

B

Cognition

The authors in this section show that if organizations wish to capitalize on creativity, innovation and knowledge they are well advised to allow space for implicit, analogical and other non-formal ways of thinking. Claxton outlines the importance of intuitive expertise and implicit learning. Nonaka and Takeuchi illustrate how Japanese firms make use of metaphor and hands on experience to assist knowledge creation. Sparrow outlines the role of emotion and imagery in creative cognition.

Guy Claxton, a cognitive psychologist and educator, outlines the reasons why creativity and innovation may benefit from a receptive form of thinking that allows intuitive knowledge to be heard. Studies of what managers actually do by Mintzberg and others have shown that managers, like the rest of the population, rely heavily on hunches and intuitive thinking to understand situations, make decisions and guide action, but they normally feel obliged to justify their thinking explicitly. Cognitive psychologists have found that intuitive thinking can be especially critical in complex and uncertain situations and that the ability to explain one's actions follows long behind intuitive wisdom. This chapter seeks to illustrate why we need to find a place for intuitive expertise and non-reflective judgement, and how creative thinking draws on tacit thought processes.

Ijuro Nonaka and Hirotaka Takeuchi are Japanese Professors who have studied knowledge creation in innovative Japanese companies. This chapter presents a cogent account of the deficiency of Western conceptualizations of innovation and knowledge, locating the information processing bias found in the West firmly within its longstanding tradition of rational and dualistic thinking. The emphasis on explicit

Cognition

doing in the West contrasts with the East, where tacit knowledge has long been recognized as an important counterpart to rational ways of knowing. Perhaps partly because of their pictographic language, the Japanese have a less atomistic and dualistic way of thinking than in the West, so the split between subject and object is less cavernous, and the concept of knowledge is less separated from its development. Nonaka charges that Westerners tend to ignore the process of knowledge creation, emphasizing explicit thought processes at the expense of implicit ways of knowing, which are especially important in the early phase of problem formulation. Nonaka goes on to show how organizations in Japan make space for implicit ways of knowing during organizational innovation processes.

Sparrow's chapter focuses on emotion. In a number of settings positive mood has been found to be associated with greater openness and a greater capacity for divergent thinking, whereas fear is known to restrict the range of options explored. Sparrow highlights the interdependence of emotion, imagery and cognition and illustrates their relationship to creative work. He points out that emotion tends to be marginalised in many work environments and argues for greater acknowledgement of both emotion and imaginistic thinking at work.

4

Beyond Cleverness: How to be smart without thinking

Guy Claxton

It is a profoundly erroneous truism, repeated by all eminent people when they are making speeches, that we should cultivate the habit of thinking of what we are doing. The precise opposite is the case ... Operations of thought are like cavalry charges in battle – they are strictly limited in number, they require fresh horses, and they must only be made at decisive moments.

AN Whitehead

There is a stupid rumour going round that intelligence is essentially rational, and that hard problems are invariably best tackled as explicitly, clearly, logically and articulately as possible. It's not true. As Whitehead says, logical clarity is *one* form of intelligence, but to assume that it is always the best, and the more of it the better, is as daft as to say that running is always the best way of getting around, or a screwdriver is always the best tool. The rumour is stupid because it makes you less intelligent, mistaking one useful faculty of mind for the whole repertoire of useful mind states and modes. People who are good at being articulate and analytical, but who confuse this with being all-round intelligent are, we might say, 'clever' – but clever is not the same as smart.

This error is widely perpetrated in education, in law, increasingly in medicine, and, unfortunately, in business. Clever people are good on paper. They can mount plausible arguments, fast. They can spot the flaws in other people's ideas, and score points by being quick to do so. They have good memories and can spout facts and statistics to support their case. They often have impressive qualifications, because first class degrees from Oxford and Harvard MBAs are designed to select and train those who are fast and clear and fluent. But such qualities, when overused or misapplied, can lead to quite unintelligent behaviour. (The stupid cleverness of lawyers is legendary.) As Robert Bernstein said, when he was CEO of publishing giant Random House, 'That's what frightens me about business schools. They train their students to sound wonderful. But it's necessary to find out if there's any *judgment* behind their language' (Rowan, 1986).

Over the last two decades, cognitive scientists have revealed a variety of ways in which 'clever' turns out not to be so smart; and conversely, some of the kinds of smart that do not involve mere cleverness. This science-based, more balanced view of intelligence is beginning to seep into the professions, and into areas such as management education. Managers, for example, are waking up to the fact that some ways of being smart are not clear, not articulate, not quick, not analytical – sometimes not even conscious.

But the stranglehold of the old lop-sided model of cleverness is proving hard to break. The distrust of non-clever forms of intelligence reflects 300 years of European cultural history. The Cartesian slogan 'Cogito ergo sum' encapsulated the successful attempt to reduce the human mind only to its most conscious and rational regions, and to persuade people that their very identity resided in the exercise of this explicit, articulate, analytical form of intelligence. The Enlightenment of the eighteenth century picked out just this single way of knowing and, in raising it to a high art, implicitly ignored or disabled any others: those that were not so clinical and cognitive, and were instead more bodily, sensory, affective, mythic or aesthetic.

In some ways, this distrust is justified. On one hand, rather grandiose claims have been made for 'intuition' that are simply not defensible. Descartes thought intuition gave direct access to the Mind of God, but it doesn't for most of us. And some people have claimed infallible status for their 'gut feelings', where the rest of us can remember only too well the times our intuition let us down – about stock market movements, horse races or people to be trusted or loved. On the other hand, recent forms of lip-service to the non-rational – 'right-brain thinking', 'brainstorming', 'emotional intelligence' and so on – have often been founded more in consultant's hype than in scientific research. Too often they have presented simplistic nostrums as if they were, indeed, God's Truth – leaving a justifiable residue of scepticism, rather than an expanded sense of possibility.

But cynicism can be as self-defeating as credulity, if it leads people to treat all 'knowledge' or 'opinion' that comes without a rational pedigree as if it had no claim on our time or our respect. It is not smart to treat action that is not planned or pre-meditated, answers that come without reasons, understandings that cannot instantly be clearly and quickly put into words, as inevitably second-rate. It is stupid to treat all forms of learning that do not involve articulation, and all ways of judging that have no explicit criteria, as lazy and inadequate. Where professional cultures become obsessed with planning, deliberation, calculation, measurement, justification and accountability, they are being less smart than they could be.

In this chapter, I want to review some of the research that is helping to rehabilitate a smarter view of what it means to be truly smart. Cognitive science is reminding us of aspects of intelligence that do not involve clear thinking; and of the occasions on which the attempt to maintain or impose such thinking is counter-productive. For example, I shall illustrate the importance of *intuitive expertise*; of *learning without thinking*; of *non-reflective judgement*; of *perceptual sensitivity to clues* and patterns; and of *receptive creativity* and problem-solving. From a consideration of these will emerge some basic principles about what makes for smart, as opposed to stupid, mind-sets, and also about the kinds of organizational cultures that encourage either genuinely smart or stupid-clever forms of thinking.

Intuitive expertise

The first of the unclever ways of being smart involves allowing the unfolding of smooth mastery of complex but familiar domains, such as a family, a sports team or a company. Such performance is usually at its best when it is unpremeditated and unself-conscious. As Mihaly Csikszentmihalyi has captured with his research on 'flow', we are often at our smartest and most fluid when we are so immersed in a situation that we are doing completely without thinking (Csikszentmihalyi, 1990). The expert manager may go through a whole meeting, adjusting intentions and moderating time as he/she goes, without being conscious of much reasoning, and without being able to say why or how he/she made the 'decisions' they did, or to what clues he/she was responding. Indeed it is well-known that becoming too aware of and reflective about one's action, in the heat of the moment, may result in a loss of fluency and even, in extremes of self-consciousness, in paralysis. Thinking about what you are doing, or consciously monitoring what you are doing, as you are doing it, can be deleterious, as the eminent philosopher A.N. Whitehead notes in the quotation at the beginning of this chapter. Intuitive virtuosity unrolls, for the most part, without the help (or the hindrance) of deliberation. Occasionally the expert in mid-performance may 'stop to think', but the moments at which these 'cavalry charges' are made must be well-timed, and not prolonged (Dreyfus and Dreyfus, 1986).

In the context of unfolding expertise, the role of conscious thinking is best conceived as the voice of an 'internalized coach'. A good coach lodges in learners' minds bits of advice about what to do, or what to attend to, at critical moments. Such bits of advice are designed to interrupt an unfolding habit and remind us of an alternative way of proceeding, or an alternative source of feedback to attend to, that is not yet automated in our system. When the coach is present, they can spot the 'psychological moment' at which to do this bit of astute reminding. Being sparing and appropriate with advice is a crucial part of the coaches' skill. Talking to ourselves and 'thinking about what we are doing' ought to have the same function. It should remind us, in the midst of action, of alternatives that we might benefit from. From this point of view, talking to ourselves too much, or doing so at inappropriate or unnecessary moments, or doing so in a critical and undermining way, rather than supportively and instructively, can all be as counterproductive as they would be if there were a bad coach in front of us. Thinking about what you are doing is not a 'good thing' in its own right; and it is certainly not the case that 'the more of it the better'.

Learning without thinking

The substantial gap between what a skilled manager can do, and what they can tell you about what they are doing, means, therefore, that learning, as well as fluent performance itself, may need to proceed intuitively. As Michael Polanyi (1958) perceptively commented nearly 40 years ago:

Maxims are rules, the correct application of which is part of the art which they govern ... Maxims cannot be understood, still less applied, by anyone not already possessing a good practical knowledge of the art. They derive their interest from our appreciation of the art and cannot themselves either replace or establish that appreciation ... [And therefore] an art which [necessarily] cannot be specified in detail, cannot be transmitted by prescription, since no prescription for it exists.

It is not just that the expert has not yet got round to articulating his/her expertise, but could do so, given the time and the inclination. Polanyi's point is that virtuosity cannot, *in principle*, be fully explicated, for it embodies observations, distinctions and nuances that are too fine-grain to be caught accurately in a web of words. And this means that, while some bits of judicious thinking may *guide* the process of learning, they cannot, by themselves, establish the nuanced expertise of the virtuoso professional or performer. For that, experience is needed – and much of this experiential learning happens best without the intervention of conscious thought or regulation.

Many psychological studies of so-called 'implicit learning', in which a person tries to gain mastery of a complex domain via an extended process of trial and error, have revealed four important findings. First, what such learning needs is an attitude of open-minded attention rather than of earnest 'problem-solving'. If you are trying to guess what is going to happen next, test out a pre-determined idea, or apply what you can remember of what you learned in a seminar, all that cognitive activity – those forms of cleverness – may well blind you to what is actually going on. You are so busy trying to impose a theory on the situation that you fail to pick up the subtle – and probably unexpected – contingencies that are actually there. You learn faster and better if you can turn off your thinking. For example, Coulson (1996), in some preliminary studies, has shown that the ability to soak up the details of a complex situation through implicit learning is facilitated by a state of confusion. If people have given up the attempt to try to figure out what is going on, and simply interact with the situation in a 'mindless' but observant manner, they come to master it, at an intuitive level – they do the right thing without knowing why – faster than those who keep struggling for conscious comprehension.

Second, this kind of 'learning by osmosis' can detect and make use of subtleties that are too fine for conscious thinking to detect at all. Lewicki et al. (1992) have found that such implicit learning can pick out and make use of patterns of information in a complex situation (such as a work team) that are too subtle to be captured in a conscious, articulate account. They showed that people can make non-conscious use of information that they are totally unable to describe, despite being well-motivated to articulate the very patterns they had been using.

Third, when people are learning to manage a complex environment, their intuitive grasp – their 'know how' – develops much faster than their ability to describe what they are doing. Expertise precedes explanation. However, during the pre-articulate phase, people often dramatically under-estimate their own level of performance. They make perfectly good decisions and actions on the basis of hunches, yet may believe that they

are merely guessing (Berry and Dienes, 1993). Their 'feelings' are reliable, yet their confidence in those feelings is weak. Clearly, the rationalist idea that 'if you can't explain it, you can't have learned it ("properly")' is at work here. Having been led, by their education as much as anything, to equate 'learning with understanding', they distrust their own demonstrably effective but unarticulated competence. That is not smart.

Fourth, when people's learning does not incorporate the intuitive stage, their conscious knowledge seems unable to guide their actions. Patients with damage to certain parts of the frontal lobes of the brain are as good as normal people at eventually being able to explain what is going on in such complex environments. They have lost none of their ability to construct accurate accounts on the basis of their experience. However this knowledge turns out to be of no real use, for their practical expertise never improves. And their 'learning' is not accompanied by any intuitive promptings, as it is for normal people. It is as if our hunches and feelings, far from being primitive or irrational, are a vital part of our learning and knowing. Anthony Damasio (1994), who conducted these studies of brain damaged patients, concludes that 'intuition' is actually the glue that holds intelligent action and conscious understanding together. Without it they become disconnected, and the level of 'articulate incompetence' becomes dangerous (Bechara et al., 1997).

The manager's job is to do or say the right thing: the thing that moves things forward and helps to get the job done well. Continually anticipating the need to justify their interventions often, as we well know, makes people 'play safe' and 'cover their backs', and such priorities can interfere with getting the job done. Management education's job is to help people get to the point where they do and say the right things most of the time, in ever more uncertain and complex situations. Being articulate about what they are doing is only of relevance to the extent that it leads to this end, and is a hindrance when it distracts from it, or *assumes* that 'comprehension leads to competence' without checking. It often doesn't.

Non-reflective judgement

When making a decision of minor importance, I have always found it advantageous to consider all the pros and cons. In vital matters however... the decision should come from the unconscious, from somewhere within ourselves.

Sigmund Freud

I have already alluded to the fact that expert judgement in many professions is often wholly or largely intuitive. The art connoisseur has a 'feeling' that the putative Giotto is 'school of', and not by the master himself. The doctor has a hunch that this combination of symptoms is not as straightforward as it looks – though could not say why. The experienced manager 'just knows' that the morale in the sales division is poor, though everyone is putting on a brave face. In a whole variety of spheres, what the medical profession refers to as 'clinical judgement' is ubiquitous and indispensable, and seems to accrue gradually as a result of extensive experience, and not through erudition. Although

the current emphasis on measurable accountability is rightly intended to safeguard against the bias and injustice that is the shadow of unbridled subjectivity, the issue is again not black and white. There are costs in swinging too far in the direction of 'objectivity', not least the undermining of people's confidence in their own judgement, and a reluctance to use intuitive judgement when it is necessary and appropriate.

The value of intuitive judgement has again been demonstrated recently in the laboratory. Timothy Wilson and Jonathan Schooler (1991) asked students to taste and rate a number of different makes of strawberry jam. The jams had recently been the subject of a 'Which?'-type consumer report, and those given to the students had been ranked 1st, 11th, 32nd and 44th by the 'experts'. Some of the students were told that they would be asked to explain the reasons for their preferences, and to think hard about their judgements. The others were free to choose more intuitively. The results showed that those students who had been left to their own devices, and who evaluated the jams intuitively, showed a much higher agreement with the experts' choices, while those who had tried to produce explicit justifications made judgements that were more idiosyncratic. What this did *not* reflect, it turned out, was the students tuning in more carefully to their own personal tastes. In a follow-up study, Schooler tested to see whether, despite their divergence from 'received wisdom' the students remained happy with their decisions over a period of time. Far from becoming more content with their choices, those students who had thought most carefully declared themselves **less** satisfied. It turns out that, in cases where much of the 'data' on which a decision is based is sensory, subtle or holistic, the effort to force the judging process into a form that demands explicit, articulate reasoning is counter-productive.

Ap Dijksterhuis of the University of Amsterdam has shown that explicit, methodical thinking breaks down as the number of variables to be considered increases beyond a certain point (Dijksterhuis, 2003). In an elegant series of studies, he faced people with choices that depended on up to a dozen different variables – as, for example, is involved in the task of choosing between applicants for a job. People who were encouraged to think most carefully made worse choices, and they did so because of the limitations of conscious thinking. We can only bear in mind – i.e. think consciously about – a handful of factors at once. As the variables proliferate, so pre-rational decisions have to be made about which factors are to be included in the conscious set, and which are to be dropped. (Imagine someone who can only juggle three balls being thrown a fourth and a fifth – they either have to ignore the incoming balls, or drop some of the original ones). Intuition, on the other hand, seems able to provide a running résumé of the decision-making process that remains more sensitive to the whole range of factors. Forcing people to be articulate requires them to focus on only a subset of all the available information, and to pick out the factors that are most 'sayable' rather than the most salient.

Sensitivity to clues

The fourth kind of intuitive intelligence reflects a heightened sensitivity to clues. To say of someone that they are 'very intuitive' can imply that they extract the maximum amount of significance from the available information: they see the meaning in the

detail that others may have overlooked. Such clues may not themselves be registered consciously by the 'intuiter', yet they can still contribute to an accurate 'feeling of knowing'. This ability to be attentive to detail, whether consciously or subliminally, may underlie the kind of 'clinical judgement' which we have just discussed, and it certainly provides a non-mystical account of the famous 'sixth sense' that some people seem to display. Scott Fitzgerald (1934), who was himself fascinated by the phenomenon of subliminal perception, illustrates in *Tender is the Night* how the so-called sixth sense may actually reduce to an acute employment of the other five.

In an inhabited room there are refracting objects only half noticed: varnished wood, more or less polished brass, silver and ivory, and beyond these a thousand conveyors of light and shadow so mild that one scarcely thinks of them as that: the tops of picture frames, the edges of pencils or ashtrays, or crystal or china ornaments; the totality of this refraction appealing to equally subtle reflexes of the vision as well as to those associational fragments in the subconscious that we seem to hang on to, as the glass-fitter keeps the irregular shaped pieces that may do, sometime. This fact might account for what Rosemary afterwards mystically describes as realising there was some one in the room, before she could determine it.

There is now a wealth of experimental evidence that attests to the existence and the value of such subtle clues, and the abilities to make use of them (see Claxton, 1997). As long ago as 1884, philosopher C.S. Pierce and his graduate student Joseph Jastrow conducted a long series of studies on unconscious perception, at the end of which they concluded that their research had:

... highly important bearings, since it gives new reason for believing that we gather what is passing in one another's minds in large measure from sensations so faint that we are not aware of having them, and can give no account of how we reach our conclusions about such matters. The insight of females as well as certain 'telepathic' phenomena may be explained in this way. Such faint sensations ought to be fully studied by the psychologist and assiduously cultivated by everyman.

Westcott (1968) gave people problems to solve, and offered them a series of clues which they could take up one by one. They could opt to take only one or two clues before venturing a solution, or they could be more cautious and wait until they had more information. Westcott found that his subjects divided into four groups, according to whether they were willing to answer on the basis of a little information, or needed more; and, within each of these two groups, whether their solutions tended to be correct or not. One group – those whom Westcott identified as the 'successful intuitives' – did consistently well with only a little information, while another, the 'conservative failures', did poorly no matter how much information they had asked for. Clearly the 'intuitives' were able to extract the significance of each of the clues more successfully than their more cautious or more insensitive colleagues.

Of particular interest were the ways in which the different groups scored differently on tests of personality. Intuitive people, Westcott found, tend to be introverted: they like to keep out of the social limelight, but feel self-sufficient and trust their own judgement. They like to make up their own minds about things, and tend to resist being controlled by others. They tend to be unconventional, and comfortable in their unconventionality. In Westcott's words, 'they explore uncertainties and entertain doubts far more than the other groups do, and they live with these doubts and uncertainties without fear. They enjoy taking risks, and are willing to expose themselves to criticism and challenge. They can accept or reject criticism as necessary, and they are willing to change in ways they deem to be appropriate'. So when risk and uncertainty exist, it is the 'intuitives' you want on your team; not those who insist on gathering every last shred of data before they dare make a move.

Too much hard thinking undermines intelligence by closing people off to their own existing resources of knowledge and experience. It renders their perception of current events coarser and more conventional. When people are searching earnestly, anxiously or impatiently for a solution, they tend to see what they expect or want to see, and the incongruous detail or the small but vital clue gets overlooked. The good tracker, or the insightful detective, possess a large body of knowledge, skill and experience – much of which is not systematically formulated in consciousness. The way they make use of this rich memory is more through 'resonance' than rationality. They take time to absorb the fine details of the situation, and to allow this subtle image to resonate gently with their accumulated wisdom in a way that could not be described as intellectual or explicit. Sherlock Holmes, you may recall, when faced with a particularly difficult case, would not spend hours, as it were, checking the Interpol database on his computer, but having inspected the scene of the crime would retire to his room with a full tobacco pouch, saying 'Do not disturb me, Watson. This is, I think, a three pipe problem'. Holmes embodies a mature form of intelligence that relies as much on quiet reflection as on busy reasoning.

It is as if there is a variable threshold between the conscious and the unconscious minds, and an analytical, critical attitude, or too much pressure for results, causes this threshold to be raised, so that information that is subtle or equivocal becomes unavailable. This happens even at the level of bare perception. People who are looking at a screen in order to detect faint flashes of light are better at doing so when they are not trying too hard. Perception is more sensitive when you are relaxed, just allowing what is faintly there to 'pop up' by itself. Interestingly, however, this effect is reduced when people do not feel comfortable adopting such a receptive attitude. For people who find it difficult to allow themselves to respond spontaneously, or who rate themselves as more highly motivated to do well, the advantage of the 'pop up' condition is removed (Snodgrass et al., 1993). Learning to ease up, and let the mind 'do its own thing' clearly has its advantages.

Creativity and problem-solving

Creativity is perhaps the area *par excellence* where hard thinking and data analysis have periodically to give way to more ruminative or even hazy forms of cognition. In the autobiographical writings of creative scientists and artists there has been, for a long time,

a recognition of the creative power of unconscious mental processes. A satisfying product may appear not as the result of conscious cognitive labour, but as a gift from 'out of the blue', and this process may be encouraged and stimulated, but it cannot be forced or controlled. Quite the reverse: the gifts appear only in a mood of relaxed reverie and rumination, when they are not being earnestly sought or worked on at all.

Now there is experimental evidence for these anecdotal conclusions, too. Janet Davidson (1995) asked people to solve simple 'insight' problems such as:

George wants to cook three steaks as quickly as possible, but unfortunately his grill can only cook two steaks at a time. The steaks take three minutes a side to cook. What is the shortest time in which George can cook all three steaks?

Call the steaks A, B and C and the two sides of each 1 and 2. Cook A1 and B1. Then cook A2 and C1. Finally cook B2 and C2. Total 9 minutes. If you do A1 + B1; A2 + B2; C1; C2, it takes 12 minutes.

In general an insight problem is one in which people's 'first take' on the problem is likely to embody a plausible assumption which turns out to be illicit; and/or one in which the solution depends on an holistic perception of the elements of the problem in relationship, rather than on analytical, sequential reasoning. She found that people who were most successful at solving such puzzles thought more slowly than those who became stuck and failed. Even though 'intelligence' is generally associated with faster processing, in the case of problems that require insight, rather than brute reasoning, it is 'slow and steady' that wins the race. What happens is that people who tend to rush at the problem are more likely to make some false assumptions, and get locked in to an erroneous way of thinking about it from which they cannot then escape.

Jonathan Schooler has shown that people who are good at solving these kinds of 'insight problems' are able to let their minds go blank and admit to themselves that they are temporarily stuck. People who persist with conscious thinking are less likely to make the breakthrough. As Schooler says: 'Verbalization may cause such a ruckus in the front of one's mind that one is unable to attend to the new approaches that may be emerging in the back of the mind' (Schooler et al., 1993). The more keenly one seeks a solution or an explanation, the more likely one is to come up with thoughts that are conventional and uncreative. Thus a young executive, baffled by the poor reception of a well-planned presentation, may be more likely to generate a creative alternative for themselves as the mind wanders drowsily in the evening than they are in a serious, anxious debriefing session with their team leader or mentor straight after the event.

The clever mind tends to be relentless in its search for solutions. It sees no value in less focused mental activity or in 'time off task'. Yet this is another of the ways in which it stifles creativity. For there is plenty of evidence that the innovative mind needs to move between open-minded playfulness and concentrated purposefulness, and to do so with a range of different rhythms and tempo. We have already seen the value of allowing pauses and gaps in the train of thought. A few seconds of 'down time' can allow a fuller and more integrated mental picture of a situation to emerge, enabling a response to be less impulsive and more 'thoughtful'.

Taking a few minutes away from a problem that is proving recalcitrant can also be very productive. Studies have shown that problems on which people have got stuck are more likely to be solved after a break of a few minutes than if problem-solving is persistent (Smith, 1995). Dijksterhuis (2003) found that the people in his complex judgement situations made better choices if the decisions were preceded by a few minutes' delay in which they were prevented from thinking about the problem. In clever mode, it is easy to get locked in, as we have seen, to a view of the problem that may contain some unnecessary or misleading assumptions. By taking a break and thinking about something else, you increase the likelihood that these assumptions will lose their strength and dissolve away, so that when you return to the problem, you may be able to take a fresh approach. Collectively, it can be very helpful to suggest such a 'hunch break' in a meeting that has become blocked, or where positions have become entrenched. Even a ten minute recess can allow minds to soften and emotions to cool, so that greater creativity can emerge.

On a slightly longer time-scale, it has been shown that creative individuals tend to structure their daily routines so that they contain significant periods of playtime or rest. A recent survey of outstandingly creative people in the US found that: 'Many of the individuals we interviewed structured their day to include a period of solitary time that follows a period of hard work... Without this solitary quiet time, they would never have their most important ideas. Several respondents kept their minds idle by engaging in repetitive physical activity'. For example, one said: 'Generally the really high ideas come to me when I'm gardening, or when I'm doing something steadying with my hands' (Csikszentmihalyi and Sawyer, 1996). Longer-term still, there are too many accounts to ignore of people who discovered solutions to complex problems whilst they were on holiday. The 30 page document that outlined the structure of the first consumer banking enterprise in the US has become widely known in financial circles as the 'memo from the beach'.

Balancing the different modes of mind

Taken together, these observations and research studies make a powerful case for the importance of kinds of intelligent cognition that do not involve elegant, clear-cut, systematic reasoning, but which are more intuitive, sensory and embodied. And they also show that these forms of intelligence can be overridden and undermined by too strong a determination to maintain conscious comprehension, clarity and control. However we must be aware of jumping out of the rationalistic frying-pan into the intuitive fire. Just as logic can lead you astray, so can intuition. Both are perfectly capable of being applied badly, or at the wrong time. The extra ingredient of real intelligence is knowing when and how to draw on each of these different kinds of smart, and how to integrate and slide between them.

For example, intuitions often come with a kind of built-in confidence rating, a subjective feeling of 'rightness', that may vary in its strength from 'complete guess' to 'absolute certainty'. Mangan (1993) has suggested that this feeling acts as a summary

in consciousness of a set of unconscious processes and judgements that cannot – at least at that moment, and perhaps in principle – surface as such. He uses the metaphor of the ‘menu bar’ on a computer word processing screen: a set of symbols and icons indicating the status of different variables, and the availability of various options, which act as pointers and reminders, but which do not take up very much of the limited space on the screen itself. Intuition in general, in Mangan’s view, is comprised of such short-hand references which inhabit the ‘fringe’ of consciousness, and he reminds us of William James’ perceptive concern with ‘the reinstatement of the vague to its proper place in our mental life’.

Intuitions can be shown to have significantly greater validity than its author gives it credit for. Bowers et al. (1990), for example, have demonstrated that we frequently undervalue faint hunches, inklings or even what feel like total guesses. Their subjects were given clues to the solution of a puzzle one at a time, and after each one were required to come up with an attempt at the answer, even if they thought it was a complete shot in the dark. Bowers was able to show that these ‘complete guesses’ began to converge on an acceptable solution well before the solution itself actually appeared, even though subjects’ confidence in them was non-existent.

However, arguing for greater respect for the feeling of rightness in our mental life does not entail always taking it at face value, or treating it as infallible. The feeling may be *indicative* of an idea that is worth taking seriously, but it is rarely *definitive*. Despite famous examples of unshakable intuitive confidence, such as Gauss’s ‘I have my result, but I do not yet know how to get it’, the feelings of rightness – or wrongness – can both be misleading. For instance, when people are solving analytical problems, their sense of how ‘warm’ they are is an accurate predictor of an imminent successful solution. But with insight problems, the feeling of warmth is actually predictive of failure. People think they are getting closer to a solution when they are actually barking up the wrong tree (Metcalf and Wiebe, 1987).

As I said earlier, one of the reasons that intuition got a bad name was the apparent contradiction between some of the grandiose claims of incorrigibility – of direct revelation of unquestionable ‘truth’ – on the one hand, and the transparent fact that it is blatantly and frequently wrong, on the other. Sometimes people’s inklings and premonitions, their gut feelings and gut reactions, turn out to be perceptive and appropriate; other times, they don’t. People can end up falling in love with each other despite unfavourable first impressions. Promising hunches regularly turn out to be blind alleys. A manager’s first guesses about how to deal with a problematic situation can be distressingly misguided. Intuition can be mistaken and misleading; but does that mean, if we shed the inflated expectations, that it is of no value, or that it cannot be educated to become *more* reliable and perceptive?

Take a famous example – one often used by Wittgenstein in his seminars – of a stubbornly false intuition. Imagine that the Earth is smoothed into a perfect sphere, and that a ribbon is tied snugly round the equator. Now untie the ribbon, and add just six feet to its total length. Space it out, so that the gap thus created is equal all the way round. How big is the gap? A micron? A hair’s breadth? A paperback book? A foot? Most people’s strong intuition is that the gap would be tiny. In fact it is easy to prove

mathematically that it is nearly a foot. You could crawl under it. The intuition is false; but the interesting question is *why* is it false? It turns out that its basis is the assumption that 'if you add a little to a lot, it won't make much difference.' Now there are many situations, superficially similar to Wittgenstein's puzzle, where this assumption is both valid and useful. If you were to turn the oceans into a giant cylinder, and add six gallons to it, the height would indeed rise by only a negligible amount.

The fault comes in an over-reliance on an *holistic unconscious analogy*; the unanalysed assimilation of this problem to a class of situations to which, despite appearances, it does not actually belong. This unconscious analogising is a vital and ubiquitous mental process. It is a way of getting cognition going by giving it a *prima facie* sensible guess to work on. Often these guesses are productive, and sometimes they turn out to be misleading (Bruner and Clinchy, 1972). The new boss tacitly assumes a model of management and leadership, both consciously and unconsciously imbibed from previous experiences of being managed and led, which may be appropriate and adequate for him/her particular personality and this particular organizational culture, or it may not. It may be a good first guess that can be trimmed and tuned, or it may be quite the wrong place to start, that is only going to cause grief and strife. It depends. The intuition serves us well if we take it as an hypothesis, rather than as the God-given truth. If we take it as gospel, and try to force situations or ourselves to fit what is in fact an inaccurate template, then we may end up stymied and frustrated. A balanced view of intuition is one which sees it as a valuable source of hypotheses, which are nonetheless capable of being interrogated.

This simultaneous respect for the fallibility and the value of intuition is reflected time and again in the literature of creativity – both artistic, scientific and pragmatic. An on-going survey of Nobel science laureates by Marton and colleagues in Sweden (e.g. Fensham and Marton, 1992) – to take just one of these spheres – reveals the absolutely central place which they give to intuitive forms of intelligence. Michael Brown (Nobel Prize for Chemistry, 1985), for example, says:

And so, as we did our work, we almost felt at time that there was a hand guiding us. Because we would go from one step to the next, and somehow we would know which was the right way to go. And I can't really tell you how we knew that.

Intuition seems also to offer a vital way of evaluating leading-edge results, where no explicit criteria yet exist. Stanley Cohen (Nobel Prize for Medicine, 1986) says:

To me it is a feeling of 'Well, I don't really believe this result', or 'This is a trivial result', or 'This is an important result'... I am not always right, but I do have feelings about what is an important observation, and what is probably trivial.

In a classic description of incubation, Rita Levi-Montalcini (Nobel Prize for Medicine, 1986) says:

You've been thinking about something without willing to for a long time... Then, all of a sudden, the problem is opened to you in a flash, and you suddenly see the answer.

While Konrad Lorenz (Nobel Prize for Medicine, 1973) emphasizes both the reliance of intelligence on a large database of experience, and the need for a relaxed and gentle attitude towards problem-solving:

This apparatus which intuits has to have an enormous basis of known facts at its disposal with which to play. And it plays in a very mysterious manner, because... it sort of keeps all known facts afloat, waiting for them to fall into place, like a jigsaw puzzle. And if you press... if you try to permutate your knowledge, nothing comes of it. You must give a sort of mysterious pressure, and then rest, and suddenly BING!, the solution comes.

So rehabilitating the less 'clever' ways of knowing seems to be largely a matter of regaining balance: the balance between effort and playfulness, which Lorenz has just described, and the balance between intuition itself and reason. Mathematician Henri Poincaré summed it up by saying 'It is through logic we prove; it is through intuition we discover.' It is as though the well-tempered mind has available to it a number of modes that needed to work in concert, each taking the lead in turn; or as if creativity demanded a cycle of cognitive 'seasons', some of them involving busily planting, harvesting or threshing, and others, the fallow 'winter months', requiring patience, and a tolerance for seeming inactivity, which is, despite appearances, necessary and productive. The classic model of creativity (Wallas, 1926) in fact divides it into four stages: *preparation*, in which data is gathered, reason is applied, and eventually an impasse reached; *incubation*, in which the problem is not consciously worked at or attended to; *illumination*, in which an intuitive solution emerges into consciousness; and *verification*, in which purposeful analysis is applied to check the intuition out, and find ways to communicate it.

Interestingly, this balance is also acknowledged by artists. Henry Moore wrote:

It is a mistake for a sculptor or a painter to speak or write very often about his job. It releases tension needed for his work. By trying to express his aims with rounded-off logical exactness, he can easily become a theorist whose actual work is only a caged-in exposition of concepts evolved in terms of logic and words. But though the non-logical, instinctive, subconscious part of the mind must play its part in his work, he also has a conscious mind which is not inactive. The artist works with a concentration of his whole personality, and the conscious part of it resolves conflicts, organises memories, and prevents him from trying to walk in two directions at the same time. (Ghiselin, 1952)

American poet Amy Lowell quite deliberately used 'incubation', describing how she would 'drop my subject into the subconscious, much as one drops a letter into a

Claxton

mailbox' and leaves it undisturbed for a while. But she also acknowledged that intuition was 'a most temperamental ally':

Often he will strike work at some critical point, and not another word is to be got out of him. Here is where the conscious training of the poet comes in, for he must fill in what the subconscious has left... he must have knowledge and talent enough to 'putty' up his holes. (Ghiselin, 1952)

Recognition of the intricate ways in which intuition and intellect, reason and reflection, experience and explanation, balance and complement each other challenges theorists of professional development to come up with a rather more sophisticated model of adult professional learning than we have at present.

Smart and stupid organisations

A smart organisation is one which understands the multifaceted nature of intelligence, which is hospitable to all those facets, and which is genuinely, cumulatively interested in discovering when and how each of those facets works best. A stupid organisation is one which is deaf to new information about how to be smart, and which maintains a rigid adherence to rationalistic, spread-sheet thinking in all situations. There is a neurological condition called 'neglect' in which people come to 'disown' perfectly functional parts of their body: they see one of their own legs as 'alien', and keep trying to throw it out of bed, for example. Though they have two good legs, the belief makes them lame – not just hypothetically, but really. The belief that clear, fast, conscious, analytical thinking is the only form of intelligence worth using – when it is installed not just in individual minds but in a workplace culture – makes people collectively stupid, not just hypothetically but really.

Cleverness is often loud and self-confident, and in a culture of cleverness, other forms of smart can find it hard to be heard, and may slide underground, to the detriment of intelligent functioning as a whole. Non-clever intelligence needs both situational and psychological conditions to support it. The outer, contextual conditions include a conducive physical environment. Though stillness and solitariness are often quoted as being conducive to creativity, for example, such conditions are personal and idiosyncratic – some people have to smoke, or pace about, or look out (as Sartre did) onto an urban roof-scape. A smart culture encourages people to find out what their optimal environment is, and to develop the disposition to seek and create these conditions. In a smart culture, the pressures for accountability are balanced, to quote Westcott (1968), by factors that 'encourage looseness of reaction, speculation, non-analytic functioning and random association'.

Such an environment, of course, is one that is convivial, playful, co-operative and non-judgemental, as well as being purposeful and professional. Prince (1975), in a review of the conditions of creativity, concludes: 'Any reaction that results in the offerer of an idea feeling defensive will tend to reduce not only his speculation but

that of others in the group... The victim of the win-lose or competitive posture is always speculation, and therefore idea production and problem-solving. When one speculates he becomes vulnerable. It is too easy to make him look like a loser.' Indeed, pressure and stress of any kind, whether competitive or not, are anathema to intuition, as they tend to focus perception and cognition on a predetermined range of strategies and information – those that are 'obvious' or 'normal' – and thus to remove the breadth and open-mindedness of vision which may be required to uncover a false assumption or a creative analogy (Easterbrook, 1959). (People in the business world are fond of quoting the old proverb: 'When you are up to your arse in alligators, it's hard to think about draining the swamp.')

Intuition also requires a conducive inner, psychological environment, one that is characterised by certain dispositions and tolerances. The foremost of these is what the poet John Keats referred to as 'negative capability', which he described as 'when a man is capable of being in uncertainties, mysteries and doubts without any irritable reaching after fact and reason'. If intuition may emerge as knowledge without comprehension, one must be able to tolerate that lack of mental clarity. If intuition takes time to develop, one must be prepared to wait – to resist the desire to end the discomfort of gestation by forcibly inducing the birth of understanding. In a classic study of creativity in artists, Getzels and Csikszentmihalyi (1976) found that the best still-life pictures were produced by those painters who played more slowly and creatively with the different elements of the composition, and who delayed foreclosing on their idea of what the painting was going to be, even until they were already part of the way through painting it.

The importance of 'daring to wait' can hardly be overstated (Claxton, 1997). As we have already seen, adults who are willing to enter a state of confusion learn a complex skill faster than those who insist on seeking theories and explanations; and insight problems are solved better by those who can think slowly. Finally, we might note the value of cultivating the skill of 'catching the inner gleam' which was mentioned earlier; and of developing the disposition to look for the unspoken assumptions – especially one's own – that may be dissolved in the very way in which a problematic situation seems to present itself.

Conclusion

Intelligence refers to a loose-knit clan of 'ways of knowing', some of which are less articulate and explicit than normal reasoning and discourse. This sub-family has tended to be ignored, marginalized, romanticized or denigrated in mainstream managerial cultures, partly because of its historical association with claims for its validity that seem grandiose or mystical; and partly because we have, until recently, lacked a cognitive psychology which makes scientific sense of its nature and its value. The members of this family include the ability to function fluently and flexibly in complex domains without being able to describe or theorize one's expertise; to extract intricate patterns of information that are embedded in a range of seemingly disparate experiences;

to make subtle and accurate judgements based on experience without accompanying justification; to detect and extract the significance of small, incidental details of a situation that others may overlook; to take time to mull over problems in order to arrive at more insightful or creative solutions; and to apply this perceptive, ruminative, inquisitive attitude to one's own perceptions and reactions – 'reflection'.

Smart cognition manifests in a variety of different ways: as emotions; as physical sensations; as impulses or attractions towards certain goals or courses of action; as images and fantasies; as faint hunches and inklings; and as aesthetic responses to situations. Some intuitions are holistic interpretations of situations based on analogies drawn from a largely unconscious experiential database. They integrate (in an image or an impulse) a great deal of information, but may also incorporate assumptions or beliefs that may be invalid or inappropriate. Thus intuitions are instructive but fallible hypotheses which are valuable when taken as such. The intuitive mental modes are not subversive of or antagonistic to more explicit, verbal, conscious ways of knowing; they complement and interact productively with them. People vary in their facility with intuition, and in their ability to create both the inner and outer conditions which are conducive to intuition. These skills, dispositions and tolerances are acquired through both informal life experience, and in the course of formal education. Professional education and training thus have the opportunity, both through explicit instruction and modelling, and through the epistemological culture which it embodies, either to enable people to harness and develop their intuition, or to neglect it, and so allow it to atrophy.

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