explanation of these qualities to be elusive and therefore we try to combine scientific explanation with a poetic metaphor which likens understanding to a dance.

We experience some dissatisfaction when the "force of reason" viewpoint is not acknowledged, but is a hidden agenda, in so many group discussions. It is as if the dance becomes a dance of deception.

To address our frustration and this issue in human coexistence, we employ second-order cybernetics, in particular the biological explanatory framework of Maturana, Varela and others, to speak about the process of human understanding. We also introduce some ideas about behavioural confidence and structural coupling which are derived from animal studies and contrast quantitative attributes of behaviour with qualitative attributes of emotion. It is in this respect that metaphor seems especially useful. The satisfaction we derive from doing this this is seen by us as part of our own understanding.

* * * *

In our research and teaching, which depend, of course, on understanding between humans, we enjoy working with the explanatory notions we have gleaned from Maturana [1], Varela and others. We invite you to consider our version of an explanation which originates in biology and extends to embrace some of the subtleties of our lived experience. We are not claiming any particular truth or validity in this explanation - only utilitarian value in that it works for us.

We build this story around the distinction between *emotioning* and *linguaging* - two new verbs, coined by Maturana - though they are not exactly buzz words in popular usage! We will use these terms in certain ways that may allow you to form certain meanings about them. The reason for distinguishing them, carefully, is to try to show how these two operations are exquisitely intertwined in the process which we refer to as our understanding.

Like the local wit who answered a lost traveller's question about how to get to Dublin by saying that if he was going to Dublin he wouldn't start from here, we are aware that each reader begins this story from a different point of viewing the world. We want to acknowledge that our starting position is a second-order cybernetical (see von Foerster 1984) or a post-modern constructivist (see Mahoney 1988) attitude, *i.e.* a working acceptance that the observer is the constituter of his or her reality - that we are all observers with our own versions of reality - that reality is not something absolute which has been given to us from outside. Our invitation to consider this explanation does imply some acceptance of this role of the observer - otherwise, the story may not make much sense.

We think the way we frame the question is also crucial. We will ask: **what is it that we would need to have observed so that we could agree that understanding had occurred?** From a constructivist viewpoint this is preferable to the alternative approach of reifying the idea of understanding by giving it a definition and then making distinctions which justify that definition. Thus we are regarding understanding as an experience which happens to us rather than an entity which exists separately from us and yet we also say we can observe that it has happened.

Physiology and Behaviour

We could say that we observe two quite different aspects of another human or animal - or, for that matter, ourselves. Firstly we observe (and sometimes measure) its behaviour, *i.e.* its actions in relation to its surrounding world. Secondly we observe (and often measure) its body directly - particularly its body fluids - to determine a host of anatomical or physiological (or sometimes pathological) attributes. This study of body function is broadly known as physiology.

Maturana has alerted us to an important blind spot in the everyday logic of biology, *i.e.* that behaviour and physiology are distinctly different domains which are non-intersecting, therefore incommensurable and not reducible to one another. Therefore, to speak of physiology in terms of behaviour *e.g.* traces of memory in the brain, biochemically-defined anxiety, is illogical unless we can demonstrate the mechanism which connects the two domains - which often we cannot.

In this explanation, we propose to use the word, *languaging*, in the context of our behaviour and the word *emotioning* with regard to our physiological state (also called bodyhood). Behaviour is observed in the relations between the organism and its surrounding medium whereas physiology is the entire system of operations which constitute the organism itself. Behaviour is always relational - it is not simply whatever the bodyhood determines - it is whatever occurs in the organism's connection with the world in which it lives.

Languaging

In observing behaviour, therefore, we see relational phenomena (coordinations) and we will say, with Maturana, that *languaging* is a particular kind of behaviour which is a second-order level of coordination, *i.e.* it is *the coordination of coordinations of behaviour*. Thus it enables us to reflect and report on our experiences and provides the most obvious means for making connections with one another. In developing an explanation about what it is to be human, Maturana has said that we do not just use language, we are immersed in it - our ever-changing present reality consists of how we describe our experiences to ourselves and one another and we are always explaining and reporting our experience. We act according to our current view of the world. Thus the term, *languaging*, does not merely refer to our use of words, or our discourse, it refers to the structured (patterned) flow of our behaviour, *i.e.* the dynamics of the domain of reality in which we see ourselves behaving.

This is quite different from regarding language as a means of communicating or transmitting information using symbols or representations of an independent reality. We are saying that in *languaging* we construct our own reality. Maturana's explanation of biology precludes the possibility that our speaking together could ever be instructive (see later). It also distinguishes human from animal behaviour in that, while some animals may employ coordination of coordinations of behaviour (*i.e. languaging*), we assume that they are not overwhelmingly immersed in this behaviour. They may use it occasionally, whereas we humans have evolved our particular manner of living largely through reliance on *languaging* as our principal relational dynamic (see Maturana and Verden-Zöller 1993).

Experiencing and Explaining

In attempting to explain our experiences - especially the more mysterious ones such as the workings of our "mind" - we have developed the habit of regarding them as entities or properties of entities with an independent existence. Thus

the baffling "mind-body problems" are attempts to relate two entities. But we prefer, with Maturana, to regard awareness or understanding (or mind or consciousness) as purely relational, *i.e.* existing only in the interactions which our bodyhood has with its world. "The mind is not in the head," Maturana has said. An experience which we associate with mental activity certainly requires some operations in our nervous system, but it does not take place in our nervous system - we observe it in our behaviour - even when we feel it in our body.

When we distinguish a particular experience that has happened to us we generally want to explain it - which we do in language. In this process we distinguish our self and we locate this self in our bodyhood, *i.e.* as something which is associated with our body, but different from it. This is the higher-order level of coordination which is characteristic of *linguaging* beings and is generally referred to as self-consciousness.

An explanation consists of the telling - and accepting - of the story of how this experience happened - of the events or processes which, if they occurred in this way, would result in that particular experience. Maturana calls this: proposing a generative mechanism which is accepted as such by an observer (who may also be the explainer, of course). Hence the form of our question: what is it that we would need to have observed so that we could agree that understanding had occurred?

Different fields of scholarship use different criteria for acceptance of an explanation - and as our individual ways of thinking vary, so do our criteria for accepting explanations. An explanation is only valid, therefore, in its particular set of human relations. So we think that truth, like beauty, exists in the beholding. We also think that understanding is experienced in the genuine acceptance of an explanation. An explanation which is totally accepted is like the pacifier which stops a baby crying - it is an unmistakable sense of satisfaction. Explaining is our major tranquilliser in the western world today and we get our "fix" through understanding.

No matter how satisfying the explanation may be, it is not the same as the experience - it cannot substitute for the experience or make it appear or disappear. This is the limitation inherent in our *linguaging*. For one thing it is an aspect of our behaviour which is a relational domain involving, not only our bodyhood, but its surrounding medium as well. Another way of putting it is that we know that the word is not the thing - they are separate phenomenal domains. However, there is a fascination in the western world today with the search for a better explanation - in an attempt to improve the fit between our explanation and what we experience. In explaining our experience we have already said that we locate our selves in our bodyhood, but what precisely is the role of our bodyhood in this process?

We have explanations in biology for the direct connections between our bodies and their immediate environs, *e.g.* through our sense organs and skin and through the food, air and sunlight we take in as nourishment. Our behaviour and *linguaging* obviously does not occur independently of these

physiological phenomena. Our task is to explain how the logically different domains of behaviour and physiology could be operationally connected in the course of our experience of human understanding.

Autopoiesis and Structural Coupling

Around 1970 Maturana started to see the living system as a *closed system* - a closed network of molecular production, but producing itself - for which he coined the term, an *autopoietic system*. He has taken pains to distinguish its *structure*, *i.e.* the component parts and their molecular relations, from its *organisation*, which is the particular emergent property of the living system as a whole which must be maintained for the system to go on living. A continually changing structure is what maintains the system organisation or, rather, what conserves its identity or its relationship, as a whole being, to the medium in which it lives. The domain of operation of its components is its physiology and the domain of operation of the organism as a whole, which involves the medium as well, is its behaviour.

This is a self-regulating system which is closed with regard to its operation, but open in its connection to its world. It is a paradox which invokes the idea of complementarity that the organism exhibits this autonomy in its operation, yet is dependent on its coupling to the environment. A living thing could never be entirely separate from its environment, nor entirely belong to its environment. We find in our explanations of biology that we employ Maturana's "double look" - distinguishing the organism as an entity which is operationally self-contained in order to see more clearly the nature of its connection with the world in which it lives.

It follows that the nervous system is also closed in its operation which invites us to see the process which we call *cognition* in a very different light. Since about 1950 the prevailing view in cognitive science has been that the nervous system picks up information from the environment and processes it and this provides a representation of the outside world in our brain. We can now say instead, to paraphrase Varela, that the nervous system is closed, without inputs or outputs - that its cognitive operation reflects only its own organisation - and that, because of this, we are imposing our *constructed* information (we would also say: our meaning) onto the environment, rather than the other way around.

This implies that our interactions can never be instructive, *i.e.* in the form of external unambiguous signals - they consist of non-specific *triggers* which do not determine the nature of the response. The operation that results from the trigger always depends on the internal coherence or arrangement of the respondent at that time. We find it extraordinarily helpful to see that the nervous system does not operate with representations of the environment - even though it may appear to be doing so in our observations of behaviour. The simple logic - which we find so satisfying - is that all body systems operate strictly according to their own structural dynamics, *i.e.* according to the operational necessities of their stream of structural change. In Maturana's words, they are *structure-determined*.

We therefore seek a different explanation which will tell how behaviour could be linked to physiology without saying that one determines the other - since they are different logical types of operation. As each is structure-determined, we say they interact in a dynamic structural coupling. Both organism and medium have their own structural dynamics and also have this emergent organisational property which is realised through structural change - so their coupling is referred to as structural even though it is observed in the behaviour, *i.e.* in the totality rather than the details. What supports the organism in its world is the coupling of its structure to the circumstances of that world - its flow of structural coupling.

Physiological Coherence

All the operations we could ever hope to observe in physiology are potentially involved in this structural coupling, but at present we cannot explain how this works. The major difficulty is not our incomplete knowledge of the details - it is our inability to express the operational coherence of the total physiological system. For this reason our usual approach in science is to try specific manipulations of components, *e.g.* effects of exogenous biochemicals, rather than to understand its operation as a whole. This can be spectacularly successful, but there are widespread health and happiness problems in which it is not. A promising new avenue in this regard is the network approach to visualising operations of the nervous and immune systems (*e.g.* Varela *et al* 1988; Varela and Couthino 1992).

The workings of our physiological systems appear to the observer as a cloud of correlations. We distinguish the components as biochemical or molecular entities and we measure their amounts and activities, *e.g.* plasma hormone concentrations, receptor numbers, *etc.*, but it is according to their pattern of relations that we form our explanations. We determine a certain coherence (*i.e.* a moving together) which we then interpret in different ways depending on our perspective. We mentioned earlier that this takes place in our *linguaging*, *i.e.* the explanation occurs in our behavioural interaction and its acceptance as an explanation is relationship-specific - confined to a particular conversation.

Here we speak of coherence [2] as a pattern of relations, not simply a cause-effect sequence such as the chain or cascade of events by which our physiological mechanisms are most commonly portrayed. The closer the correlation the stronger the connectivity between any two biochemical entities which we choose to distinguish. We could represent this in terms of the volume of traffic on different parts of a complex highway network - the traffic flow indicating the strength of relations between those particular centres, *i.e.* the connectivity of the system.

When an experimenter manipulates one component of a system and observes a particular effect, there is a tendency to attribute a causal role to that component - ignoring the fact that the whole system has also been changed. To use one of Maturana's examples, we do not confine our explanation of the operation of our wristwatch to saying that one component causes another to move - we say also that the watch goes because of the overall arrangement of

its parts. Experimenting with exogenous agents which promote or block specific pathways can be used to determine the strength of correlations between different components, of course. It depends on how we choose to interpret the data in the behavioural domain which is our *linguaging*.

From this viewpoint we see connectivity everywhere in physiology. The binding of hormones, neuropeptides, *etc.* to their specific receptors is a very well-researched example. What has happened now is that receptors for dozens of different neuropeptides have been found on such a variety of cell types (such as monocytes of the immune system, for example) that it is becoming almost impossible to speak of a specific chain of events in endocrinology or immunophysiology. Pioneers such as Candace Pert (*e.g.* see Dienstfrey 1991) now refer to the organisation, integration and prioritisation of receptor networks and she goes on to say that the mobilising force in this process is the emotional state.

Another example of connectivity (see Newell 1992) is the idea of cell adhesion molecules (CAM's) - proteins found on every cell surface - which have been called the molecular "velcro" of the body. These are believed to be involved in the mysteries of embryonic development - when cells move around for a time and then stay put - in enabling white blood cells to stop circulating and stick to the basement membrane in order to leave the bloodstream to reach injured or infected tissue - and in many other physiological events. CAM's bind less tightly than hormone receptors, but are far more numerous. Promising new avenues in vaccine development and cancer research consist of interfering with the ability of pathogens or certain cells to adhere to cell surfaces. Connectivity is not a new idea in physiology, but its scope seems to be increasing.

SensoryEffector Correlations

A particular type of physiological correlation which could be useful in explaining the connection of bodyhood with behaviour is the sensory-effector correlation. The body surface, which is the interface between organism and environment, can be said to have a dual participation in the outer as well as the inner world. It has long been a feature of physiological explanation that surfaces are distinguished as *sensory* or *effector* according to their function, *i.e.* whether they detect external stimuli or implement some action. This is arbitrary, like all distinctions, and only a part of the story. The "double look" shows that sensing and effecting are one operation in an organisational sense. The simplest explanation of the process which we call cognition is a sequence of sensory-effector correlations at the organism's surface.

The autonomous operation of the nervous system - the changing relations of activity according to its own structural dynamics - at any moment in time, has the potential for a certain configuration of sensory-effector correlations at its surface. The organism's behaviour - its relations with the medium - also consists of potential sensory-effector correlations at the interface. Where these two sets of possibilities meet, we say a structural coupling occurs in that moment. The flow continues according to its own history of recursive

interaction. Each coupling triggers the change which brings about the next possibilities, so the flow of behaviour and the flow of physiology are mutually modulating. The dynamic matching of internal and external sensory-effector correlations constitutes the course or history of structural coupling.

This is by no means a complete or adequate account of the behaviour/physiology interaction. Most of this still remains to be worked out. Our remarks provide a few elements of a particular way of looking at it (based on Maturana's explanations) which we think could be useful in our conversation. As observers we see certain things which we explain in our *linguaging* - which then constitute our reality and also a sufficiently satisfying reality for those who wish to be in conversation with us. The utilitarian value of our particular explanation is the extent to which it provides a satisfying answer to the question: what is it that we would need to have observed so that we could agree that understanding had occurred?

It may look as if the nervous system is making computations to accommodate behaviour to the circumstances - as implied by the idea of "learning" - but we prefer the explanation that it is not part of the operation of the nervous system to have a representational "knowledge" of the medium. Therefore, we say the nervous system does not constitute behaviour, but it shapes the organism's participation with the medium by its pattern of possible sensory-effector correlations. The nervous system can generate adequate sensory-effector correlations as long as its flow remains congruent to that of the medium. We observe that the organism and its circumstances change together as long as they remain coupled. It is a dynamic congruence through recursive interaction along a path which is "laid down in walking." [3]

We see the flow of structural coupling in the image of a tightrope walker maintaining her balance by means of the exquisite structural dynamics of her bodywork intertwining with the precise behavioural dynamics of her footwork on the rope. She and the rope change together as long as their coupling lasts. There are times when the relationship is shaky and times when it is slick and smooth. Similarly the path - or railroad track - which we lay down in living is sometimes narrow and uneven, sometimes broad and straight.

Structural Coupling and Quality of Life

What is the difference between a smooth or bumpy ride through life? We could say it is a quality of structural coupling. Although autopoiesis - maintaining organisation - is an all-or-none phenomenon, we think that the structural coupling could vary in its extent or its strength or in some other characteristic such as its harmonic proportion. We agree with Maturana and Varela that an organism must fit with its world to go on living - it always conserves its adaptation - but its grip on life, or its match with the world, appears to us to wax and wane. Living is achieved somewhere between a perfect match and no match at all - either of which would constitute a loss of biological identity, *i.e.* death. The issue of biological fitness is a relational dynamic which could be seen in terms of structural coupling.

Maturana has argued that a person on a life support system in hospital, for example, is still living in perfect congruence with his medium, but we would say that the quality of his structural coupling is not the same as when he was fully fit. Considering his history of structural coupling, we can see that this situation could have developed through a deterioration in his physiological coherence or through a history of exposure to hospital circumstances - or both - and it is a recognisable trend in his quality of life.

Cyberneticians have pointed out (see von Glasersfeld 1985) that the complementary aspect of autonomy is the necessity, in interaction, to make do with whatever is at hand. It is not necessarily the best fit which occurs in the course of structural coupling - it is whatever connection will work for the time being, *i.e.* whatever will enable the adaptation to be preserved in that moment. It makes one appreciate that the course of one's life is subject to many vagaries in the delicate balance of connection between bodyhood and behaviour.

We have not mentioned intentionality in this explanation. However, the question of free will or determinism will always rear its ugly head some time. We may ask: do we have a choice about our structural coupling or the direction of our life? It seems to us that the idea of choice, like understanding or awareness, arises in the reflection that we make about our experience - it is a commentary on what has happened rather than the happening itself.

The ability for reflection which we have as *linguaging* beings is extraordinarily powerful because, once we have reflected, we are cognitively different - our physiological coherence has changed - and our opportunities for structural coupling (and therefore the direction of our lives) have changed. Our blind spot is that we then say, with the benefit of hindsight to show us that there were alternatives, that we have made a decision to choose a new direction. We do not notice that the choice arose in the reflection, not primarily in the living process - which we would say does not have choice or intention as a primary component of its operation. We are saying that cells, organs or bodies do not choose - they simply live (in the life-stream) - but, as *linguaging* beings, we bring forth a higher-order self-reflection which becomes a crucial element in the quality of our existence.

Behavioural Confidence

The quality of structural coupling can be observed in the behaviour of other animals which use linguaging only occasionally, or not at all, and are therefore not living with continual access to self-reflection - at least, we do not see a need to include that refinement in our explanation of their regular coordinations of behaviour. These studies of animal behaviour can add to our story because the classification and measurement of behaviour can be more simply managed than in studies of human behaviour.

In research with farm animals (see Fell and Shutt 1989 and Fell 1992; 1994a[4]) the idea has been developed of behavioural *confidence* as a measure of the quality of structural coupling over a period of time. If the history of

structural coupling is one of diminishing opportunities in the environment and declining physiological coherence - whichever "leads" they will both occur - then this will be reflected in a diminished behavioural repertoire for the animal. Certain behaviours that would have been expected to occur in that situation will have disappeared and this loss reflects some kind of deterioration in the structural coupling. Intensively housed farm animals provide examples of this. What is often called "learned helplessness" is a chronic loss of confidence.

For each species of animal there is a distinctive ethogram, *i.e.* the quantifiable elements of its behaviour - although some behaviours are also situation-specific. We say that *confidence* is the extent to which an animal uses its behavioural options - the range of behaviours observed in a standard time and situation compared with a standard ethogram for that situation. The measurement of *confidence* can be greatly simplified by using an "arena test" such as Fell has employed for cattle, sheep and laboratory rats. This is a motivational-choice, open-field test in which a mild approach-avoidance conflict is established and the propensity of the animal to engage in the conflict can be precisely measured (see Fell 1992; 1994a).

In this system, experimental perturbations which we would describe as a disruption of physiological coherence, *e.g.* blocking adrenal hormone release, clearly reduced the animals' confidence. Conversely, there appeared to be a positive relation between the animals' resistance to certain infections, *i.e.* immunocompetence, and its behavioural confidence (Gates *et al* 1992). We believe that a functional connection between behavioural confidence and physiological coherence is beginning to be constructed in this research.

This interpretation is consistent with our earlier comments about cognition. In assessing behavioural confidence we are evaluating the animal's cognitive status. We are saying that, like us, the animal acts according to its current view of the world - what it does is what it knows. Animals which lack confidence, or have suffered a reduction in confidence through bad handling, stress or some malaise, are cognitively at a disadvantage and this can be assessed in their behaviour and has implications for their immune status *etc.* - if our present findings are borne out by further research.

So when we see an animal exhibiting its most complete behavioural repertoire we say that its dynamics of structural coupling lack nothing - that it has maximum *confidence* - and that this was made possible by its most perfectly coherent bodyhood. With a less coherent bodyhood the same coupling is not available or not as strong - some behaviours are seen to be absent, *i.e.* the level of *confidence* is said to be reduced. The physiological contribution to structural coupling is like a template of available patterns which do not directly determine behaviour but which have a predisposing influence upon it.

The term *confidence* can also be applied more generally to quality of life - as seen in the behaviour - in explanations of human experience where languaging has become the principal manifestation of behavioural interaction. We speak of confident behaviour when there seem to be many options available - few

barriers or restrictions to behaviour - an openness to accept the life stream as it is. [5] When this happens our behaviour is often said to be related in some way to what we call our emotions, or our emotional state. Being "in a good mood" is the natural accompaniment to confident behaviour.

Emotioning

Maturana coined the term, *emotioning*, to distinguish different bodyhood dynamics by means of observations in the domain of behaviour. He said that *emotioning* was a *bodily predisposition to action* and that certain characteristics of behaviour could be used to distinguish certain emotions. This implies a generative mechanism linking physiology to behaviour such as has been outlined above. We do not regard predisposition as the same as intentionality because the latter implies a prior knowledge of what options were available.

Maturana said that love is the easiest emotion to characterise in humans because it is seen in that class of behaviours which evince a genuine trust and respect for another living thing. In contrast, fear is an emotion which sets an aggressive style of behaviour and also constrains the spectrum of possible behaviours. A fearful animal will show a greatly reduced behavioural repertoire, *i.e.* it has also lost much of its *confidence*. An analogy used by Maturana is that of a motor car whose structure is in reverse gear so that it does not have forward motion in its realm of possible actions.

However, *confidence* is not considered here as an emotion; it is a behavioural attribute. The emotion is also being evaluated behaviourally - as a characteristic behavioural style, not a physiological measure - but by virtue of the mechanism proposed above, we are saying we can also distinguish different styles or classes of bodyhood which are the shaping templates for that brand of behaviour and that it is useful to call these different emotional states. This is a physiological dynamic, however - not a fixed state - so we prefer to use the verb, *emotioning*, to speak about a particular flow or stream - or pattern of changing relations - in the domain of bodyhood.

Therefore *emotioning* is a qualitative, indirect assessment whereas *confidence* is a direct assessment of behaviour which can be quantified if necessary. Different levels of *confidence* can be associated with particular emotions, but this is not our primary consideration because the attributes refer to different logical domains. The construction of an assessment scheme for *emotioning* is important to us because it adds a vital ingredient - bodyhood - to our explanation of understanding.

The assessment of *emotioning* may be indirect and qualitative, but what we are concerned with is how useful it may prove to be. For, in the end, our explanation of understanding is not to be entirely literal - it must be metaphorical as well. If we cannot explain understanding without considering the bodyhood and we cannot reduce behavioural observation directly to a

physiological pattern in any more precise way (for the moment), then we must use what we have at hand to reach some satisfaction in this matter.

In the assessment which we make of *emotioning* from our behavioural observation we rely on our previous experiences (or history of structural coupling) and we say that our intuitive skills come into play. Charles Darwin was one of the keenest observers of detail in all of biology, yet when he came to make explicit descriptions of what he called the "emotions of animals" he relied upon drawings, particularly of their facial expressions (Darwin 1965:1872). Bateson often referred to the qualitative as pattern rather than number (*e.g.* Bateson 1991) and his writing brought a new regard for metaphor into the world of biological explanation.

Kövecses (1990) addressed the question: how do people understand their emotions? He said that "emotion concepts" have a distinctive metaphorical structure in our language and that these metaphors of emotion "yield such an unambiguous understanding that they can be seen to represent a coherent cognitive model." To speak about emotions in the abstract is to lose precision - psychological theories about emotion have little consistency among them - but careful observation of our language shows that metaphor is the vehicle by which we reach agreement about this vital aspect of our bodyhood. [\[6\]](#)

Metaphors of communication, brought to life by Krippendorff (1993) in an earlier issue of this Journal, are seen to be "vastly more powerful" when we wish to use language, not to represent an external reality, but to organise our experience and interact with one another. They are not merely "embellishments in language, they affect the users' perceptions and actions." They convey structural similarities, but also have "entailments" (Lakoff and Johnson 1980) which organise far beyond the initial similarity and, in Kövecses' view, help to organise the emotion concept itself.

Such is the subtlety of our own *emotioning* pattern as observers that we can recognise subtle differences in the *emotioning* of others via the apparently crude medium of behavioural observation - including listening to their *linguaging*. We can do this by employing the poetic precision of such *linguaging* tools as metaphor which complement our literal scientific explanations.

As an illustration of this we give here a Table of various emotions and some possibilities for corresponding styles of behaviour - using the metaphor of a couple engaged in different movements of a dance. This is not meant to be prescriptive. It is not a textbook table, but the personal ability of each of us to discern the subtle patterns of *emotioning* in one another which makes the business of our living together so fascinating to explain, so apparently difficult at times and, at other times, so joyful.

Understanding Realised

Watching a child's face when his mother reveals a lost toy - sharing the "joy of movement" glimpsed in Van Gogh's "Starry Night" or heard in Beethoven's first piano concerto - are memorable experiences. A sigh between two lovers in their parked car - the radio pulsing shared triggers of contemporary music - is another form of mutual knowing. The aha! experience in speaking with a counsellor, watching a film, or solving a mathematical puzzle; all have a quality of satisfaction about them which we call understanding. We often think of more pragmatic examples such as understanding how to get to somewhere on a map, how to make a cherry pie, or what was the reason for a friend being late.

These experiences consist of an intense behavioural interaction which, even without words, occurs as *linguaging*. However, we do not think that the meaning of the words or "body language" has been transferred from one person to the other - although that is a plausible metaphorical explanation which undoubtedly has some utilitarian value. In human communities we have been using that plausible metaphorical explanation to guide many of our activities over the past 40 years, particularly in education and science. It is said that we live in the "information age" and we come together ostensibly to exchange information rather than to interact. In doing this we have come to value our rationality far above our emotionality since one can "process bits of information" whereas the other cannot.

Our re-framing of the basic biology means that we do not regard cognition as an information-processing operation, but as a constitutive mechanism of living things. We have attempted to bring forth our explanation more directly out of our biological operation, *i.e.* dealing with our experience as living beings, rather than with "information" in the artificial domain of computer processing. This enables us to accommodate both *emotioning* and *linguaging* in our explanation of understanding. The supposed meaning - sometimes called the information content - of the words we use is only a part of the story.

From the biology of Maturana and Varela we can say - as Mingers (1991) has done - that language is essentially connotative rather than denotative. Especially in science, we generally act as if the words denoted an external reality which existed independently of us - it is convenient and often profitable to do so. But this expedient turning-a-blind-eye to the connotative nature of our language also obscures the explanation of our more fundamental experiences such as understanding.

The fact that we often reach agreement about the meaning of a word or scientific concept is a testament to our ability to reach agreement, not a proof that such an entity exists in reality. We would say that the meaning of something is not in the words - nor in what they describe - it exists in us, as we relate to that something. So it is context-dependent - meaning different things at different times, even for the same person.

From this it follows that meaning is not transferable - it is formed individually in the course of conversation. This has become a useful guiding statement in our work. Of course, we cannot be responsible for the meaning which you

form regarding our explanation, but we must take full responsibility for the impeccability (to us) of the words we use.

We are saying that a phenomenon or an experience such as understanding (or stress or disease) cannot be validated independently of us as observers. What we can do, if we wish, is try to reach agreement as observers about what we will choose to call understanding (or stress or disease). We are speaking of a knowledge which arises in our conversation - in our living together - not directly through the properties of something independent of us.

In this way our culture arises through networks of conversation leading to widespread agreement about many concepts and values and a comfortable ability to live together in mutual understanding. We observe this in our *linguaging* - which we now say is inextricably related to our bodyhood. Maturana refers to this relationship as braiding - a metaphor of delicate and loving human work, *e.g.* taking strands of hair from either side of the head so that they hold together - the course or trajectory of the length of braided hair arising from both sides.

If we say that the flows of *linguaging* and *emotioning* are braided, it follows that, without emotional matching, a semantic connection or congruence could not occur. The meaning which is formed will only match when the emotion matches. Only when we dance in the flow of emotioning of another can we experience understanding. Then we are moving in the same stream - cognitively flowing together. The roots of "conversation", *con versare*, mean "turn together" - suggesting dancing. Other metaphors from physics such as "being on the same wavelength" or "getting up to speed" also reflect this idea.

What we might have observed in order to agree that understanding had occurred is a harmony of emotions, best expressed as metaphor, underpinning an *linguaging* experience which is satisfying.

Understanding in Daily Life

We are talking here about something which is very commonplace, of course. Everything we do in our relationships at work and play - in our families, clubs, institutions - consists of a structural coupling which can be construed in our reflection as consisting of a certain level of understanding. Even a so-called solitary existence is said to involve a certain understanding of the world in which one lives.

Conversations in the conventional cognitive sciences have produced many ideas about mental gymnastics and special "powers" of the mind. But we would say, of course, that cognition does not even require a nervous system - it occurs in the simplest of living things - although the nervous system does add great plasticity to its operation. We say that cognition is biologically constitutive - it is the way an organism defines itself, in relation to its world - the way it forms its own meaning by operating in the world. This is not something given; it is something which is made. The word "information"

derives from *in formare* meaning "formed within." As Varela has so clearly stated, what we know as our world and what we know as ourselves are part of the same process - they are inseparable.

Even though we have acknowledged an experience which we call self-consciousness, arising out of our ability for reflection, we regard the operation of cognition as entirely unconscious. "Knowing is in the doing," Maturana has said - knowledge is defined by the observer in terms of the adequacy of the behaviour/language which he or she observes. It is not considered to be part of the fundamental operation of knowing to know that we know about something - that occurs in a higher order of reflection. The confident cattle and sheep mentioned earlier, presumably, do not know that they know, but we say that what they do is what they know.

In human coexistence, the quality of an action is normally recognised in terms of its emotional context, *e.g.* a churlish, but obedient child who "sits up straight" does so quite differently from an excited, eager child awaiting some reward. This is an evaluation of the person's emotioning which we carry out intuitively in the course of our understanding - which, ironically, we are now attempting to explain so rationally! [7]

In a biological context we could say (again with Maturana) that we are rational/emotive animals, but it is not our rationality which distinguishes us from other animals - it is the way our rationality and emotions braid together. We are animals that naturally use reason to justify our emotions. The prevailing culture today - in science especially - is to deny our bodyhood and to denigrate emotionality, particularly when stacked against the supposed ideal of a precise and accurate understanding. This has many consequences in the relationships which make up daily life.

When we start to tell one another about our *emotioning* another difficulty arises. What we describe as our feelings does not necessarily correspond with our *emotioning* because it is a reflection that we make - a commentary about our experience - which is shaped in our *language* like any other explanation. A wife may laugh to hear her husband saying "I feel fine" in a loud and angry voice - a girl may say "it meant nothing" with tears in her eyes - many incongruities may arise in our feelings. The term *emotioning* - although not precisely measurable - refers precisely to the structural dynamics of the body as they are involved in the operation of living.

The reputed unreliability of feelings, combined with a craving for immediate technological remedies to treat uncomfortable feelings, have contributed to a profound devaluation of the lived experience. Yet the extraordinary clarity and precision by which poetic images enable us to recognise the subtle nuances of emotion in one another suggest that it is only in our lived experience - not in our theories - that we can know the satisfaction which we call genuine understanding.

Because our interaction is a mutually triggering experience, not an information transfer, the songs we sing together are as important to our understanding as

the discourse which we have. Pictures can connect us powerfully, providing personal meaning via sharp, shared, triggers in our rational/emotive dance. What would become of human understanding if it were not for the theatre, art and music which we create and enjoy together?

What we have tried to do here is to improve the fit between our explanation and our lived experience. Our measure of this can only be our personal satisfaction which manifests itself in increased confidence in what we do.

Some Further Illustrations

It seems that an educator's work is not likely to be successful unless the student is emotionally inclined towards the educational task - or has an appropriate bodily predisposition. To want to listen is the main prerequisite for any form of education. The educator who tries to conceal his own emotions to provide the most rational explanation of his topic may be sacrificing opportunities for understanding to occur. The ability of a schoolteacher to establish an emotional rapport, or mutual respect, with her pupils may explain much of the variation in classroom performance.

There is concern that what is known as "technology transfer" is relatively ineffective in the business of research and development. The metaphor of direct information transfer does not seem to match the lived experience. Fell and Russell (1991) and Russell and Ison (1993) discussed the idea of "second-order research and development" which is based on the conversation among the clients, their families and the researchers.

The way that Maturana speaks of science, not as a means of discovering an objective reality which is independent of us, but as a way of operating in the world, enables us to acknowledge that scientific data is valuable because it helps to shape the meaning which we form in the course of our conversation, but it does not determine that meaning. Thus scientists need not be - nor do they function as - final arbiters on any community issue, but their contribution is important, nevertheless.

This brings ethics and a sense of personal responsibility to science. The wry quote attributed to von Foerster (Glaserfeld 1985) sums it up: ". . . invoking objectivity is abrogating responsibility; hence its popularity!" We have great opportunities in science if we are not talking 'facts', but offering scientific interpretation - claiming only to be custodians of valued scientific data which can make a helpful contribution to the networks of conversation which make up our human culture and, ultimately, to our continued existence.

Management consultants advocate strategic planning, setting priorities and goals and performance assessment as tools to improve project outcomes. At a planning meeting, everyone "agrees to the plan", but how often is this a shallow and unsustainable arrangement? Winograd and Flores (1987) speak of understanding as pattern recognition, conversation as the vehicle for genuine commitment, and "enthusiasm for action" as the crucial element in corporate success.

It seems that a confident person can listen more closely and notice more details of the interaction than one who is lacking in confidence. It is easier to understand a confident person - to move together coherently - just as it is easier to dance with a natural, confident dancer. In public speaking, it often seems that the way we speak is more important than the content. This is acknowledging the interaction itself. Interacting leads to more interacting - there is a flow.

The enterprise which is known as Neuro-Linguistic Programming has developed the art of behavioural observation to a high degree. Eye movements, muscle tone, skin colour and facial expression provide immediate triggers for connection in the present moment which can be used to exploit the interaction itself.

Good salespeople know about matching emotional shapes. In real estate, the salesman need not be factual about every detail of the house, but must know with whom it will fit - who will have an 'understanding' with the house and want to buy it. Experience at observing human behaviour - noticing the emotional reactions of a client during the inspection of a house - seems to be the most appropriate history of structural coupling (training).

If we say that animals have emotions, but not feelings - because they do not live immersed in *linguaging* - we can speak unequivocally about the understanding between people and animals. To dance in the flow of *emotioning* of another does not require particular thinking skills. Dogs are said to have the same social prejudices as their masters - they bark at the same people (Maturana said)! They come to match the *emotioning* of their owner in the same way that a child learns from its mother whose company is acceptable and whose is not.

Many people choose to keep companion animals and say that their company prevents loneliness, provides purpose in their lives and satisfies their need for a relationship. There are therapeutic programs based on this. In the outback of Australia, there is a sport called camp drafting in which a rider and horse must guide a wild bullock through a specified course. To watch a good performance of this is to marvel at the understanding between different species - understanding of the bullock by the horse, of the horse by the bullock, and understanding of the rider by them both.

Much could be said about the possibilities for healing experiences arising from the feeling that one is understood - or possibly from the effect of this on one's confidence. However, there are also many potential pitfalls in this kind of extrapolation. Andrea Maloney-Schara [8] has pointed out to us that to say that understanding is the crucial factor in psychiatry, counselling, business, or even love relationships is to make many assumptions. A host of factors go into a healthy relationship which may allow an individual to cure self. An individual may experience reduced anxiety in a healthy relationship, but there may be little or no understanding. It appears that people can tolerate not being understood, at least for some amount of time. Maloney-Schara also says that

understanding can be a "big pretend", especially in the initial stages of love, therapy, *etc.*

The use of the term 'understanding' can be misleading because we can so easily succumb to the temptation of attributing to it a rather magical quality. Perhaps this is inevitably so, given our history of the everyday usage of the word, unless it is redefined in the light of Maturana's work. Understanding must always be an after-the-event explanation as it is only ever a reflection on an earlier experience. If there is a desire (which is an emotional experience as it is a predisposition to act) to continue the interaction - then one can conclude that there has been some understanding.

Of course this begs the question - "What can be done to create an environment that encourages or facilitates the occurrence of this experience we are calling understanding?" What we can do, to the best of our ability (itself a comment on the particular history of structural coupling), is put into place the practice of *mutual acceptance* - which is not the same as saying that we seek agreement.

Mutual acceptance is the behavioural expression of the inner reflection: "Your reality is just as valid (truthful/real) for you as my reality is for me." In every practical sense the two realities are equally valid, though often differing greatly one from the other, so it is misleading to say there is an agreed or shared meaning. What needs to be stressed, repeatedly, in this context, is that our use of the term understanding - by which we imply the mutual acceptance of different realities - does not imply that these differing realities are then judged to be equally useful given any one particular set of circumstances.

As an example: if an individual behaves *as if* she was fully accepting of the validity of an experience for an acquaintance, but in her heart acknowledged that "it's wrong for you" or "it's sick behaviour" or "it's out of touch with reality", then any notion of this being the acting out of an illusion is meaningless. An outsider (the one reflecting on her experience) must always be responsible for any judgment made.

Understanding is in the eye of the beholder. It is totally a comment on the observer making the judgment and can never represent a snapshot of, or insight into, and objective reality. Understanding, as we are using the term, is a name for the mutually shared desire to do more-of-the-same.

On reflection, one can say that understanding in the initial stages of love or therapy, is a 'big pretend'. However, such a statement seems to us to reflect the common belief that understanding is the vehicle for general consensus-making - that the more we share common understanding, the more we will be able to do things together in a satisfying way - and we will increasingly agree on the facts of the matter. Our day-to-day experience suggests that this is just not so. This view does not acknowledge that every individual can only ever live in, and relate to, the world that he or she has created.

A relationship might be characterised (again by an observer) as being cold, distant, not supportive of individual autonomy, even psychotic, but the lived

experience for the individuals involved (due to the experience of mutual acceptance) might be characterised as being satisfying and mutually sustainable.

On the other hand, the judgment of one's daily experience as a lack of understanding can be devastating leading to breakdown and suicide. The widespread problem of alcohol and drug abuse is characterised by reported feelings of alienation and mystification about the nature of the addictive process. Stories of recovery in Alcoholics Anonymous meetings provide striking illustrations of an unlikely degree of emotional understanding across cultural, intellectual and socioeconomic boundaries. At these meetings, it is not so much the telling of the stories that is therapeutic as the climate which has been consciously created to foster understanding - "No matter what your story is, it is your story, your truth - and we value it!"

It could be that the confidence which people show as human beings is being sapped by too much reliance on the rational element in understanding and a denial of the emotional basis which pervades all human interaction.

The quest for a more satisfying explanation of understanding is our particular addiction. If an explanation "works", *i.e.* some understanding arises in the biological interaction, it brings some satisfaction - and an appetite for more! Perhaps this process contributes to the building of our confidence which, in turn, could point towards that ethical imperative which von Foerster repeated for us recently (von Foerster 1992): "act so as to increase the number of choices."

Notes

1. As well as the References cited, we are drawing on various unpublished manuscripts provided by Maturana and also notes taken from several comprehensive workshops he has given in Australia. It will be apparent that our use of language throughout this paper owes much to Maturana.

2. Recent explanations in physics - a different explanatory domain - distinguish coherence (in condensed and living matter) from incoherence in the following way: "In the dominant paradigm of the 'incoherent regime', whose features guide the intuition of most researchers in condensed matter science including chemistry and biology, particles are localised separable and countable, 'know' each other through collisions and external forces and require an external agent to become ordered. In the 'coherent regime' particles lose their individual identity, cannot be separated, move together as if performing a choral ballet and are kept in phase by an electromagnetic field which arises from the same ballet." (Del Giudice 1993).

3. This phrase from a poem by Antonio Machado (in *Proverbios y Cantares*, 1930) has been used in this context by Francisco Varela.

4. This paper was presented to the Australasian Society for the Study of Animal Behaviour and is in preparation for *Animal Behaviour*.

5. In a related paper (Fell 1994b - submitted to *Perspectives in Biology and Medicine*) there is an explanation of the experience which is known as **stress** - expressed as a loss of confidence, *i.e.* apparently having fewer behavioural options. The physiological coherence involved in **stress** is also discussed. This may be compared with Bateson's definition of **stress**: "a lack of entropy . . . the organism lacks and needs flexibility, having used up its available uncommitted alternatives." (Bateson 1980).

6. (Kövecses 1990) "Emotions are not really *entities* in the same way as a rock is; they are not really *forces* in the same way as the wind is; they cannot really *make* us do things in the same way as a superior can; they do not really involve a *desire* in the same way as an animal can have an appetite; and we cannot really *lose control* over them in the same way as we can lose control over our body when we slip and fall. But this is all possible in the metaphorically created world of human emotions." (p. 204) . . . "A chief advantage of this view is that a better fit can be ensured between the way we conceptualise emotions, on the one hand, and what we experience when in some emotional state, on the other." (p. 214).

7. We do not regard this written explanation as adequate by itself; therefore, our workshops include songs, stories and pictures which trigger in other ways.

8. Andrea Maloney-Schara, from the Georgetown Family Centre, Arlington, Virginia, USA, is a Consulting Editor for *Cybernetics and Human Knowing* who acted as one of the referees for an earlier version of this manuscript.

References

Bateson, Gregory (1991) **A Sacred Unity: Further Steps to an Ecology of Mind**. Edited by Rodney E. Donaldson. HarperCollins, New York.

Bateson, Gregory (1980) **Mind and Nature: A Necessary Unity**. Bantam Books, New York.

Darwin, Charles (1965) **The Expression of Emotions in Man and Animals**. University of Chicago Press, Chicago. (originally published, 1872).

Del Giudice, Emilio (1993) Coherence in condensed and living matter. **Frontier Perspectives** 3: 16-20.

Dienstfrey, Harris (1991) **Where the Mind Meets the Body**. Harper Collins, New York. pp. 91-108.

Fell, Lloyd and Donald Shutt (1989) Behavioural and hormonal responses to acute surgical stress in sheep. **Applied Animal Behaviour Science**, 22: 283-294.

- Fell, Lloyd (1992) Does it matter what sheep think? **Rural Science Annual 1992**. University of New England, Armidale. pp. 45-47.
- Fell, Lloyd and David Russell (1991) The practice of science: the research-development relationship with particular reference to agriculture. Proceedings of the Gadamer Action and Reason Conference, University of Sydney, pp. 25-30.
- Foerster, Heinz von (1984), **Observing Systems**, 2nd edition, Intersystems Publications, Salinas, Cal., (first edition 1972).
- Foerster, Heinz von (1992), Ethics and second-order cybernetics. **Cybernetics & Human Knowing** 1: 9-19.
- Gates, Richard, Lloyd Fell, Justin Lynch, David Adams, Jane Barnett, Geoff Hinch, Robert Munro and Ian Davies (1992) The link between behaviour and immunity in sheep. In **Behaviour and Immunity**. Ed. Alan J. Husband. CRC Press, Boca Raton. pp. 23-41.
- Glaserfeld, Ernst von (1985), Declaration of the American Society of Cybernetics. American Society of Cybernetics Newsletter No. 24, pp. 1-4.
- Kövecses, Zoltán (1990) **Emotion Concepts**. Springer-Verlag, New York.
- Lakoff, George and Mark Johnson (1980) **Metaphors We Live By**. University of Shicago Press, Chicago.
- Krippendorff, Klaus (1993) Major metaphors of communication and some constructivist reflections on their use. **Cybernetics & Human Knowing** 2: 3-25.
- Mahoney, Michael (1988) Constructive metatheory: 1. Basic features and historical foundations. **International Journal of Personal Construct Psychology** 1: 1-35.
- Maturana, Humberto and Francisco Varela (1987) **The Tree of Knowledge - The Biological Roots of Human Understanding**. New Science Library, Shambala Publications, Boston.
- Maturana, Humberto (1988) Reality: The search for objectivity or the quest for a compelling argument. **Irish Journal of Psychology** 9: 25-82.
- Maturana, Humberto and Gerda Verden-Zöllner (1993) **Liebe and Spiel: Die vergessene Grundlage des Menschlichkeit**. Carl Auer Verlag, Berlin.
- Mingers, John (1991) The cognitive theories of Maturana and Varela. **Systems Practice** 4: 319-338.
- Newell, John (1992) A sticky end for disease. **New Scientist**. 5 December. pp. 29-31.

Russell, David and Ray Ison (1993) The research-development relationship in rangelands: an opportunity for contextual science. Proceedings 4th International Rangelands Congress, Montpellier, 1991, Vol. 3, pp. 1047-1054.

Varela, Francisco (1979) **Principles of Biological Autonomy**. North Holland, New York.

Varela, Francisco, Antonio Couthino, Bruno Dupire and Nelson Vaz (1988) Cognitive networks: Immune, neural and otherwise. In **Theoretical Immunology, Part 2**. Ed. A.S. Perelson. Addison-Wesley Publishing Co., New York. pp. 359-375.

Varela, Francisco and Couthino, Antonio (1991) Second generation immune networks. **Immunology Today** 12: 159-166.

Winograd Terry and Flores Fernando (1987) **Understanding Computers and Cognition - A New Foundation for Design**. Addison-Wesley Publishing Co., New York.