

TRIBUTE

OSAKA  
UNIVERSITY

Since 1965

大阪大学現役合格のすべてはこの本の中にある。

本書は、大阪大学を目指す受験生のために作られた素読用・音読用の英文集である。「音読を主軸に置いた学習こそ、語学学習の王道である」は英語の達人たちが必ずと言って通った道である。素読・音読とは、英文を繰り返し読むことで、言葉の響きやリズムに慣れ親しむことによって感性を磨き、学びを深めるための土台をつくる知的行為である。

本書に収められている英文は、すべて大阪大学にて過去に出題されたものである。1965年度から現在(2022年度)に至るまでの前期日程の英文解釈と1983年度から現在(2022年度)に至るまでの前期日程の英語長文、および1989年度から2016年度(現在後期日程は廃止)に至るまでの後期日程と、2000年度から2016年度後期日程で出題された英語長文を収録している。英文数にして218、語数にして約56000語にも及ぶ。大阪大学が受験生に問い続けてきた英文を通じて、日々研鑽あるのみである。過去から現代へと連綿と続く知の旅へといざ出発しようではないか。

「英語を修むる青年は、ある程度まで修めたら辞書を引かないでむちゃくちゃに英書をたくさんと読むがよい。少しわからない節があつて、そこは飛ばして読んでいっても、どしどしと読書していくと、ついにはわかるようになる。また、前後の関係で了解せられる。それでもわからないのは、めったに出ない文字である。要するに、英語を学ぶものは日本人がちょうど国語を学ぶような状態に自然的慣習によってやるがよい。すなわち、いくへんとなく繰り返し繰り返しするがよい。ちと極端な話のようだが、これも自然の方法であるから、手あたりしだいに読んでいくがよからう。英語の発音をなだらかにする場合には、稽古として音読することもある。またうたうべき性質の詩などは、声を出すのもよからうが、思考を凝らして読むべき書籍をベラベラと読んで読者自身にわからないのみならず、あたりのものの迷惑な話ではないか。

夏目漱石『現代読書法』より

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## 1 前期目程

1 [1965]

We are often puzzled by the order of preference into which working-class people in England will range the items between which they have to divide their income: the replacement of the necessary household equipment is likely to rank lower among them than it would among the middle classes; sheets are often badly worn and much mended, and towels inadequate in number. This may not be due simply to a shortage of money; the shillings which bought a rather elaborate frame for a photograph or a new ornament would have bought an extra pair of towels. And ‘pleasure’ — smoking and drinking, for example — is ranked high. Pleasures are a central part of life, not something perhaps to be allowed after a great number of other requirements have been met. The importance of each item in this rough financial pattern will vary from family to family; those who reverse the pattern itself are unusual.

Not only does the frequency of book-reading vary markedly, it is also unevenly distributed among the constituent groups of the community. For a variety of reasons some kinds of people read a great deal more and some not much. The major factor which differentiates readers from non-readers in research to date is education — in the limited sense of number of years of formal schooling. The more years of schooling the individual has, the more likely he is to read books. In one national survey only twelve per cent of the college-educated had not read a book in the preceding year as against seventy-five per cent of those with only secondary school education or less.

Now, this might mean several things. It might mean that additional schooling has improved the individual's basic reading skills, or that it has developed in him the types of interests which are ordinarily satisfied by books, or even that the people who go on to further schooling already have a reading

disposition which formal education only reinforces.

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3 [1966]

“I can’t make out,” \*Henry James has \*Mrs. Tristram say to an American, “whether you are very simple or very deep.” This is a dilemma which has often confronted Europeans. Usually they conclude that Americans are childish. But one cannot accurately call one society mature, another immature. Each has its own logic.

What is it then that makes Americans recognizable wherever they go? It is not, we hope, the noisy, boasting, critical, money-scattering impression made by one class of tourists. The only thing to be said in their defense is that, released from the social restraints which would make them act very differently at home, they are inclined to make the most of this freedom.

Americans carry with them an appearance which is more a result of attitude than of clothing. This

attitude combines a lack of class consciousness, a somewhat light-hearted optimism and a great curiosity which in combination look to the European like naivety. Also a liking for facts and figures, and above all a desire to be friendly.

To boil it down to the briefest summary, American characteristics are the product of response to an unusually competitive situation combined with unusual opportunity.

〔注〕 \*Henry James 米国の有名な小説家で晩年英国に帰化した人。 \*Mrs. Tristram Henry James の作品に出てくる一人物。

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#### 4 [1967]

One of life's more peculiar little laws is that what other people have is always preferable to what one possesses oneself. This tends to produce two familiar situations: in a restaurant the other person always has the better dish, and it invariably takes a foreigner

to notice what is best about one's own country. The problem of food I shall leave to the psychologists, but the question of ignorance of one's own country or city is, I think, a rather different one. It has its roots, surely, in familiarity and its inevitable concomitant\* — not contempt but an almost fatal lack of urgency. Because London is one's home one knows that it does not matter terribly if one has not yet fully got to know it; there is always that free weekend next month, or next year .... Without the inquisitive zeal of a tourist one cannot overcome one's normal laziness and discover what London has to offer in the way of art and architecture.

[注] \*concomitant : a thing that goes with another [例: Sleeplessness is often a concomitant of anxiety.]

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5 [1968]

Most of us think a good deal about faces: about

our own with vanity, resignation, anxiety and the unease brought on by self-consciousness, about other people's with love or hatred, admiration or envy, distaste, amusement, ridicule, indifference. We also think about other people's faces speculatively\*, wondering how much we understand of what we see and if we understand rightly. One's own face, however, is too much part of one's being, too closely identified with the emotions of one's private life, for any objective judgement to be made on it. There seems to be a barrier within the mind which makes it impossible for one to look at a portrait or a photograph of oneself, still less a reflected image in a mirror, dispassionately\*\*.

\*speculatively=making guesses

\*\*dispassionately=calmly ; impartially

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6 [1968]

次の文の筆者(英国人)は長い間オーストリアのウィーン

(Vienna)に住み、第二次世界大戦の開始前に英国へ帰った人である。大戦によって、英国はオーストリアを敵とすることになった。この一節において、筆者は当時の心境を回顧している。

In spite of the fact that I had begun to change the center of my life from Vienna back to London over a year before the war broke out, and in spite of my impulse, after the blow fell, to repress the too painful memories, I could not altogether resist a longing to keep in touch with Austria and to do something for my friends there. I could not think of a single one among them who had ever expressed any warlike sentiments or any appetite for the military life, and it was horrible to me to imagine them being trained to kill young Englishmen, who — so it seemed to me from my own circle of friends — had just as little hatred of them and just as little passion for killing.

No letters of course could get through. I did ask an English friend in Italy, who had connections and acquaintances in many parts of South-Eastern

Europe, to try and get news of my former secretary Toni, his wife and family, by indirect means; but, not surprisingly, he failed. My life, which had grown its roots in two countries, thus made me realize the cruelty of modern war, the declaration of which immediately cuts off tens of thousands of people on one side of the frontier from all contact with, or knowledge of, the tens of millions of people on the other side of the frontier; and I thought of how, in the 18<sup>th</sup> century, the artists and writers of one country could visit the capital of another with which they were at war, and be received in dignity and respect.

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7 [1969]

Reading aloud in the family circle was, as one may suspect, a more familiar recreation in the time before talking movies, radio, and television. But, as one who was read to a good deal by his parents and who now, more than fifty years later, is in the habit of

reading aloud himself, with his wife as the audience, I believe there is a good deal to be said for this old-fashioned habit.

Of course, reading aloud does not permit the setting of any speed records. But it has many of the advantages over solitary reading that a ramble along mountain paths has over a \*breakneck dash by automobile over a highway designed for fast traffic. One covers far less ground by the former method. But one sees and appreciates so much more: a field of mountain wildflowers, a squirrel or hare running for cover, the detailed outline of a distant peak or valley.

〔注〕 \*breakneck=very dangerous

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8 [1969]

An actor is a man who must put himself into the skin of another man, even if, as in the Elizabethan theater, the other man is a young woman. And it is not enough for him to imitate and physically to move into

the gestures of the other man. This is only half of what he does. The other half is to think and feel himself into the man, and if he fails to convince, that is where he fails.

A young actress acts all the gestures of an old woman, and yet she fails to act an old woman, because she cannot think herself into that experience. By contrast, \*Sarah Bernhardt in old age went on playing a girl in love, and is said to have played her very movingly. Perhaps she played her more movingly than a girl could, with a \*\*pathos which was not true to the part, and yet which was true for those who saw her — because, like her, they had once had greater hopes from love than had been fulfilled.

[注] \*Sarah Bernhardt フランスの名女優(1845-1923)

\*\*pathos = quality is speech, action, etc., that excites pity or sadness

Birds, so wonderful and interesting in all their structure and life, have that most treasured of all the senses — sight — so highly developed that there is nothing with which we can compare it among living creatures. With our great telescopes we can see to a greater distance than any bird; with the high-power lenses of our microscopes we can distinguish infinitely smaller objects than any feathered creature is capable of perceiving, but where else on the earth is there an organ of vision which in a fraction of time can change itself from telescope to microscope; where is the eye that, seeing with wonderful clearness in the atmosphere, suddenly adapts itself to the refraction<sup>(註)</sup> of water, or (less slowly, although no less surely) to the darkness of night?

Next to our powers of reasoning, we value sight above all things, and fortunate indeed should we be could we but exchange our imperfect vision for sight like that of an eagle! Little need of spectacles or

binoculars has he, for the perfection of his eye enables him to become near-sighted or far-sighted at will.

(注) refraction:屈折作用

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10 [1971]

Early in the nineteenth century it was recognized that the status of landscape painting was changing. This change happened quite quickly. The tremendous successes of Turner, the greatest English landscape painter, occurred only about thirty years after the vain attempts of earlier artists to attain popularity by painting foreign landscapes; and in the course of the century landscapes which were at least intended to be close imitations of nature came to hold a more secure place in popular affection than any other form of art. A peaceful scene, with water in the foreground reflecting a luminous sky and set off by dark trees, was something which everyone agreed was beautiful, just as, in previous ages, they had agreed about a

naked athlete or a saint with hands crossed on her bosom. As for an extensive view, there has been a great change since the Renaissance when a few artists first discovered the beauty of a wide prospect commanded from a high mountain top, and, with the exception of love, there is perhaps nothing else by which people of all kinds are more united than by their pleasure in a good view.

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**11** [1972]

Small children are able to find and correct their mistakes for themselves. However, what we must remember about this ability of children to become aware of mistakes, to find and correct them, is that it takes time to work, and that under pressure and anxiety it does not work at all. But at school we almost never give it the time. When a child at school makes a mistake, say, in reading aloud, he gets an instant signal from the environment. Perhaps some of the

other children in the class will make a face, or wave their hand in the air — anything to show the teacher that they know more than the unfortunate reader. Perhaps the teacher herself will correct the mistake, or will say, “Are you sure?” Perhaps, if the teacher is sympathetic and kindly, as many are, she will only smile a sweet, sad smile — which from the point of view of the child is one of the severest punishments the school has to offer, since it shows him that he has hurt and disappointed the person on whose support and approval he is accustomed to depend. He will feel great shame and embarrassment, enough to paralyze his thinking. The result of this is a great loss.

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**12** [1973]

Man, who once walked four miles an hour, later tamed the horse to carry him at ten, and developed the railway engine to take him at sixty, now commonly uses a plane which flies at 300 miles an hour. No part

of the world is now theoretically more than a day's journey from any other part.

On the other hand, we remain unable to move the actual lands and seas. It might be an advantage, climatically and politically, to tow, say, the British Isles to a new location in the middle of the North Atlantic Ocean: it cannot be done. How many nations would be grateful to be relieved of frontier problems and of neighbours they do not desire!

注 tow=draw along through water by rope or chain

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**13** [1974]

What light does the study of history cast on the meaning of human experience and, in particular, to what extent does it sustain the belief in the progress of civilization? Leaving on one side the pessimistic theories widely prevalent in antiquity but alien to modern thought, we reached the conclusion that,

while the last four centuries have witnessed a steady advance in the fields of pure, and even more clearly applied, science, any wider generalization as to the onward march of civilization can hardly be supported. In particular, it remains highly questionable whether man's intellectual progress has been attended by any corresponding growth in his moral achievement. This doubt has inevitably been intensified by the catastrophic events that have menaced the very foundations of our culture within our own life-time.

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**14** [1975]

The odd thing about the present world energy crisis is that, apart from temporary, emergency measures, little or no thought seems to be given to the reduction of waste, or to the planning of a society that can get along in reasonable comfort with very much less energy. On the contrary, the plans of the energy industries — oil, gas, coal and electricity — are all

based on the assumption that the demand for energy will become three times as much by the end of the century. This is the official assumption of the Central Electricity Generating Board, and it plans to meet this anticipated demand mainly by nuclear power, which is expected to provide two-thirds of our electricity supplies by the year 2000. This requires nuclear power output to be multiplied 25-fold.

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**15** [1976]

In person my father was small, of the same height that my brother and I eventually attained, but very much handsomer than either of us. He had large grey eyes, eloquent of kindness and humour, a fine brow and a full head of hair, which changed in imperceptible stages from grey to white. He had been very slight in build, but at about the time of my birth gained weight until in the end he was uncomfortably fat. I remember him as always stout. In dress he was conventional and tidy, but though he was noticeable

in appearance and noticeably agreeable, he had a genuine conviction of his ugliness. He shunned the camera and, if he caught sight of himself in a glass, would recoil from his reflection, crying, in the tones of the ghost in *Hamlet*: “O horrible! Most horrible!” or some similar expression of revulsion.

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16 [1977]

For many years scientists have been aware of the dangers represented by increasing rates of population growth, of mineral resource utilization, and energy consumption; and by the growing gap between the living standard of those in the developed as against the developing nations. But for most of the scientists, that knowledge was intellectual, not emotional, not a stimulus to action. It was clear that somewhere in the future those various trends would collide unpleasantly, although neither the date nor the nature of that confrontation was foreseen.

Today we know that worldwide disaster may be

possible within the lifetimes of persons already born. Attempts to deny that the relatively near future could witness large-scale disaster rest, it seems to me, more on optimism than on scientific analysis. The prospects of an imminent world food shortage, and of a not distant day when the supply of natural resources will be insufficient to support the world economy, seem to me to be almost self-evident.

(注) collide: come into conflict or collision; clash  
confrontation<confront: come face to face with

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17 [1978]

One of the results of scientific development has been the amazingly increased mobility of ideas and the language in which they are clothed, along with the mobility of human beings themselves. Cheap books and newspapers, radio, television and the cinema have shrunk distances as it were to a point where an expression coined by a journalist sitting in an office in

Los Angeles may be well known all over the English-speaking world in a few days. It is a matter of common knowledge among students of language that poor communications hinder linguistic change whereas ease of intercourse fosters it, and so at a time when words and phrases are carried all over the world on the magic carpet of science there must be a strong likelihood that a novelty of speech will more easily find a place for itself than before in the permanent fabric of English.

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**18** [1979-A]

Memory is one of the greatest of our faculties. The ability to retain information and experience is of vital importance. But it is a more subtle art to be able to cast out of the mind — or at least from a commanding place in it — failures, events, unhappy things that should be forgotten. It is a great skill to be able to be selective and say: “I will hold this in cherished

memory. This other I shall cast from me.” To be efficient, to be happy, to have full control of your powers, and to go ahead successfully, you must learn how to forget.

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**19** [1979-B]

In our own culture, as we move from childhood, we become increasingly narrow in our view. We assume a great deal and these assumptions are often right. And so it is with people in other cultures as well. Culture enables us to attend to the business of living and mixing with people without constantly examining situations and without making too many mistakes. However, in an unfamiliar culture, old assumptions are no longer right.

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**20** [1979-C]

Mary, who had by this time married a Danish

doctor and spent all her week-ends skiing, said, “Skiing is a wonderful sport. It is the closest you’ll ever come to flying. You must go. It is very healthful, stirs up the blood, and I think everybody in the family should learn.”

I said, “But I’m no good at sports and I’ll probably break my leg.”

“Nonsense,” Mary said. “Skiing is all a matter of relaxing and balance. Anybody that can bend their knees can ski.”

I said, “How did Claire do last week-end?”

Mary said, “Oh, she broke her leg but it was a simple fracture\*, so she’ll be back on skis in no time.”

(注)\* fracture=骨折

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21 [1980]

Memory, in its broadest sense, refers to the effects of a person’s past on his present. The person is modified, changed by what he does and experiences.

And these persisting modifications affect what he does and experiences on later occasions; they enable him to accomplish much which would otherwise be impossible. Now, the accomplishments made possible by the retained effects of past experience are many, varied, and of enormous value to the person. Their value lies in their enabling him to adjust to present circumstances in the light of past events. In a phrase, they enable him to profit by experience.

Try to consider what would happen if a person were left totally unchanged by his experiences and activities. It is almost impossible to imagine what he would be like. Every situation he encountered would be forever strange, unfamiliar, unpredictable. He would commit the same errors over and over again with no chance of their ever being removed. He would develop no new accomplishments. Language would be impossible, so would thinking, self-awareness, anticipation of the future, and all art and science. He would be deprived of possibly everything that makes him recognizable as a human being.

Different subjects and modes of study should be undertaken by pupils at fitting times when they have reached the proper stage of mental development. Accordingly, from the age of eleven onwards there is wanted a gradually increasing concentration towards precise knowledge of language. Finally, the three years from twelve to fifteen should be dominated by a mass attack upon language, so planned that a definite result, in itself worth having, is thereby achieved. I should guess that within these limits of time, and given adequate concentration, we might ask that at the end of that period the children should have command of English, should be able to read fluently fairly simple French, and should have completed the elementary stage of Latin. I conceive that such a measure of attainment in these three languages is well within the reach of the ordinary child.

**23** [1982-A]

The underlying assumptions of an age, the things commonly taken for granted to the extent that no one will bother to write them down, are not only among the most significant, but also among the most difficult to grasp by minds brought up in the captivity of different assumptions.

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**24** [1982-B]

Within any social group talking must be a principal means whereby trouble is avoided and through which efforts are made to resolve it when it does arise. Through talk people get to know what others are thinking and are going to do, as well as how their own actions are perceived, and are enabled to arrange their affairs accordingly. Where trouble does crop up, talking in the first instance provides a vehicle through which anger can be expressed and released, and then a means through which those involved can

feel their way towards a settlement. It also provides an effective channel for third-party intervention in search of a settlement, whether in the informal atmosphere of the home, or the more formal setting of a law court.

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**25** [1983-A]

Intelligence springs from experience — in many cases ancient experience inherited; in others, by direct contact with life. It is possible that inherited ancient experience can be wiped out, insuring thereby a return of barbarism. Current, immediate life experience might possibly by degrees replace the loss of ancient inherited experience — maybe. But it could also prove a slow and maybe never wholly successful process. In the western world, for instance, the high civilization of Egypt, which was maintained for nearly 4000 years, was almost entirely lost to succeeding generations by being confined to a small class of the

more intelligent of the population — the purpose of which was to prevent its “wrong” or dangerous use by the ignorant or evilly disposed. Again it is possible that greater civilizations than any so far recorded by man have been and, for other or related reasons, have gone.

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**26** [1983-B]

Concerning the ‘Americanization’ of post-war Europe, Stuart Hughes suggests that ‘Europe was not so much being influenced by the United States as travelling of its own will the same path that America had pursued a generation before. Consumption levels were rising and life was becoming democratized. The rest follows almost automatically.’

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**27** [1984-A]

One might say that after billions of years nature,

by creating a species equipped with reason and will, turned its fate, which had previously been decided by the slow, unconscious movements of natural evolution, over to the conscious decisions of just one of its species. When this occurred, human activity, which until then had been confined to the historical realm — which, in turn, had been supported by the broader biological current — spilled out of its old boundaries and came to menace both history and biology. Thought and will became mightier than the earth that had given birth to them.

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**28** [1984-B]

John was torn between relief and anger. It lightened his spirits to realize that Christmas was the only thing that was the matter with Martha. At the same time, he could have screamed at how typical this was of her. She had always made a fuss over Christmas. In her little apartment in New York, they

had always had a Scandinavian-style Christmas tree, with round Swedish cookies and coloured candies. There were always heaps of presents, expensive ones, from the very best shops. She rejoiced in having things specially made for him. But he did not care at all about getting presents. This year, her play would be present enough, if she gave it to him in manuscript covers, with a dedication. He had told her this months ago, and she had agreed, but now she had gone back on her word, obviously, and was borrowing money they could not afford to give him something he did not want.

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**29** [1985-A]

Our knowledge and our power have been enriched and increased to an extent that no one would have thought possible. We have thereby been enabled to make the conditions of human existence incomparably more favourable in numerous respects, but in our enthusiasm over our progress in knowledge and power

we have arrived at a defective conception of civilization itself. We value too highly its material achievements, and no longer keep in mind as vividly as is necessary the importance of the spiritual element in life.

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**30** [1985-B]

Falling in love teaches a young man an important lesson. The lover readily imagines that he and the girl he loves are one. He feels he has love enough for both and that his loving will can wrap the two of them together like twin nuts in a shell. But what one loves is, after all, another human being, a person with other interests, other pains, in whose world one is oneself an object among others.

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**31** [1986-A]

Conversation or communication between people

does not take place in a vacuum, but at a particular time and place, in a particular physical and temporal setting. They may be sitting or standing, walking or driving along in a car. They may be in a crowd or alone together; among friends or strangers; in a room, a cathedral or a street. All these factors may play a part in what goes on in the conversation, but they are not what it is about. Where we are, who we are with and at what time may limit what we talk about and how we talk about it, but they are not, for that reason, the topic of our conversation.

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**32** [1986-B]

‘I count myself a lucky person,’ he continued. ‘When I’m in London I feel I could never live out of it. When I’m in the country I feel the same about the country. After all, I do believe that birds and trees and the sky are the most wonderful things in life, and that the people who live amongst them must be the best.’

It's true that in nine cases out of ten they don't seem to notice anything. The country gentleman and the country labourer are each in their way the most depressing of companions. Yet they may have a silent sympathy with the workings of Nature which is denied to us of the town. Do you feel that, Mrs. Honeychurch?

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**33** [1987-A]

There is nothing people do more often, in more ways, than talk to one another. For most people, nothing is easier. Sometimes we have to struggle to find the right words, sometimes we must pause to discern what someone else says, but on the whole we speak fluently and understand others effortlessly. Yet using language is a very complex enterprise, as anyone knows who has tried to master a foreign language. Moreover, much goes into using a language besides knowing it and being able to produce and

recognize sentences in it. Exchanging words is a social affair, usually taking place within the context of a fairly well-defined social situation.

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**34** [1987-B]

One evening Leonora was sitting alone by the fire reading a novel by Elizabeth Bowen, when the front door bell rang. She knew that it couldn't be James, for he had told her that he was going to a party that evening, which he didn't expect to enjoy. It was comforting to know that if she had hinted that she might be lonely he would have stayed with her, but of course she had urged him to go, saying that she was sure he would enjoy it when he got there, the sort of thing one said to a child.

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**35** [1988-A]

Time scales have changed dramatically in the

twentieth century. The biggest changes in our interpretation of the distant past have taken place within the last twenty years as new schemes of dating, new discoveries of material remains and new evaluations of evidence have come so fast that earlier surveys have been rapidly outdated. It is through our late-twentieth-century sense of time and space, so different from that of previous centuries in that it is governed by science, that we now step backwards and reach out to our most remote ancestors. This does not mean that we should ignore the journeys of past explorers of history when we make our own journey through time, for the social historian learns much about social history from out-of-date and discarded explanations.

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**36** [1988-B]

“What would you like for Christmas?” Mrs Deverell asked. Angel had scarcely spoken a word all day, was lying there, fuming, frustrated by this

intrusion.

For once, she did not know what she would like. It was only a matter of time before she would have everything she wanted. As a famous novelist, she could buy herself jewellery, expensive clothes, a fur coat, her own car. All that separated her from such riches was the time it would take to transfer what was in her head to the pages of the exercise-book — time which her mother's unexpected visit was causing her to lose.

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**37** [1989-A]

Acquiring a knowledge of history is a pleasant and safe pastime for the amateur. Developing an understanding of history is essential for those who would influence the future. It is not only on the lessons that history has to teach, valuable though they are, that this claim lies. It is rather because history, by making us aware how we arrived where we

are today, gives us our bearings so that, like any traveller, we may venture into the unknown confident at least of our direction. When we meet the future by reacting to the present, how we react is largely determined by the past — our history.

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**38** [1989-B]

When new fields of scientific activity first take form they begin, almost necessarily, with things and ideas that are part of the common experience of all men. During this early period of growth the new science is widely intelligible, and the discoveries it makes can be understood, argued, resisted, supported, or ridiculed by millions of people. At a later stage the science may become more precise, may achieve deeper understanding or soar to greater intellectual heights, but it will never again have the same impact on the average man's view of himself and the world around him.

**39** [1990-A]

In the age of abundance, the apparent availability of virtually all material necessities tended to lead people to expect speedy gratification of their desires and to have little sense of the length of time over which people in other times and places had had to wait in order to have some of their more basic material needs satisfied.

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**40** [1990-B]

The people that Butcher photographed were intensely aware of the ability of the photograph to freeze time and, in a sense, provide immortality. In a number of his pictures, people hold photographs to replace deceased or absent family members. In such cases photographs ascend to the status of a real person. It is perhaps because of this respect for the image that people were seldom photographed in less than their best clothing. In fact, there are records of

family members' being excluded from family photographs because they did not own proper attire.

Butcher = Solomon D. Butcher (1856-1927) アメリ  
カの写真家

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41 [1991-A]

Only the smallest fraction of the human race has ever acquired the habit of taking an objective view of the past. For most people, even most educated people, the past is merely a prologue to the present, not merely without interest in so far as it is independent of the present, but simply inconceivable except in terms of the present. The events of our own past life are remembered, not as they seemed to us at the time, but merely as incidents leading up to our present situation. We cannot persuade ourselves — in fact, we make no attempt to do so — that undertakings which ended in failure were entered upon with just as much forethought and optimism as those which have

profoundly affected our lives.

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**42** [1991-B]

The picture postcard was divided into six small sections. There were views of the beach, the promenade, the bowling green, the pier, the flower-gardens and the war memorial. In the middle, inscribed in capital letters, was the name **WORTHING**.<sup>\*</sup> The photographs, in smudgy black and white, appeared to have been taken before the war. It was an ugly card — the fussy little segments distracted and repelled the eye — but Henry could mentally trace the motives behind its purchase with perfect confidence, for it was just the sort of card he had bought himself in past years to send to friends or relatives. Six pictures for the price of one was good value for money and eliminated the problem of choice.

<sup>\*</sup> **WORTHING** = イングランド南部の保養地

**43** [1992-A]

What is new to our time is the realization that, acting quite independently of any good or evil intentions of ours, the human enterprise as a whole has begun to strain and eat away at the natural terrestrial world on which human and other life depends. Taken in its entirety, the increase in mankind's strength has brought about a decisive, many-sided shift in the balance of strength between man and the earth. Nature, once a harsh and feared master, now lies in subjection, and needs protection against man's powers. Yet because man, no matter what intellectual and technical heights he may attain, remains embedded in nature, the balance has shifted against him, too, and the threat that he presents to the earth is a threat to himself as well.

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**44** [1992-B]

Philosophers love posing dilemmas. Here's one.

You're standing in the National Gallery at the opening of an art exhibition. Suddenly a fire breaks out and spreads with enormous speed. In front of you is a priceless Leonardo. To your right is one of the country's most respected elder statesmen. To your left is your four-year-old daughter. You can only rescue one of them. Which do you save?

Well, if you emerged into the open air with the painting or the statesman, you might have contributed to the greater good. But I wonder whether we would altogether trust you as a human being.

Somehow, the family goes to the heart of our sense of moral obligation. Our ties to our children and to our parents are fundamental; and not the result of any rule or reflection. Rather, they have to do with who we are and our peculiar relationship with those who brought us into the world and those we have brought into being in turn. We would be inclined to say it is an instinct, a natural feeling. But it is also a matter of culture, of acquired values.

New techniques used in film-making have made movies more vividly lifelike in recent years and further developments may make it possible to copy reality still more closely. Even so, there will always be a distinct difference between experience of the real world and the experience in the cinema. Perception of reality is an active process whereas our activity while watching a movie is strictly limited. What we see in the real world is the product of our own will and choice. In the cinema we have to accept the point of view given to us. The making of a film requires the choice of a viewpoint which controls what is shown on the screen, thus limiting our normal freedom to survey what is in front of us, to select and examine what catches our attention or interest. We can watch. We can listen. We cannot investigate for ourselves.

**46** [1993-B]

For only a tiny fragment of human history has man been aware even that he had a history. During nearly all the years since man first developed writing and civilization began, he thought of himself and of his community in ways quite different from those familiar to us today. He tended to see the passage of time, not as a series of unique, irreversible moments of change, but rather as a continuous repetition of familiar moments. The cycle of the seasons — spring, summer, fall, winter, spring — was for him the most vivid, most intimate sign of passing time.

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**47** [1994-A]

There can be no human society without conflict: such a society would be a society not of friends but of ants. Even if it were attainable, there are human values of the greatest importance which would be destroyed by its attainment, and which therefore

should prevent us from attempting to bring it about. On the other hand, we certainly ought to bring about a reduction of conflict. So already we have here an example of a clash of values or principles. This example also shows that clashes of values and principles may be valuable, and indeed essential for an open society.

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**48** [1994-B]

The huge blue heron glides over our cottage roof and settles down gently, taking up his post at the mouth of the tidal cove. Standing guard on elegant long legs, he picks off trespassers who swim too close to the border. When he is through and the water begins to intrude again, he takes off, arching out over the bay.

Every day since we arrived, the great bird has followed this pattern. He arrives at each low tide like clockwork — no, nothing like clockwork. Watching

him at my own porch post, I cannot imagine anything more different than tides and clocks, any way of life more different than one in tune with tides and another regimented by numbers.

The heron belongs to a world of creatures who follow a natural course; I belong to a world of creatures who have fractured continuity into quarter hours and seconds, who try to mechanically impose our will even on day and night. But each year I come here, vacating a culture of fractions and entering one of rhythms. Like many of us, I need a special place, just to find my own place, my own naturalness.

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49 [1995]

There is an extremely powerful conceptual connection between our idea of *mind* and our idea of *writing*. Records are understood as a sort of external memory, and memory as internal records. Writing is understood as thinking on paper, and thought as

writing in the mind. By means of this conceptual connection, the written work is taken as a substitute for or even as the essence of the author: the author's mind is an endless paper on which he or she writes, making mind internal writing; and the book the author writes is external mind, the external form of that writing. The writing is therefore conceived of as having a voice, one that speaks to us, and to which we respond. The author is understood as the self thinking. The self is understood as an author writing in the mind. Sometimes, the self is an author writing thoughts externally on paper. This makes it extremely easy for us to talk about "putting our thoughts down on paper" and to see the author's self as contained in the writing. This makes the everyday reference to writing by its author's name — as in "Pascal is on the top shelf" — seem so natural.

Four and a half billion years ago, the earth was formed. Perhaps a half billion years after that, life arose on the planet. For the next four billion years, life became steadily more complex, more varied, and more ingenious, until, around a million years ago, it produced mankind — the most complex and ingenious species of them all. Only six or seven thousand years ago — a period that is to the history of the earth as less than a minute is to a year — civilization emerged, enabling us to build up a human world, and to add to the marvels of evolution marvels of our own: marvels of art, of science, of social organization, of spiritual attainment.

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If, as I intend, I go on living in New Mexico, I suppose I shall know it far better than I do now, but I suppose I shall never again see it as clearly as during

my first year. And what is there about this land which sets travelers to altering their schedules and overstaying? What is there, more forcefully still, that has seized upon astonishing numbers of people who came to look, and then put down their luggage and remained? As it has upon me. I had no intention of living here. When in late August we drove through a hurricane out of our Connecticut village — my wife, three of my children, with eleven pieces of lightweight baggage, and trustful that though New London\* was flooded we might get a train in Hartford\* — we were leaving for a year. I had lived all my more than forty years in New England, I wanted a change, and I wanted to see the Southwest.

New London と Hartford とは、アメリカ合衆国の Connecticut 州の町の名前である

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52 [1997-A]

Why do mothers instinctively hold babies on their

left side? One theory was that it was a matter of convenience — mothers need their right hand free to feed the baby. Others thought it had something to do with the greater sensitivity of the left breast. But now, says a medical magazine, doctors have found the answer: mothers cradle on the left because it leaves the baby's left ear exposed. The left ear feeds information to the right side of the baby's brain, the side which interprets the melody and emotional sound quality of the mother's voice.

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**53** [1997-B]

Home is where the heart is. But at the same time, home is so sad. Bland's attitude towards his flat was the somewhat shifting point at which these two attitudes met. When he was away from it he thought of it longingly, as the place which would always provide him with a refuge from the world. When he was actually inside it, safe and warm and quiet, as he

had always wished to be, it irritated him, precisely on account of those same qualities for which he had felt such intense nostalgia. The quietness, which he cherished, tormented him. There seemed to be no way in which he could resolve the conflict between these feelings.

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**54** [1998-A]

Reading is not a passive act. Good writing of any kind will invite you to participate, engaging your senses, emotions, imagination, and intellect. It will trigger your own memories and associations, and it will stimulate your thinking. When you read, you absorb, evaluate, and extend what the writer has articulated, interpreting it in light of who you are and what you know. In this sense, when you read a work of literature, you recreate it.

**55** [1998-B]

Human cultures evolve differently under varying circumstances, just as biological systems do. From one culture to another, different attitudes about human relationships with nature — about the degree to which human beings are part of or separate from nature — prevail, and different assumptions arise concerning the roles human beings play in the natural order.

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**56** [1999-A]

A prudent employer would take the time to analyze the incentives workers might list as their reasons for working — and most importantly, the order in which they list them. A recent study disclosed that money was number seven on such a list. Topping it was satisfaction in performing the job. Obviously, that good feeling one gets from having accomplished something is still the best reward for hard labor. But workers also need to know they are doing their job

well, and the major deficiency within management today is the failure of telling them so.

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**57** [1999-B]

It is good when someone speaks out about an issue that troubles a group, because then it can — must — be faced. I know from experience that the habit of avoiding controversy can in the end cause far more trouble than it avoids, because strong feelings, unexpressed, don't die but build up. They can accumulate other resentments that might otherwise be unimportant. In the end, if we are not to be possessed by hidden ill-feeling, we have to listen to one another.

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**58** [2000-A]

The mass media, printed and broadcast, are probably the most pervasive influences on attitudes

and opinions in the modern world. Access to mass media is, in fact, one of the defining characteristics of modernity. Other, more powerful forces may exist within a given region or culture. On a global basis, however, in terms of sheer numbers reached, other forms of communication cannot compete with the words and pictures carried in newspapers, broadcasts, magazines, and advertising. For example, the ways women are presented in the mass media strongly affect people's notions on woman's place, as it is and as it ought to be.

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**59** [2000-B]

Any grouping of human beings has its own world: a certain range of knowledge and certain modes of evaluation. Such a worldview is subject to constant modification as time rolls on. Nor can its association with the particular grouping prevent it from being adopted, to a greater or a lesser extent, by members of

some other grouping. On the contrary, information, tastes, habits, modes of feeling and judgement can be transmitted from one sociocultural grouping to another, and individuals can in any case have loyalties to more than one grouping, so that they themselves are mobile between different worldviews accordingly.

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**60** [2001-A]

For better or worse, there is no doubt that English is now a world language. It is also of course a rapidly changing one, and no one can predict how it will develop. It seems likely, however, that there will be movement in two directions: on the one hand, towards greater standardization of English used as a shared means of communication in international contexts; and on the other, towards varieties of English which are only used, or understood, within particular countries or communities.

The function of the nursery school is not to be a substitute for an absent mother, but to supplement and extend the role which in the child's earliest years the mother alone plays. The nursery school is probably most correctly considered as an extension 'upwards' of the family, rather than an extension 'downwards' of the primary school. It seems desirable, therefore, before discussing in any detail the role of the nursery school and of the teacher in particular, to set down a summary of what the infant needs from the mother, and the nature of the role that the mother plays in fostering healthy psychological development in the child's earliest years. It is only in the light of the mother's role and the child's needs that a real understanding can be gained of the way in which the nursery school can continue the mother's work.

It was language that, for the first time, enabled our ancestors to teach others, including their children, about objects and events that were not actually present. There are other intelligent animals living today with complex brains and elaborate communication systems, but they cannot, so far as we know, do that. Chimpanzees and other apes can be taught many of the signs of American Sign Language, ASL. They have acquired three hundred or more, and can use them in new contexts and with each other as well as their trainers. But they did not, during their evolution, develop the uniquely human ability to talk about that which is not present, share events of the distant past, plan for the far-off future, and, most important, discuss ideas, exchanging them to share the accumulated wisdom of an entire group.

**63** [2002-B]

Any adult who interacts with a child, any traveler who visits other cultural groups, any historian who studies beliefs and attitudes of the past immediately becomes aware that others might not interpret the world as she or he does. Even peers from the same culture are confronted with these issues, such as when communication falls or when one person misunderstands another. When we make such observations, we often say the others have different concepts from us; this sort of statement is especially common in discussions of children.

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**64** [2003-A]

As a beginning we should try to clarify our thinking by looking, in some historical depth, at the presuppositions that underlie modern technology and science. Science was traditionally aristocratic, speculative, intellectual in intent; technology was

lower-class, empirical, action-oriented. The quite sudden fusion of these two, towards the middle of the nineteenth century, is surely related to the slightly prior and contemporary democratic revolutions which, by reducing social barriers, tended to assert a functional unity of brain and hand. Our ecological crisis is the product of an emerging, entirely novel, democratic culture. The issue is whether a democratized world can survive its own implications. Presumably we cannot unless we rethink our axioms.

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**65** [2003-B]

Did you ever think, when you held or looked at a beautiful pearl, that its origin was irritation? An oyster, in response to the irritating presence of sand within its shell, creates a thing of beauty. Not only is the conflict resolved but value is created. When we understand that conflict includes the potential for us to create beautiful pearls and contribute to the world

and to ourselves, then we begin to open up our shells, less concerned about letting life in. Embracing conflict can become a joy when we know that irritation and frustration can lead to growth and fascination.

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**66** [2004-A]

Lectures on videotape, on audiotape and — if delivered from detailed, antique notes — even in the lecture hall, come closer to the way knowledge is stored in books or on the Internet than to the manner in which it can be created and obtained through open questions and collaboration. As a method of conveying information, lectures lack the speed and the free-ranging exploration typical of computer access to data. The information they contain is rarely the reason for our interest in them; the source of their fascination is the eloquence and angle of vision of the lecturer. What makes such presentations worthwhile is the opportunity they afford of seeing, and asking

questions about, how another human being perceives the world.

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**67** [2004-B]

Colors have specific significance based on the various meanings our culture associates with them, and we use them like a simple language. Blood is red, for example, so red in many cultures is seen to be an aggressive color and is used both as a warning, as in the sign system used for road traffic, and to signify passion, as in the gift of a red rose. In traffic signs, green, the color of nature and harmony, is used as the opposite of red to mean 'safe to go'. Perhaps because we associate darkness and 'the night' with death, clothes at funerals are black to acknowledge mourning, whereas at carnivals we put together as many bright, primary colors as possible.

**68** [2005-A]

One of the most interesting forms of insect behavior is exhibited by the social insects, which, unlike the majority of insect species, live in organized groups. The social insects include wasps, bees, and ants. Characteristically an insect society is formed of a parent or parents and a large number of offspring. The individual members of the society are divided into groups, each having a specialized function and often exhibiting markedly different bodily structures.

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**69** [2005-B]

Research is hard work, but like any challenging job well done, both the process and the results bring immense personal satisfaction. But research and its reporting are also social acts that require you to think steadily about how your work relates to your readers, about the responsibility you have not just toward your subject and yourself, but toward them as well,

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especially when you believe that you have something to say that is important enough to cause readers to change their lives by changing what and how they think.

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70 [2006-A]

The dictionary tells us that luck is the favorable or unfavorable occurrence of a chance event that could not have been foreseen. Of course, we don't need a dictionary to define luck for us: it is one of the critical aspects of our lives, and it plays an important role in how we make sense of things that happen to us, and to others. You don't have to be a gambler or a fortune-teller to believe in luck. Even people who consider themselves completely rational and who immediately dismiss superstition will still say "good luck" every now and again; perhaps they assume that the other party believes in luck, even if they don't believe in it themselves. But believe in it or not, luck is

unavoidable.

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**71** [2006-B]

Most living cells seldom last more than a month or so, but there are some notable exceptions. Liver cells can survive for years, though the components within them may be renewed every few days. Brain cells last as long as you do. You are given a hundred billion or so at birth and that is all you are ever going to get. It has been estimated that you lose five hundred brain cells an hour, so if you have any serious thinking to do there really isn't a moment to waste. The good news is that the individual components of your brain cells are constantly renewed so that no part of them is actually likely to be more than about a month old. Indeed, it has been suggested that there isn't a single bit of any of us that was part of us nine years ago. It may not feel like it, but at the cellular level we are all youngsters.

**72** [2007-A]

Scientists and animal trainers have devoted their lives to trying to understand what the world looks like to animals. After all, the planet is full of perceptive creatures — of whom we are a small minority — and it's more than a matter of idle curiosity to consider how life appears to them. Humans can't help approaching this problem from a human perspective. We posit our own intelligence, our behavior, emotions, and language skills, as the norm. A horse-trainer friend of mine is often asked if horses are intelligent. "It depends who's writing the test," he likes to say. I've often wondered how it would turn out if humans weren't the ones writing the tests, defining the norm.

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**73** [2007-B]

Communication is far more than speech and writing. Most of us are unaware that we are communicating in many different ways even when we

are not speaking. The same goes for other social animal species. We rarely learn about this mostly non-verbal human communication in school even though it is very important for effective interaction with others. Growing up in a society, we learn how to use gestures, glances, slight changes in tone of voice, and other auxiliary communication devices to modify or emphasize what we say and do. We learn these highly culture-bound techniques over years largely by observing others and imitating them.

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**74** [2008-A]

When Takanori Shibata first began robotic research 14 years ago, he wasn't interested in inventing a robot to help with jobs around the house. He wanted to design something that would improve the quality of people's lives. Shibata thought about animals and how they enriched the lives of the people who interact with them.

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As Shibata studied the interplay between animals and humans, he learned how pets have positive psychological and social effects on people, and began focusing on that aspect. In addition to cheering people up, domesticated animals can reduce stress and encourage communication in humans, particularly people who suffer mental and physical problems. He decided to design a therapeutic robot, one that would be unfamiliar, yet lovable. In 1998, he created Paro, modeled after a baby harp seal.

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**75** [2008-B]

How we handle our own feelings of impatience, hostility, and anger is a far more powerful example to our children than what we tell them to do with theirs. We don't want to impose our black moods on our children, but neither do we want to pretend that our angry feelings don't exist. In any case, we may as well be honest, for even when we try to cover up our anger,

our children sense how we feel.

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76 [2009-A]

Slang is more pervasive than ever, and teachers nationwide are wearying of the unyielding fight against improper speech and a breed of student that simply refuses to learn the correct way to use language. Furthermore, when asked what they perceive to be the cause of this situation, most of them point straight at new inventions, such as e-mail, cell phones, and \*instant messaging, wholeheartedly believing them to be the source of any perceived decline in youth literacy.

[注] \*instant messaging 「インスタント・メッセージ」(対話やメッセージのやりとりなどができるインターネット上の機能)

77 [2009-B]

The current understanding of anticipated climate change and its effect on ecosystems and societies, uncertainties and all, is not anecdotal. Rather, it is articulated explicitly as a consensus view of a world-wide community of researchers. Too few politicians and members of the public appreciate this. And although not every individual scientist involved will fully agree with each sentence and each probability estimate in the \*\*IPCC's reports, few if any will seriously question that what the IPCC delivers is as good a piece of scientific advice on climate change as anyone could hope to get.

[注] \*\*IPCC 気候変動に関する政府間協議会

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78 [2010-A]

Some people still persist in a view of the natural world and its inhabitants as having no other value than to serve humans as tools, objects, and resources.

This approach is very different from that of indigenous people who recognize no such hierarchy and do not see a separating wall between humans and the animal and plant kingdoms. They regard all creatures of the earth as fellow travelers and spiritual teachers.

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**79** [2010-B]

A legacy of humans' evolutionary past is the fact that extensive brain development occurs after a child is born. Other creatures have a genetic inheritance that includes a specialized body and mind fitted to a specific environment, but humans have a brain that grows while exposed to the environment. Brain development and the environment interact. A child is born with an ability to grasp complex patterns and learn from a wide number of possible environments. Interaction with the environment shapes a child's brain, narrowing its learning potential to fit the

actual community in which the child lives.

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**80** [2011-A]

Silence is an act of nonverbal communication that transmits many kinds of meaning dependent on cultural norms of interpretation. Our tendency to describe silence as an absence of speech reveals a particular cultural bias, implying that something is missing, but silence is a “something” with purpose and significance. Silent behavior occurs in all societies, although its message varies both between and within different groups. It conveys meaning, as does all communication, partly from the situational and interactional contexts of its use. Emphasizing the “use” of silence also focuses on the fact that silence does not simply exist but is actively created by participants.

**81** [2011-B]

Freedom of the mind requires not only, or not even especially, the absence of legal constraints but the presence of alternative thoughts. The most successful tyranny is not the one that uses force to assure uniformity but the one that removes the awareness of other possibilities, that makes it seem inconceivable that other ways are viable, that removes the sense that there is an outside. It is not feelings or commitments that will render a man free, but thoughts, reasoned thoughts.

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**82** [2012-A]

Culture is not something in opposition to biology; rather, culture is the form that biology takes in different communities. One culture may differ from another culture, but there are limits to the differences. Each must be an expression of the underlying biological commonality of the human species. There

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could not be a long-term conflict between nature and culture, for if there were, nature would always win; culture would always lose.

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**83** [2012-B]

What is cinema and what is a film? A mere hundred years old, the cinema has — in its different manifestations — become at once so obvious and so ubiquitous that one hardly appreciates just how strange a phenomenon it actually is. Not only an extraordinary entertainment medium, a superb storytelling machine, it also gives a kind of presence and immediacy to the world unparalleled elsewhere, and undreamt of before the cinema was invented. Nothing else seems to give such intense feelings; nothing involves people so directly and tangibly in the world out there and in the lives of others.

**84** [2013-A]

The fundamental reason why exceptional creativity and genius tend to elude institutional training is that they arise from many elements, such as motivation and personality, whereas schools, colleges, and universities focus chiefly on only one element: intelligence. Whatever intelligence consists of — and there is still no consensus after a century of intelligence testing — it does not appear to be the same as creativity. Intellectual skills and artistic creativity surely do not mutually exclude each other, but neither do they necessarily accompany each other.

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**85** [2013-B]

Like Galileo, Newton stressed the importance of comparing theories and models with experiments and observations of the real world, and always carried out relevant experiments himself, whenever possible, to test his ideas. This is so deeply ingrained as part of

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the scientific method today that it may seem obvious, even to non-scientists, and it is hard to appreciate the extent to which, even into the seventeenth century, many philosophers would speculate about the nature of the physical world in an abstract way, without ever getting their hands dirty in experiments. The classic example is the argument about whether two different weights dropped from the same height at the same time would hit the ground together.

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**86** [2014-A]

It is true that science requires analysis and that it has fractured into microdisciplines. But because of this, more than ever, it requires synthesis. Science is about connections. Nature no more obeys the territorial divisions of scientific academic disciplines than do continents appear from space to be colored to reflect the national divisions of their human inhabitants.

**87** [2014-B]

One way in which we evade responsibility for our actions is to hide behind the advice of others. Indeed, one of the main reasons we ask other people what they think is that we hope they agree with what we want to do, and so provide external validation for our choice. Lacking the courage of our own convictions, we seek strength in those of others.

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**88** [2015-A]

Of the total energy produced on Earth since the industrial revolution began, half has been consumed in the last twenty years. Disproportionately it was consumed by us in the rich world; we are an exceedingly privileged fraction.

Today it takes the average citizen of Tanzania almost a year to produce the same volume of carbon emissions as is effortlessly generated every two and a half days by a European, or every twenty-eight hours

by an American. We are, in short, able to live as we do because we use resources at hundreds of times the rate of most of the planet's other citizens.

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**89** [2015-B]

Humor is the broad term used to describe situations, characters, speech, writing or images that amuse us. At the physical level, it is no more than an involuntary response to a stimulus — laughter. Although we can imitate this in social contexts where we feel an obligation to be polite, genuine laughter comes upon us spontaneously; it is beyond our control. It may be a motor response, but we seek out experiences that will result in laughter, and if we don't get the physical reaction, we don't feel that we have been amused.

**90** [2016-A]

Human beings are good at finding all the ways in which to be creative within prescribed limits — painting inside a rectangular frame, writing in iambic pentameters or composing a sonnet. Scientists sometimes like to study how that creativity occurs, what it achieves, and where else to look for inspiration. Many artists are nervous about scientific analysis. They fear its success, worried that art might lose its power, or they might be diminished, if the psychological roots of their work and its impact on us were exposed.

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**91** [2016-B]

From a broad range of early cultures, extending back to about a million years, natural objects began to be used as tools and implements to supplement or enhance the capacities of the hand. For example, the hand is capable of clawing soil to dig out an edible root,

but a digging stick or clam shell is also capable of being grasped to do the job more easily, in a sustainable manner, reducing damage to fingers and nails.

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**92** [2017-A]

The advantage of the scientific approach over other ways of knowing about the world is that it provides an objective set of rules for gathering, evaluating, and reporting information, such that our ideas can be refuted or replicated by others. This does not mean that intuition and authority are not important, however. Scientists often rely on intuition and assertions of authorities for ideas for research. Moreover, there is nothing wrong with accepting the assertions of authority as long as we don't accept them as scientific evidence.

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**93** [2017-B]

Animals that are active at night usually have large eyes that let them make use of any available light. With owls, the eyes are so big in comparison to the head that there is little room for eye muscles, meaning owls can't move their eyes. Instead, owls must move their entire head to follow the movement of prey. However, having fixed eyes gives owls better focus, with both eyes looking in the same direction. And even though it seems that owls can twist their head completely around, most owls turn their head no more than 270 degrees in either direction.

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**94** [2018-A]

Growing older is an activity we are familiar with from an early age. In our younger years upcoming birthdays are anticipated with a glee that somewhat diminishes as the years progress. Our younger selves feel that time moves slowly, whereas, with advancing

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years, time seems to fly at an ever-quickenning pace. And late in life, or when a person is faced with a terminal illness no matter what their age, the sense of a finite amount of time remaining becomes acute, and there may be a renewed focus on making the most of one's allotted time in life.

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**95** [2018-B]

Culture is the location of values, and the study of cultures shows how values vary from one society to another, or from one historical moment to the next.

But culture does not exist in the abstract. On the contrary, it is inscribed in the paintings, operas, fashions, and shopping lists which are the currency of both aesthetic and everyday exchange. Societies invest these artefacts with meanings, until in many cases the meanings are so "obvious" that they pass for nature. Cultural criticism denaturalizes and defamiliarizes these meanings, isolating them for inspection and analysis.

In December 1877, Thomas Edison made history by recording ‘Mary Had a Little Lamb’ on his phonograph and playing it back. This was not just ‘an epoch in the history of science’, it was a revolution for the human voice. Before then, hearing someone talk was exclusively a live experience: you had to be listening as the sounds emerged from the speaker’s mouth. We can read the text of great speeches that predate the phonograph, like Abraham Lincoln’s Gettysburg Address, but how exactly the president delivered the lines is lost forever. The phonograph captured the way things are said, and this can be just as important as the words themselves. When someone says ‘I’m all right’, the tone of their voice might in fact tell you they are not all right.

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In recent years, study after study examining

exercise and weight loss among people and animals has concluded that, by itself, exercise is not an effective way to drop pounds. In most of these experiments, the participants lost far less weight than would have been expected, mathematically, given how many additional calories they were burning with their workouts. Scientists involved in this research have suspected and sometimes shown that exercisers, whatever their species, tend to become hungrier and consume more calories after physical activity.

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**98** [2020-A]

Perhaps the most defining feature of deep friendship is “doing for,” as when my friend has my back in a combat situation, or brings me soup or medicine when I’m sick. Only strong bonds, built through embodied mutual activities, have the power to motivate real sacrifices. But it is unclear why online “friends” would bother to do the hard work of

friendship.

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**99** [2020-B]

Attention restoration theory looks at the two main types of attention that humans employ: directed and undirected attention. Directed attention requires us to focus on a specific task and block any distractions that may interfere with it. For instance, when we are working on a math problem, or engrossed in reading a literary passage or in assembling or repairing an intricate mechanical object, our brains are totally dedicated to the task at hand, requiring our direct undivided attention. After we complete the task we often feel mentally fatigued or drained. Conversely, when we are outdoors, we may enjoy observing patterns or a sunset, clouds, flowers, leaves or a beautiful meadow, which call on our undirected attention.

**100** [2021-A]

One of the oddest aspects of American culture is our general dismissal of commensality. Most human cultures have considered food preparation and consumption, especially consuming food together, as essential to family, tribal, religious, and other social bonds. Some people would go even further and say that as social creatures, eating together makes us more socially adept and indeed happier human beings. However, in our highly individualistic society the value of eating and drinking together is probably honored more in the breach than in the observance.

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**101** [2021-B]

In language, the relationship between the form of a signal and its meaning is largely arbitrary. For example, the sound of “blue” will likely have no relationship to the properties of light we experience as blue nor to the visual written form “blue,” will sound

different across languages, and have no sound at all in signed languages. No equivalent of “blue” will even exist in many languages that might make fewer or more or different color distinctions. With respect to language, the meaning of a signal cannot be predicted from the physical properties of the signal available to the senses. Rather, the relationship is set by convention.

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**102** [2022-A]

Many owners identify what they think is a dog’s “guilty look”, but science has shown that this is actually a reaction to the owner’s body language at that moment. Guilt is a relatively complex emotion. The dog is simply worried that it’s about to be punished, without knowing what it’s done wrong.

(<https://www.bbc.co.uk/programmes/articles/5dVxCLC17wL7G7Q0h1YRHd8/eleven-pawsome-f-acts-about-dogs>)

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The notion that religion is a force produced by cultural evolution, and that it primarily exists to produce functional benefits to individuals and groups can explain why religions are *in decline* in some parts of the world. As human societies created nations, and devised mechanisms for self-governance, the gods who were so effective at enforcing group norms and ethical behavior through punishment were no longer as necessary.

(Vedantam, Shankar & Mesler, Bill. 2021. *Useful delusions: The power and paradox of the self-deceiving brain*. W .W W. Norton & Co. より一部抜粋)

## 12 後期目程

104 [1989-A]

The motives that bring an audience together to hear a talk are bound to be mixed. Some members will have come out of genuine interest in what you have to say; others will come because they regularly attend the meetings, whatever the topic for the evening. A certain number will come a little reluctantly, in response to a pressing invitation from the organizer or another member anxious to build up the audience to a respectable size. Some will be present because friends have brought them and a few may be there because their lives are lonely and an event such as your speech will take them out of their homes and into the company of others. Of course you cannot take account of all these different motives, but it is as well to remember that an audience is made up of individuals and some strange chemistry turns them into a single body with a character of its own. One main part of that process is you, the speaker. You will

be the one responsible for the audience leaving the hall either pleased and stimulated or bored and depressed.

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**105** [1989-B]

Leisure in the twentieth century has been dominated by the greater spending power of the majority of the people. This has led to higher standards of comfort in the home, and the home has become a place of leisure because of shorter working hours. At the same time labour-saving devices have released men and — especially — women from much of the housework and provided a ready market for commercialized leisure products outside the home. Standards and expectations which once were the experience of only the very wealthy have gradually been democratized until they have reached all but the poorest sections of society. Nowhere is this more clearly exemplified than in the history of holidays.

**106** [1990-A]

The social experiences and values of the old and the young have always been in conflict; if younger people did not question the advice and beliefs of their parents, little change or 'progress' would ever occur. But with the accelerating speed of change in modern times, the conflicts between members of different generations, or between those people anxious to adjust to change and those less inclined to do so, were in danger of becoming more harmful than helpful. Furthermore, the very phrase by which these conflicts are described, the 'generation gap', was becoming out of date.

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**107** [1991-A]

Within England, it was the railways which, by lowering the cost of transport and by speeding the movement of perishable produce, had the most profound impact on agriculture. Instead of making the

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long journey from Wales, Scotland or northern England on the hoof, cattle could be transported by rail without loss of weight. The railways also influenced the supply of milk to London, which had formerly depended mainly on urban cowhouses or on farms in the immediate vicinity of the metropolis. Only 4 per cent of supplies was transported by rail in 1864, and that from farms within a fifty-mile radius, but by 1891 the proportion had increased to 83 per cent and substantial quantities came from as far afield as Wiltshire\* and Staffordshire.\*\* Change on this scale would not have been possible without the railways, even though the initial cause of this switch was the cattle plague of 1865.

\* Wiltshire=ウィルトシャー州(イングランド南西部の州)

\*\* Staffordshire=スタッフォード州(イングランド中部の州)

**108** [1992-A]

One of the most obvious practical needs we have is to be able to communicate. It is worth asserting again the need to distinguish the concept of language, as something as necessary to us as our limbs or our most essential man-made tools like spades and kettles, from that of literature. Literature, being a form of art, unlike language, is dispensable. In saying this I do not mean to trivialize art. Far from it. Our highest and most serious imaginative inventions may show themselves in the medium of the arts. And our greatest pleasures may be found there.

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**109** [1993-A]

In order to survive and produce young, most animals depend on their relationship with other members of their own species. They can be aggressive towards one another, as in the fights which occur over food or living space, but much of the time they work

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closely together and give each other help.

It would be a mistake to think that this co-operation is due to kind-heartedness or because their attitude to their neighbours is simply unselfish and generous. They behave in this way for the same reason that, in other circumstances, they fight or drive each other away: because they or their young gain some advantage. This explanation may at first be hard to accept, considering the behaviour of an animal, for example, when it defends its young against an enemy even at the risk of its own life, with no advantage to itself. Taking a wider view, however, it becomes clear that animals which protect their young, even at the cost of suffering themselves, have the chance of increasing their numbers and thus strengthening their position in a highly competitive world.

About a quarter of a century ago many historians decided that it was high time to study rather more of the population than the top 2 per cent or 3 per cent from whom were drawn the political and social elite: the kings, generals, nobles, judges, bishops, politicians and local magnates whose (mostly bloody) deeds had hitherto filled the history books. The trouble was, however, that very few of the remaining 97 per cent have left any trace of themselves in the records, except the bare facts of their birth, marriage and death. As a result, much of the early work on this group was aridly\* statistical in nature. But it fairly soon became apparent that reducing the vast majority of the population to a set of numbers in a table was hardly more enlightening than ignoring them altogether. We still did not know anything about what they thought or felt. One way out of this dilemma was to turn to the records of the court, for here alone can the authentic voices of these people be heard.

\* arid: dry, uninteresting, dull

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111 [1995-A]

By its nature, the expensive habit is not only physically gratifying but also beyond the financial reach of all but a fortunate few, thus making it a treat for the mind as well as the body. There is no lasting satisfaction to be gained from eating caviar and wearing cashmere sweaters if your neighbour, your chauffeur and your greengrocer are all as privileged as yourself. The course of social history is marked by countless expensive habits, from golf to foreign travel, that have lost their appeal as they have become more generally available, but we in our creativity have always been able to devise rarer and ever more luxurious alternatives to anything that threatens to become commonplace.

History begins when men begin to think of the passage of time in terms not of natural processes — the cycle of the seasons, the human life-span — but of a series of specific events in which men are consciously involved and which they can consciously influence. History, says a famous historian, is ‘the break with nature caused by the awakening of consciousness.’ History is the long struggle of man, by the exercise of his reason, to understand his environment and to act upon it. But the modern period has broadened the struggle in a revolutionary way. Man now seeks to understand, and to act on, not only his environment but himself; and this has added, so to speak, a new dimension to reason, and a new dimension to history. The present age is the most historically-minded of all ages. Modern man is to an unprecedented degree self-conscious and therefore conscious of history. He peers eagerly back into the twilight out of which he has come, in the hope that its

faint beams will illuminate the obscurity into which he is going; and, conversely, his hopes and anxieties about the path that lies ahead quicken his insight into what lies behind. Past, present, and future are linked together in the endless chain of history.

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**113** [1997-A]

By late June, the early summer rainy season is well underway, with thick, humid air and prevailing dark skies. The rain front develops between a cold high pressure system over Siberia and a warm high pressure system over the Pacific Ocean. The result is a month or more of quite unpleasant weather.

Still, the Japanese rainy season does not necessarily bring heavy rain all day long. Clear blue skies, of course, are few and far between, but there are usually enough breaks in the rain for short botanical explorations into nearby parks and gardens.

Lack of skill in conversation is also likely to make poor readers, at least of many kinds of writing. The good reader enters into an active dialogue with the writer. He converses with him, even argues with him. The bad reader reads passively; the words do not engage his mind; he is like a bored listener at a lecture. Such a reader, studying a text, is very likely to use his mind as if it were a photographic plate, as if by staring hard enough and long enough at words on a page he could fix them in his memory. This never works. In courses like maths or science, in which one must often follow instructions, turn other people's words into action, the inarticulate child often finds that he can't do it. Or he may find that he cannot separate in his mind what he understands from what he does not, or state his confusions clearly enough to enable others to help him. In short, the child in school who is not fluent with words is bound hand and foot. No doubt our schools are too symbol-minded, and should give more

time and scope to other forms of expression. Perhaps some day they will. Right now, it is fluency that pays. Yet, in almost all schools, hardly anything is done to help children become fluent, precise, and skillful in speech.

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**115** [1998-A]

Whether consciousness could arise in a complex, artificial system is a question many people find intrinsically fascinating. Although it may be decades or even centuries before such a system is built, a series of experiments offers strong evidence that an artificial brain, if organized appropriately, would indeed have precisely the same kind of conscious experiences as a human being.

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**116** [1998-B]

For many Americans wilderness stands as the

last remaining place where civilization, that all too human disease, has not fully infected the earth. It is an island in the polluted sea of urban-industrial modernity, the one place we can turn for escape from our own too-muchness. Seen in this way, wilderness presents itself as the best cure for our human selves, a refuge we must somehow recover if we hope to save the planet.

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**117** [1999-A]

Should a group have an appointed or elected leader? Or should everyone in the group share the responsibility for leadership? When someone is appointed or elected leader, the group looks to him or her for leadership. If the individual is a good leader, the group will benefit. Each participant can concentrate on considering the issues being raised, confident that the leader will guide the group justly. The disadvantages of having an appointed or elected

leader are seen when the person is so unsure of direction that the group rambles about aimlessly; when the leader is so dominant that participants do not feel free to contribute spontaneously and the discussion follows a path predetermined by the leader; and when the leader is so unskilled that the group becomes frustrated and short-tempered. Good leadership is a necessity; when the appointed leader cannot provide it, the group suffers.

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**118** [1999-B]

Soot, pencil lead and diamonds are all forms of carbon. The beauty of the diamond crystal is due to immense pressure over millions of years on what started as plant debris, gradually squashed into peat and coal. So that is what pressure can do, converting formless fragments into treasure. 'Rough diamonds' are what we call people in whom the pressures of life have developed great strength and character without making them uncomfortably perfect. Spiritual life

seems to parallel natural diamond formation. We have all probably seen the miracle of people under extreme pressure, be it physical, emotional or moral, developing a new and shining strength.

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**119** [2000-A]

One of the most basic spiritual principles in many philosophies is the idea of opening your heart to “what is” instead of insisting that life be a certain way. This idea is so important because much of our internal struggle stems from our desire to control life, to insist that it be different than it actually is. But life isn’t always the way we would like it to be — it is simply the way it is. The greater our surrender to the truth of the moment, the greater will be our peace of mind.

When we have preconceived ideas about the way life should be, they interfere with our opportunity to enjoy or learn from the present moment. This prevents us from honoring what we are going through,

which may be an opportunity for great awakening.

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**120** [2000-B]

That nineteenth-century Britain was radically unequal is self-evidently true. For many, the difference in power and wealth between, on one hand, the very rich and others holding dominant positions in the British Establishment, and, on the other, the great majority of people for whom the economic changes of the industrial revolution brought only want and misery, was the central salient feature of nineteenth-century life. Yet against the existence, and possible growth, of economic and social inequality in Britain must be set the growth of parliamentary democracy and the gradual, but almost continuous, growth of civic and political rights. It may well be that important trends in equality and inequality in nineteenth-century Britain produced contradictory long-term results.

**121** [2001-A]

Loneliness is currently one of the biggest problems facing the elderly, but I expect technology to contribute a lot to quality of life, especially for people who are house-bound or bed-bound. Economically, the affluent elderly represent an enormous potential market, albeit one that has been ignored until now. All that is going to change. Indeed the fastest growing market for internet users in the United States is now among the over 60s.

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**122** [2001-B]

It is frequently said that people tend to have an irrational fear of crime. Older people, especially those living in poorer areas, are often anxious about being mugged, when the chances of this happening are low. Young men are much more likely to be victims of assault than the elderly. However, this ignores the fact that people who fear crime alter their behavior so

as to avoid potentially threatening situations — not going out after dark and so on. The risk of being a victim of crime thus seems lower than it actually is.

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**123** [2002-A]

‘Time’ has been established as the most widely used noun in the English language. It is not surprising therefore that our everyday communication is full of references to time. The same word, however, is used to convey a multitude of very different meanings that are rounded in a variety of theories of time. We speak of clock time and winter time, of opening times and bad times, of the right time for action and the timing of an interaction. We refer to the time of things and processes, to a time that flies and a time that takes its toll.

**124** [2002-B]

An individual person is unique and valuable. This value we place on the individual finds expression in a cluster of ideas and attitudes. People should be treated as ends in themselves, and never merely as means. One person's loss is not necessarily justified by someone else's gain. People have rights. And, linked to these ideas (psychologically if not logically) is the pleasure we take in human variety, and a reference for a society in which individuality flourishes.

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**125** [2003-A]

When countries move out of extended periods of violence, societies and leadership alike need to decide whether and how to deal with the widespread human rights violations that have been committed. In considering whether to close the book on such abuses or to investigate what happened and hold individuals responsible, ethical and political considerations need

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to be balanced: the demands of justice must be weighed against what is politically feasible. A tension is then often perceived to exist between the pursuit of both justice and peace, given the politically unstable nature of a transition. It is feared that the former may jeopardize the latter when a democracy or peace agreement is still fragile.

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**126** [2003-B]

Globalization is not just an economic matter but is concerned with issues of cultural meaning. While the values and meanings attached to place remain significant, we are increasingly involved in networks which extend far beyond our immediate physical locations. We are not of course part of a world state or unitary world culture, but we can identify global cultural processes which are independent of inter-state relations.

**127** [2004-A]

When people behave in ways we find strange or offensive, we often attribute this to their cultural background. We are inclined to speak of culture as though the word had a clear and unambiguous meaning. In fact, however, as soon as we try to define it, the concept of culture proves to be an extremely slippery one. We should therefore be very cautious about attributing anybody's behavior to his or her culture.

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**128** [2004-B]

It is easy to take maps for granted — road maps help to guide us between towns and cities; street maps help us to find places we want to get to; we might use detailed large-scale maps to guide us when we go for walks in the countryside. Few of us can probably remember a time in our lives when we didn't understand how to use maps like these, at least at a

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basic level. And yet maps are actually quite complicated abstractions. They are not simple photographs of reality, but representations of such aspects of reality as those preparing them wish to emphasize. They are highly selective in what information is included or excluded.

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**129** [2005-A]

Farming has changed and developed rapidly over the last few decades, and looks set to continue to do so. It is molded by economic considerations to produce more and more product for less investment; by calls from environmentalists to use methods that do the minimum of damage to the natural world; by pressure from supermarkets to supply uniform, attractive food all year round; and by varying demands from consumers, some of whom want cheap food above all, and others who are prepared to pay more for genuinely fresh food from a trustworthy source. In

many ways farming has become polarized into two main systems — agribusiness and organic farming — although many farms use methods from both. The world needs high technology, but humanity has a disturbing tendency to let technological development lead the way, with politics and ideology following behind. We need to ensure that the farming of the future provides safe, tasty food for the expanding world population in ways that are sustainable, and allow humans and other species a good quality of life.

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**130** [2006-A]

Unlike length, capacity and weight, time can be neither seen nor felt. All timing devices measure time in terms of some quantity other than time. In the case of a clock, this quantity is distance, or rotation; in the case of a sand timer, this quantity is volume. A child who can tell the time from a clock face does not necessarily have a concept of the quantity that the

clock is actually measuring, time. An activity or game in which children are absorbed seems to take a short time, while a boring lesson seems to last an eternity. How can we make them aware that we can measure how long it takes to do something?

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**131** [2006-B]

In the rich and fascinating tradition of philosophy there are various schools of thought, and individual philosophers have often put forward views which conflict with those of other philosophers. The point is not that there are final answers in philosophy which one can accept, like buying a ready-made suit. What the philosophers agree about is that we have to think things through for ourselves, taking the different sides of every problem into account.

**132** [2007-A]

Prehistoric warfare is a topic that matters very much today because it has the ability to tell us a great deal about the human condition and even the human future. The nature and extent of warfare deep in our tribal past can help throw light on whether human beings are a fundamentally warlike or peaceful species. If the human condition has always been bound by warfare, then a pessimism about the prospect of changing this and an investment in a heavily armed nation state would be the rational choice. But if human nature is ultimately peaceable, then it makes more sense to be optimistic, to believe all disputes can eventually be resolved nonviolently, and to work for an international order dedicated to negotiation and agreement.

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**133** [2007-B]

The English language has more than one billion

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speakers worldwide. Many millions speak English as a native language, many more speak English as a second language, but most speak it as a foreign language. However, English is more than a language that people learn to express their thoughts. It is also a social phenomenon that promotes and reinforces certain types of social behavior. Some say that English is a deadly virus that is permeating the world and destroying local cultures. Others say it is a benevolent medicine that will cure the ills of the world as it promotes social and economic advancement.

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**134** [2008-A]

Characteristically the child moves in short bouts of no more than a few seconds. He stops between bouts for similar brief periods. Most of his walking time is spent drawing nearer to or farther from the mother. Objects and events in the environment do not appear to affect the way the child moves. The child does not

necessarily move away from the mother because he is attracted by an object nor return to her in flight from an object.

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**135** [2008-B]

Globalization is not just an economic matter but is concerned with issues of cultural meaning. While the values and meanings attached to “place” remain significant, we are increasingly involved in networks which extend far beyond our immediate physical locations. We are not of course part of a world state or unitary world culture, but we can identify global cultural processes, of cultural integration and disintegration, which are independent of inter-state relations.

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**136** [2009-A]

A large genetic study of the extinct woolly

mammoth has revealed that the species was not one large homogenous group, as scientists previously had assumed, and that there was not much genetic diversity among the species.

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**137** [2009-B]

Both writing and photography require observational skills and attention to detail. When you compose a piece of writing, an article for example, you have to decide which ideas to include and in which order to arrange them. You add \*transitions to lead the reader along in a way that is logical, from one paragraph to the next. Composing an image is similar. Again, you must decide what to put in the frame and what to leave out. But instead of arranging the elements sequentially, you arrange them in space, creating a pleasing balance and design.

[注] \*transitions つなぎことば

**138** [2010-A]

What is a human life worth? You may not want to put a price tag on it. But if we really had to, most of us would agree that the value of a human life would be in the millions. Consistent with the foundations of our democracy and our frequently professed belief in the inherent dignity of human beings, we would also agree that all humans are created equal, at least to the extent of denying that differences of sex, ethnicity, nationality, and place of residence change the value of a human life.

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**139** [2010-B]

As the global economy has grown, our ability to make complex products with complex supply chains has outpaced our ability to comprehend the consequences — for ourselves and the planet. We evolved to respond to threats that were clear and present. That's why, when we eat spoiled food, we get nauseated and when we see a bright light, we shut our

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eyes. But nothing in evolution has prepared us to understand the impact that imperceptible amounts of industrial chemicals may have on our children's health or the slow-moving, long-term danger of climate change.

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**140** [2011-A]

Parents have always worried about where to send their children to school; but the school, statistically speaking, does not matter as much as which adult stands in front of their children. Teacher quality tends to vary more *within* schools — even supposedly good schools — than among schools. But we have never identified excellent teachers in any reliable, objective way. Instead, we tend to ascribe their gifts to some mystical quality that we can recognize and revere — but not replicate. The great teacher serves as a hero but never, ironically, as a lesson.

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**141** [2010-B]

Enlightenment philosophy is imbued with a sense of life being in transit from a primitive origin to a utopian end. The maintenance of things as they are is not so much an end in itself as a means to an end, and the significance of the present stems from its being a staging post on the way to a better future.

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**142** [2012-A]

We live in a world densely populated by humans in close communication with one another over the surface of the earth. More and more, the world looks like a single society, a “global village.” But in fact, human society consists of a great many groups, as different from one another as the city dwellers of New York, rice farmers of India, and aboriginal hunters of northern Canada. People differ not only in their daily occupations and material wealth, but also in the ways in which they view the world around them. This

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multitude of perceptions is directly related to cultural diversity around the world, a diversity that is rapidly shrinking.

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**143** [2012-B]

From the point of view of popular culture, science often seems like little more than a hatchery for technology. While most educated people will concede that the scientific method has delivered centuries of fresh embarrassment to religion on matters of fact, it is now an article of almost unquestioned certainty, both inside and outside scientific circles, that science has nothing to say about what constitutes a good life.

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**144** [2013-A]

The ability to recognize individuals can convey significant benefits to social animals. In humans, the capacity to recognize different faces is crucial for

making individual behavior predictable for other members of a group — for keeping track of who is aggressive, bold or wise — and so for knowing everyone's place in a family or society. Moreover, there is strong evidence that primate brains contain specialized modules for face processing and recognition.

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**145** [2013-B]

In a democratic culture people are inclined to believe that it is presumptuous to claim to have better taste than your neighbor. By doing so you are implicitly denying his right to be the thing that he is. You like Bach, she likes U 2; you like Leonardo, he likes Mucha; she likes Jane Austen, you like Danielle Steel. Each of you exists in his own enclosed aesthetic world, and so long as neither harms the other, and each says good morning over the fence, there is nothing further to be said.

**132**

**146** [2014-A]

Education as a right, rather than a privilege, was a feature of the last years of the nineteenth century. This was partly a consequence of economic change; only when the national economy could afford to educate all the young, and dispense with their labour, could compulsory education become a reality.

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**147** [2014-B]

Every good scientist is a skeptic — the very premise of scientific inquiry is to not believe something unless there is compelling evidence for it and against all reasonable alternatives. The problem is that scientists aren't always skeptics in equal measure.

**148** [2015-A]

One of the basic facts which characterizes the nature of human association is the existence of rank differences between individuals and groups in all human societies. We cannot fully understand the social life of human beings unless we take into consideration how these rank differences influence their interactions and pattern their social relationships. Of course, the importance of rank differentiation varies greatly from one society to another and from time to time, but most societies have a well-structured and fairly evident rank order.

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**149** [2015-B]

With their eyes fixed on the future and guided by new international standards, architects and city planners are not only seeking to construct environmentally friendly buildings, but also redeveloping entire urban spaces to make the most of

limited natural resources, to reduce our impact on the environment and to improve the well-being of city-dwellers. The dream of economically, socially and — importantly — environmentally sustainable cities is here.

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**150** [2016-A]

When top sprinters line up for a major final, psychological rather than physical differences could decide who takes gold. In contests won or lost by hundredths of a second, athletes need every advantage they can get. So being able to handle pressure and manage the accompanying emotions is critical.

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**151** [2016-B]

When a chimpanzee gazes at a piece of fruit or a gorilla beats his chest to warn off an approaching

male, it's hard not to see a bit of ourselves in those behaviors and even to imagine what the animals might be thinking. We are, after all, great apes like them, and their intelligence often feels like a diminished — or at least a familiar — version of our own.



### 13 長文総合 〈前期〉

152 [1983]

I want to give a few examples to show how what the brain has learned influences the process we call 'seeing things'. Seeing, they say, is believing. But is it? An arrangement can be made so that a person looks through a peep-hole into a bare corridor, so bare that it gives no clues about distance. If you now show him a piece of white card in the corridor and ask how large it is, his reply will be influenced by any suggestion you make as to what the card may be. If you tell him that a particular piece is a visiting card, he will say that it is quite near. Show him the card at the same distance and tell him that it is a large envelope, and he will say that it is much further away. On the other hand, if you show a very large playing-card, say a Queen of Spades, he will say that it is very close, and if you show a tiny one he will say it is a long way away. Because, you see, playing-cards are nearly always of a standard size. In fact, the size we say things are depends upon what we

otherwise know about them. When we see a motor-car from far away, its image on the retina is no bigger than that of a toy seen near, but we take the surroundings into consideration and give its proper size. We can get some clues about how we do this from the situations in which we judge wrongly. When we are in an aeroplane, the houses below us all look like dolls' houses. Why do we not see them at their 'proper' size, as we do distant houses in the country? Evidently we use the clues provided by the ground, with which we are familiar. We are not used to estimating the distance of objects seen far away with nothing in between.

For most situations, however, we have learned to interpret the images on the retina in the light of the framework in which they are set. When one comes into a room and looks around the walls, the pictures in their frames throw all sorts of curious shapes upon the retina. But we do not say that a particular picture frame is an irregular one with sides not parallel. We interpret the angles, and say that the frame is square

or round, as the case may be. It can be shown that we do this largely by reference to the shape of the surrounding room. If the room is made to give false clues, we shall be misled in our reports about the pictures. This has been done in some experiments in America, in which people were made to look through a small hole into a specially made room with distorted walls. The sides of the room were not parallel and did not form right angles with each other, or with the ceiling. When perfectly ordinary pictures of people were hung on these funny walls, the viewers reported that the frames and faces had peculiar shapes, and they made all sorts of wrong statements about the sizes of objects in the room. But nobody said anything about the room being distorted.

注 retina = 網膜

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**153** [1984]

One of the most important properties of glass,

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which makes possible many of the production processes such as the blowing of glass bottles but makes the manufacture of flat sheets very difficult, is the continuous change of viscosity with temperature without any abrupt breaks. Glass has no melting point, in the manner of a metal, but becomes gradually softer as it is heated.

For normal uses, such as domestic windows, a glass with a good surface finish and low cost is needed, but a certain amount of distortion and lack of flatness can be accepted: this is known as sheet glass. However, for mirrors and motor cars and shop windows a much higher degree of freedom from distortion is necessary. For such purposes the superior properties of an entirely different glass — plate glass — are needed.

The modern sheet glass process has been developed since about 1913. The glass is drawn vertically in a ribbon from a bath in which it is kept at a controlled temperature to give it a viscosity similar to a thick syrup. The surface of glass made in this way has what is called “fire-finish”. This is the

surface achieved by letting the glass cool on its own and without touching anything solid while it is still soft. This is the best finish for glass and the cheapest.

However, the solidified ribbon of glass has a certain amount of distortion which cannot be avoided arising from small differences in viscosity due to variations in chemical makeup and temperature. The thickness of the ribbon of glass drawn from the bath is controlled by the viscosity, so that the effect of these variations is uneven thickness of the finished sheet. We have spent a great deal of time on research to improve the control of composition and temperature of the glass and have been able to reduce this unevenness in thickness to a remarkably low level, although even the best sheet glass does not compare in uniformity and flatness with plate. The machine needed to produce this sheet glass is relatively simple and the glass is therefore inexpensive. Even the best quality sheet glass is not good enough for certain purposes, particularly where large pieces are required and an oblique angle of view is likely. Up to the

present the only way of obtaining glass of this quality has been to grind the surfaces truly flat and parallel.

In the plate glass process a ribbon is formed by passing glass at about 1, 111° centigrade through a pair of water-cooled rollers. The surface of the ribbon is rapidly chilled and the imperfections of the roller surface are imprinted in the glass, leaving it rough and obscured. The ribbon passes through an annealing oven in order to remove the stresses set up by the rapid cooling of the surfaces as the glass passes between the rollers.

The next stage is to grind away the top and bottom surfaces of the glass to make them flat and parallel. After grinding, the glass sheet has a smooth semitransparent appearance. It is then polished with felt and polishing powder. Plate glass is very free from distortion, but the surfaces produced by the polishing process are not quite as bright as those which have been “fire-finished”. Inevitably, the glass is also expensive because of the complexity and size of the grinding and polishing processes.

〔注〕 viscosity=粘性 annealing=焼きもどし

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154 [1985-2]

When the modern Olympics were revived in 1896, more than fifteen centuries had passed since the classical games, in Olympia, Greece, had last been held. But those ancient games had not been forgotten — nor had their ideals of fellowship, fair competition, and pursuit of personal excellence.

There was nothing coincidental about the fact that those games, and those ideals, were Greek. Indeed, the idea that excellence is real, and can be striven for, pervaded Greek beliefs. As the famous Athenian leader, Pericles, said in the fourth century B.C., “our public opinion welcomes and honors talent in every branch of achievement, not for any sectional reason, but on grounds of excellence itself.”

Ancient Greece is said to be the mother of democracy. But it gave the world another powerful idea as well: that men, equal and free, should pursue

excellence in all they do And today, in free societies, the competition to excel can indeed be seen in every branch of achievement: in universities, as scholars seek to know the truth; in private enterprise, as businesses strive to make products the people want; in government, as leaders strive to improve their people's lives; or even in such fields as science, as scientists strive to be first with a new discovery or life-saving medical procedure. And, as we can see, the competition to excel is once again visible in the international fellowship of sports as Olympic contenders "go for the gold."

This competition to be the best seems to serve the victors but in fact, it serves us all. The pursuit of excellence produces excellence in realm after realm that benefits mankind. And therein lies the truth of the Olympic Creed: "the most important thing in life is not the triumph but the struggle."

**155** [1985-3]

There was a woman who worked in the publishing house. She once told the manager that she never read a book that didn't make her want to close it and go to sleep. She was a challenge to the manager, who loved books, and he spent many years giving this woman good books and bad books to read; the books were alike in that they put this woman to sleep. She just didn't like to read, she told him; but he would not give up on her. No one else in the publishing house ever asked this woman to read anything at all. The woman moved through the books lying all around the publishing house as if these books were ashtrays and she was a nonsmoker.

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**156** [1986]

As at all high altitudes, the temperature here drops quickly when the sun goes down and the nights, except in the very middle of summer, are usually cool.

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They are also, in the thinnish, dry air, exceptionally brilliant with stars, and the great band of the milky way is unusually distinct. On one of my first nights, a slender new moon was declining toward the west as the sun sank; for nearly two weeks thereafter I did what I have never done before — I watched the moon every night as it grew from the first silvery sliver to its full, round glory. This is an ideal spot for such an enterprise, and I suppose that fact tempted me to it, but I was astonished to realize that I had never undertaken it before and astonished at how beautiful and strange it seemed when one took the trouble to be really aware of what was happening. Every night my moon was about an hour later reaching a given place in the heavens; every night, very noticeably larger; and every night, revealing, through field glasses, more and more of those pits — once called volcanoes but now usually taken for meteor craters — which mark her mysterious surface. One need spend only ten minutes a night to see the show, but one should not miss a phase. On the first evening, the moon offers little

competition to the stars; soon, she is indisputably queen of the night. First the milky way yields, then the stars begin to fail one by one, and at the full she has the great bowl almost to herself.

Wondering that I had never really observed these things before, I was led to wonder further just how many of the obvious phenomena of the sky I should ever have noticed for myself if no one had ever called my attention to them; if I had been, for example, one of those shepherds of the East who are said to have been the first to take accurate note of them. To be sure, the shepherds had a sky much like this one, and they practiced a solitary profession with plenty of leisure thrown in. But unless I had had at least equally favorable circumstances, I am not sure that I should ever have been more than casually aware that the moon was sometimes present and sometimes absent, sometimes crescent and sometimes round. I am not sure that I or most of the people of my acquaintance, would ever have even counted the days of its circle; and I am equally unsure that I would ever have

noticed that the sun rises farther and farther to the north until, after the summer solstice, it begins to retire southward again. I grow pale to think how delayed science would have been had it been dependent upon me for its beginnings.

[注] high altitudes=高所 sliver=細長い裂片  
summer solstice=夏至

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157 [1986]

There are two obvious “modes” of pleasure. One we may call *intended* in that the event which brings pleasure is planned and intended, like the meeting with a lover or the visit to a concert. The second and much more important kind is *fortuitous*, in that it comes unexpectedly — not only the surprise meeting with an old friend, the sudden beauty of some usually banal landscape, but all those elements in the active intention to have pleasure that were not clearly foreseen. In fact, when we plan an intended pleasure

we always unconsciously assume that there will be a free bonus of the fortuitous kind. Our approach is that of the traveller: to the extent that his journey is planned and has definite aims he will get the pleasure intended, but he will also expect a very large content of the fortuitous kind, both in what he intended to happen to him and in what will happen to him by chance. In this way we hedge our bets — if the planned pleasures disappoint, there are the unexpected ones, and the other way round.

What is immediately striking about both these modes of pleasure is that they depend very largely on hazard. A girl may have long planned to marry. But when the wedding is finally present, is taking place, there is a sense of good luck. Nothing has happened, although many things could have happened, to prevent it. Perhaps she may look back then to the chance first encounter with the man who is now her husband; and the basic element of hazard there is overwhelming. In short, we are conditioned to see pleasure of both kinds as very largely a result of

hazard. We do not arrive at it so much as it arrives at us.

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**158** [1988-A]

My father was always interested in magic and carnival tricks, and wanting to see how they worked. One of the things he knew about was mind-readers. When he was a little boy, growing up in a small town called Patchogue, in the middle of Long Island, it was announced on advertisements posted all over that a mind-reader was coming next Wednesday. The posters said that some respected citizens — the mayor, a judge, a banker — should take a five-dollar bill and hide it somewhere, and when the mind-reader came to town, he would find it.

When he came, the people gathered around to watch him do his work. He takes the hands of the banker and the judge, who had hidden the five-dollar bill, and starts to walk down the street. He gets to an intersection, turns the corner, walks down another

street, then another, to the correct house. He goes with them, always holding their hands, into the house, up to the second floor, into the right room, walks up to a bureau, lets go of their hands, opens the correct drawer and there's the five-dollar bill. Very dramatic!

In those days it was difficult to get a good education, so the mind-reader was hired as a tutor for my father. Well, my father, after one of his lessons, asked the mind-reader how he was able to find the money without anyone telling him where it was.

The mind-reader explained that you hold onto their hands, loosely, and as you move, you pull a little bit. You come to an intersection, where you can go forward, to the left, or to the right. You pull a little bit to the left, and if it's incorrect, you feel a certain amount of resistance because they don't expect you to move that way. But when you move in the right direction, they give way more easily, and there's no resistance. So you must always be pulling a little bit, testing out which seems to be the easiest way. My father told me the story and said he thought it would

still take a lot of practice. He never tried it himself.

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**159** [1988-B]

There are two kinds of description. There is one kind— non-technical description—wherein the writer tries to tell you what he feels about something—that is the usual kind of description you find in most books. Let us take an example. If the writer wants to describe a simple thing like his chair and at the same time to tell you that although the chair is old, he loves its comfort and has used it for many years, he might write something like this:

“What a pleasure it is for me, on coming home after a hard day’s work, to see my chair near the window, inviting me to a few minutes’ repose. It isn’t a new chair; I’ve had it for many years; one of its arms is cracked a little, and the paint has long since worn off the parts where I rest my elbows and scrape my shoes, but nevertheless it is an old friend whom I am always glad to see again and into whose arms I trust

myself with thankfulness and, pleasure.”

How does the writer show his affection for his chair? He uses words which show emotions; words like thankfulness, pleasure show you what his emotions are, what he feels about his chair. This is “emotional” writing.

There is no place for emotional writing in the second kind of description, which is technical description. In the technical description of a chair, for instance, you say as much as you can about the chair in as short a way as you can. Your reader should be able to draw a sketch of the chair when he has read your description or he should be able, if it is a good description, actually to make a chair similar to the one you describe. That is the purpose of complete technical description: to allow your reader to make the things you describe by giving him all the necessary details.

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**160** [1989-3]

What happens when people attend a meeting of

some kind and later report what took place? Does their narrative characterize the original happenings fully or only partly? Is it faithful to the original as far as it goes? These questions are sometimes of practical importance, and they are not independent of each other. Thus, the narrative may faithfully characterize some aspects of the meeting, yet omit so much that it conveys a distorted impression. Again, an account may be detailed and full, yet inaccurate. On occasion, the narrator may not be aware of the inaccuracies and distortions but genuinely accept their truthfulness. On other occasions, the narrator may be aware that he is introducing inaccuracies. For example, he may include passages of direct speech: 'He said to me... and I said to him ...' and so on. Yet he need not believe these lively quotations to be exact reproductions of the words originally used: social convention may allow their inclusion merely to represent the general flavour of the remarks made and to give the narrative a more lively and personal appeal.

There isn't much in Thomas Hardy's philosophy of life that I would willingly accept, yet I do appreciate one particular theme of his work: that the past lives on in the present, and that every life leaves traces of itself. This idea colours all of Hardy's tragedies of course, yet it can also be seen in all kinds of chance discoveries; in Hardy, a pack of playing-cards will exhibit the thumb-prints of players long dead, and doorposts will have been worn smooth by generations of shoulders.

But I wonder, did Hardy ever have the experience of opening a library copy of one of his own books and discovering within it the startling evidence of long-dead readers in the form of cigarette ash and coffee stains. A ghostly thumb-print is one thing, but anyone who has opened a page to find finger-nails and blood stains will know they can stop you dead in your tracks. In my own experience, finding an old picture of Marilyn Monroe between the pages of *War and Peace*

contributed only slightly to my enjoyment and understanding of the novel.

What is far worse, of course, is all that dreadful pencilling. You can be sailing along and happily disagreeing with your author's argument, and then you turn a page and are suddenly confronted by a strange note in the margin: "YES-ABSOLUTELY. See page 92." It throws you. A stranger has cut into the conversation, a stranger whose thoughts you somehow feel you have to put straight. And what do you do? Do you turn to page 92 to see what the note means? Do you answer back with a long explanation of your opinion? What you probably don't do is to rub out the mark: it might, for all you know, have been made by somebody famous.

I say this as a reformed writer of notes. As a student I wrote hundreds of knowing little remarks on my own books — remarks that now rise up and shame me either because they reveal a breadth of knowledge now lost or because they betray my scholarly self-importance in judgement. Either way, it is even more

perplexing coping with one's own past voice intruding into the conversation than with the past library user, whether somebody famous or not.

In a recent literary journal there appeared a poem by D.J. Enright about reading a library book and discovering between its leaves a succession of long black hairs. So many long black hairs did he find that by the time he closed the volume he had conceived a mental picture of the previous borrower as a lady totally bald. A friend told me about the poem, cut it out and gave it to me. I see that it has a fresh thumbprint in the corner, but whether it's mine, hers, or Enright's I think I shan't inquire.

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**162** [1989-3]

Putting a permanent base on the moon has become an unofficial goal of the most important space centres, but scientists say that a large number of technical problems have yet to be solved. One of the

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least expected is pollution. However, at a recent conference scientists expressed , optimism about the future of lunar bases.

At the conference it was suggested that a lunar base of about eight people would represent the initial stage. But some scientists consider that this could grow to as many as 10,000 by the year 2050. Whether large or small, the colony presents a threat to the delicate moon environment. Scientists emphasized the real danger of creating a man-made polluted atmosphere that would destroy the moon's value as a place for looking at the stars. The pollution would come from the routine activity of lunar life, and also from rockets bringing supplies and people from the Earth.

During the Apollo missions two decades ago, measurements showed that gases and dust produced by a single landing of a tiny spacecraft doubled the mass of the moon's atmosphere for months. Unlike the Earth, where weather and wind remove pollution from the air, the moon's atmosphere is cleared only by

solar winds and evaporation. Activity at even small lunar bases would be too much for these natural forces. An unclean “industrial” atmosphere of dust and rocket fuel could last for hundreds of years.

Finally, the inhabitants of the moon may have a problem known to people on the Earth: where to put the rubbish. At first the occupants would throw it into the nearest crater. After a while, however, the base would become totally surrounded. At a later stage, rubbish could be used to fill in craters to create new land, a technology that is well established on the Earth.

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**163** [1990]

Although it is unquestionably the scientists who have led us to the edge of the nuclear abyss, we would be mistaken if we either held them chiefly responsible for our plight or looked to them, particularly, for a solution. Here, again, the difference between scientific

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revolutions and social revolutions shows itself, for the notion that scientists bear primary responsibility springs from a tendency to confuse scientists with political actors. Political actors, who, of course, include ordinary citizens as well as government officials, act with definite social ends in view, such as the preservation of peace, the establishment of a just society, or, if they are corrupt, their own profit; and they are accordingly held responsible for the consequences of their actions, even when these are unintended ones, as they so often are. Scientists, on the other hand (and here I refer to the so-called pure scientists, who search for the laws of nature for the sake of knowledge itself, and not to the applied scientists, who make use of already discovered natural laws to solve practical problems), do not aim at social ends, and, in fact, usually do not know what the social results of their findings will be; for that matter, they cannot know what the findings themselves will be, because science is a process of discovery, and it is in the nature of discovery that one

cannot know beforehand what one will find. This element of the unexpected is present when a researcher sets out to solve some small, carefully defined mystery — say, the chemistry of a certain enzyme — but it is most conspicuous in the synthesis of the great laws of science and in the development of science as a whole, which, over decades and centuries, moves toward destinations that no one can predict. Thus, only a few decades ago it might have seemed that physics, which had just placed nuclear energy at man's disposal, was the dangerous branch of science, while biology, which underlay improvements in medicine and also helped us to understand our dependence on the natural environment, was the beneficial branch; but now that biologists have begun to explore the secrets of genetics, and to manipulate the genetic substance of life directly, we cannot be so sure. The most striking illustration of the utter contradiction that may occur between the wishes of the scientist as a social being and the social results of his scientific findings is certainly the career of

Einstein. By nature, he was, according to all accounts, the gentlest of men, and by conviction he was a pacifist, yet he made intellectual discoveries that led the way to the invention of weapons with which the species could destroy itself. Inspired wholly by a love of knowledge for its own sake, and by an awe at the creation which bordered on the religious, he made possible an instrument of destruction with which the earth could be totally disfigured.

enzyme=酵素    genetics=遺伝学

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**164** [1991-2]

With the cost of computers plunging, a new age of invention is about to start. New horizons will appear in every direction, much as if ten continents were discovered simultaneously. The result will not only be new products and activities but also new concepts and cultures. It is possible to glimpse fragments of this future now and to sense how rich and unexpected it

will be.

Unfortunately, for the past century some humanists have been at odds with technologists, viewing technology as a harmful force beyond their control — all the more intolerable because of its human origins. This attitude is part of the humanist's traditional focus on the past and unwillingness to embrace either the art or technology of the present. The effect of a work of art is strongest at the time of its creation and weakens with the passage of time. An artistic work that can be understood only with a scholar's footnotes cannot be considered more powerful than one that speaks to its audience directly. The common assumption that fifty years' hindsight is required for the identification of a work of art is based on a lack of confidence, denies the value of art created in the present, and makes aesthetic judgment a kind of historical Nielsen rating.\* This attitude goes back to the worship of the Greeks by the Romans. It is anti-art. The young are taught to appreciate past art much as doctors expose people to a weakened form of a virus

so they will become immune to the real thing.

Art exists in the present. It affirms it. We are living in epochal times, inventing technology with existential implications. Surely the art of such times must use the most powerful means of expression available, leading rather than following in the exploration of aesthetic technology. Artists cannot remain aloof, cultivating an utter ignorance of all things technical.

\* Nielsen rating=アメリカのニールセン社の調査によるテレビ視聴率

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165 [1991-3]

I walked carefully in the indicated direction, until approached a small flowery meadow that I was familiar with, then crawled to the foot of a tree on its margin, bearing in mind what I had been told about the shyness of bears. Looking out cautiously from behind the tree, I saw a big, burly cinnamon bear

about thirty yards off, half erect, his paws resting on the trunk of a fir that had fallen into the meadow, his hips almost buried in grass and flowers. He was listening attentively and trying to catch the scent, showing that in some way he was aware of my approach. I watched his gestures, and tried to make the most of my opportunity to learn what I could about him, fearing he would not stay long. He made a fine picture, standing alert in the sunny garden walled in by the most beautiful firs in the world.

After examining him at leisure, noting the sharp muzzle thrust inquiringly forward, the long shaggy hair on his broad chest, the stiff ears nearly buried in hair, and the slow, heavy way in which he moved his head, I foolishly made a rush on him, throwing up my arms and shouting to frighten him, to see him run. He did not mind the demonstration much; only pushed his head farther forward, and looked at me sharply as if asking, "What now? If you want to fight, I'm ready." Then I began to fear that on me would fall the work of running. But I was afraid to run, lest he should be

encouraged to pursue me, so I held my ground, staring him in the face within a dozen yards or so, putting on as bold a look as I could, and hoping the influence of the human eye would be as great as it is said to be. Under these strained relations the interview seemed to last a long time. Finally, the bear, seeing how still I was, calmly withdrew his huge paws from the log, gave me a piercing look, as if warning me not to follow him, turned, and walked slowly up the middle of the meadow into the forest; stopping every few steps and looking back to make sure that I was not trying to take him at a disadvantage in a rear attack I was glad to part with him, and greatly enjoyed the vanishing view as he waded through the lilies and columbines.

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**166** [1992-2]

Sherlock Holmes and Dr Watson first meet in Arthur Conan Doyle's *A Study in Scarlet*. Despite Holmes's powerful intellectual abilities, Watson is

astonished to discover that Holmes is entirely ignorant of the Copernican theory, according to which the earth and the other planets travel around the sun. Imagine, then, his surprise when Holmes refuses to be enlightened on the matter: “what the deuce is it to me?” he interrupted impatiently: “You say we go round the sun. If we went round the moon it would not make a pennyworth of difference to me or to my work.”

In their quaint Victorian way, Watson and Holmes raise a question that is still of fundamental importance today. Does it really matter whether people know anything about basic scientific questions like the relationship between the earth and the sun, the structure of the atom, or the nature of life? Shall we take the side of Watson, and say that such things are part of what every civilised human being ought to know; or shall we fall into line with Holmes, and say: what the deuce is it to me? In short, why should we care about the public understanding of science?

I believe there are, at least, two very good reasons why we should care. First, science is the outstanding

feature of our culture and people deserve to know about it. If you doubt this, try asking yourself the following question: for what area of creative achievement, above all others, will our civilisation be remembered, centuries and millennia from now? Will it be for the brilliance of our architecture, for the quality of our fine art, or for the excellence of our literature? I doubt it. I think, when everything else has turned to dust, we shall still be remembered for the extraordinary advances we have made in understanding the world and our place in it.

In terms of the grand sweep of history, ours is the age that first discovered what kind of place the universe really is, and what kind of thing a living organism really is. Although scientists rarely say so in an explicit way, the plain fact is that these (among, of course, many others) are fascinating things to know about. People deserve to be let in on the great secrets that science is continually uncovering. Poor old Sherlock; he really didn't know what he was missing.

My second reason for caring about the public

understanding of science is more practical. Science is not just the thing our culture does best, it is also the thing that most critically influences the way we live. Think of almost anything we do — eating, having babies, working, taking holidays — and you find that it is shaped by science.

For those of us with wider interests, science is everywhere — at work (the job looks interesting but will I be able to cope with the information technology involved?); and at home (the microwave oven looks convenient, but how does that microwave actually work and is it really safe?); in the supermarket (shall I buy irradiated food because it's supposed to be germ-free, or avoid it like the plague because some people say it's dangerous?) and at the clinic (shall I ask about that troublesome ankle, and if so will I be able to understand the reply?) We need to know at least something about science in order to make some sense of everyday things like these.

(1) Between the years 764 and 770 the Empress Shotoku ordered the printing of one million religious texts, each to be placed in a miniature wooden pagoda and distributed to important places in Japan. An engraved wooden block was used for the printing. This was a technique which derived from China. These printed texts are of the utmost importance in the history of Japanese printing, and indeed of world printing. They are probably the oldest printed documents in existence.

(2) Johann Gutenberg, born at Mainz in Germany at the beginning of the fifteenth century, is regarded as the inventor in Europe of the art of employing movable metal type in printing. In 1434 he was living in Strasbourg and seems to have been well known as a man of considerable skill. In 1440 he was engaged in experiments adapting a wine press and using separate pieces of metal in the form of model letters.

(3) In England the first printer, William Caxton, who had learned the art of printing in Cologne, set up his press in London in 1476. In Europe at that time Latin was the language most commonly used for written communication. Caxton's books were largely translations and he was the first printer in Europe to use his own language instead of the usual Latin. He was an accomplished linguist, and his own translations fill more than 4,500 printed pages.

(4) Printing in Europe facilitated the spread of knowledge and coincided with voyages to unknown regions in search of outlets for trade. It provided a record of the voyages on a form which was easy to obtain. Portuguese merchants and missionaries arrived in Japan in the 1540s and in 1577 the first published account of Japan in English came off the press. At the same time the first reliable printed maps began to be more widely available.

(5) The printed book at first increased the use of reading and writing among the ruling orders of society.

In time it has become a door to knowledge open to everyone. In each succeeding era more and more men and women have taken from the store of printed wisdom and made their own contribution. The present abundance of knowledge and its many methods of transmission can be traced right back to the religious texts produced in Nara over a thousand years ago.

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**168** [1993-2]

次の英文は、南米の密林での生活を描いた物語の1節である。

It was late when I woke up the next morning. I felt so fully reanimated, so rich with energy, that it seemed the whole world could be mine for the taking.

In remembering the dream which I had had during the night, I thought that never before had I had a dream in which every detail had been so clear, so logical as this last one. It could not have been more clear and impressive if it had not been a dream at all but an episode of the day, a slightly strange episode,

but nonetheless real and natural.

I looked for my boots.

Why, they were not stuffed with paper and neither were they placed on a chair. Experience had taught me, when living in the jungle, to stuff my boots with balls of crumpled paper or something else, and to put them on a chair or box or hang them up. Otherwise, when you started to pull them on in the morning, you might find a scorpion or a small snake inside them. It had happened to me once; I still remembered the speed with which I got the boots off on that occasion, and since then I know that one can get one's boots off just as quickly as a hat from one's head. To have a little red snake in the lowest part of your boot while your foot is inside is not so very pleasant, because the snake, as terrified as you are, wants to get out, as does your foot. The worst thing about it is that you don't know exactly what it is that is under the sole of your foot. It drives you nearly crazy while your foot is still in, and makes you feel aghast with horror after your foot is out and you see

what was, or still is, a tenant of your boot.

Anyway, my boots were not stuffed and they were not standing on the chair.

All of a sudden I remembered that I had dropped the boots rather carelessly last night, due to the fact that I was very tired when I turned in again after the Indian had left. I remembered, too, that while he had been in the room I had pulled out the paper from my boots and had put them on to go to the room where the bookshelves were. It is no sound practice, when living in the jungle, to walk with bare feet by night. A native can do so, but a white man avoids it. When I had come from the other room I had lain down immediately on my cot, not paying any attention to the boots or anything else, and had fallen asleep as soon as I had touched the pillow.

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169 [1993-3]

Mistakes are at the basis of human thought. If we

did not have the skill of being wrong, we would never get anything useful done. We think our way forward by choosing between right and wrong alternatives, and the wrong choices have to be made as frequently as the right ones. We get along in life in this way. We are designed to make mistakes, programmed for error.

There is a common saying that learning is 'by trial and error'. Why do we always say that? Why not 'by trial and rightness' or 'by trial and success'? The old phrase puts it that way because that is, in real life, the way it is done.

A good research laboratory has to be run like a computer. Almost everything is done exactly, by the rules, and the predicted results regularly obtained. The days go by. And then, if it is a lucky day, and a lucky laboratory, somebody makes a mistake: the wrong chemical used, something added by accident, a mouse out of his box, or just a misreading of the day's instructions. Whatever it is, when the results are examined something is obviously wrong. Then action can begin. The mistake, not in itself important, opens

the way. The next step is what matters. If the research scientist can say, 'There was an error, but even so — look at *that!*' then the new finding, whatever it is, is ready to be taken up and put to use. Progress can be made by deciding on a new approach that comes from considering the error and its results.

For new ways of thinking to be achieved, in any subject, there has to be a kind of argument beforehand. Two sides debate in the same mind, a discussion for and against, and behind it is an understanding that one side must be right and the other wrong. Sooner or later the thing is settled, but there would be no resulting action at all if there were not the two sides and the process of argument. The hope for moving forward is in the recognition of the possibility of being wrong.

Other creatures do not seem to have the ability to make mistakes as part of the normal routine of their daily lives, certainly not as a regular method of learning. Dogs occasionally make mistakes, but they get this way by trying to copy their masters. Cats

almost never make a mistake. Fish are perfect in everything they do. And completely inhuman. Our gift for being wrong may be a uniquely human skill, perhaps contained in the genetic instructions in our DNA material, an essential part of what makes us human.

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**170** [1994-2]

次の英文は、ある英字新聞からの抜粋である。よく読んで下の設問に答えよ。

Thanks to shorter working hours, more working mothers and values that are slowly but surely changing, Japan's "thirtysomethings" are leading the way in redefining fatherhood. The infamous *chichioya fuzai* — absentee dad — is slowly giving way to younger fathers trying to balance work and home lives.

They are starting to come home earlier, spend weekends with their families and even help out with the household chores. They are learning the creativity of cooking and the joys of childrearing, two tasks their

fathers shunned as women's work.

A new law enacted last year giving both parents the right to take child-care leave has even prompted a handful of men to sign up as “house husbands.” And for the first time, beginning next April, all high school boys will be required to take home economics.

“In our fathers' generation, what was most important to the family was a father who worked hard and brought a lot of money home,” said Mutsumi Ota, 34, a company employee who was one of the first men to take paternity leave. “But what is most important to families today isn't only money. It's something else.”

For a growing number of younger parents, raised amid affluence, that “something else” seems to be greater family intimacy ...

To be sure, values are slow to shift. But rapid economic changes are prompting new family relationships out of sheer necessity. As women continue to enter the work force in record numbers, dual-income households outstripped single-earners for the first time last year.

At the same time, the lingering recession has motivated firms to scale back overtime and entertainment expenses, cutting down on after-work drinking bouts. And the government has launched a deliberate campaign to shorten work hours in the face of international criticism.

The so-called “1.57 shock,” Japan’s lowest birthrate in history, has also set off national cries to ease the burden of child care on mothers. Some people say the low rate points to a “quiet rebellion” by overburdened women.

All told, the effect is that more husbands come home earlier and face growing requests, often demands, from their working wives to pitch in. One survey, for instance, showed the percentage of women supporting traditional gender roles in the home dropping from 36.6 % in 1987 to 9.3% in 1992.

Throughout the world, and throughout history, animals have been regarded anthropocentrically — that is as inferior life forms which perforce must circle helplessly around the all-powerful human being. Since the human race is dominant on earth, we also must be its most superior life form, as evidenced by prodigious deeds in art, literature, and science. It is sobering today to look back over these last twenty years and see the great revolution that has taken place in our attitude toward animals. Instead of believing in our anthropocentric position in the universe, we are now increasingly concerned that we may be helpless victims, not much more than pawns in a cosmic game we do not understand. We suspect that we really have no control over our lives, and certainly only marginal knowledge of their intricacies. This change in attitude has come about subtly. While rockets have explored other planets, while hearts and kidneys have been transplanted, while new advances

in agriculture, sociology, physics, and medicine have occurred, students of animal behavior, the ethologists, have painted an entirely different picture of our occupancy of the earth. In this picture, a human being is just another animal. Moreover, we are a species that has subjugated our world before we are capable of controlling, or even understanding, ourselves.

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**172** [1995-2]

The detailed science of nature seldom goes on for any length of time without reflection on the underlying principles intervening. And this reflection reacts upon the detailed work; for when people become conscious of the principles upon which they have been thinking or acting, they become conscious of something which in these thoughts and actions they have been trying, though unconsciously, to do: namely to work out in detail the logical implications of those principles. To strong minds this new consciousness

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gives a new strength, namely a new firmness in their approach to the detailed problems. To weak minds it adds a new temptation, the temptation to that kind of limited attitude which consists in remembering the principle and forgetting the special features of the problem to which it is applied.

The detailed study of natural fact is commonly called natural science, or, for short, simply science; the reflection on principles, whether those of natural science or of any other department of thought or action, is commonly called philosophy. Talking in these terms, and restricting philosophy for the moment to reflection on the principles of natural science, what I have just said may be put by saying that natural science must come first in order that philosophy may have something to reflect on; but that the two things are so closely related that natural science cannot go on for long without philosophy beginning; and that philosophy reacts on the science out of which wait has grown by giving it in future a new firmness and consistency arising out of the

scientists' new consciousness of the principles on which they have been working.

For this reason it cannot be well that natural science should be assigned exclusively to one class of persons called scientists and philosophy to another class called philosophers. People who have never reflected on the principles of their work have not achieved a mature attitude towards it; scientists who have never philosophized about their science can never be more than second-hand, imitative scientists. People who have never enjoyed a certain type of experience cannot reflect upon it; philosophers who have never studied and worked at natural science cannot philosophize about it without making fools of themselves.

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**173** [1995-3]

Sometimes a television commercial will use slow-motion films of an automobile crashing into a brick

wall at high speed. The suddenness of the collision in real time makes it seem like a single, immediate transformation of the car into a twisted mass of metal. But in slow motion we see a process of change in which the various parts of the car slowly crumple\*, one by one, colliding in seemingly logical and predictable ways with each other and with the occupants inside. The steering column, for example, may be pushed by the engine to pierce one dummy while a second dummy slowly shatters the windshield with its wooden head.

What is now occurring in the global environment can be seen in similar terms. Our ecological system is crumpling as it suffers a powerful collision with the hard surfaces of a civilization speeding toward it out of control. The damage is remarkably sudden and extensive in the context of the long period of stability in the environment before the damage, but we see the destruction in slow motion. When the Aral Sea dries up and its fish all die, for example, it is as if this fragile ecological system is gradually being crumpled

by the force of civilization crashing into it. When vast areas of the rain forest\* are cleared and the species living there no longer exist, it is as if the forest is shattered in slow motion by the impact of its collision with civilization. And when an overpopulated nation overgrazes its pastureland, causing a collapse in its ability to provide food the following year, it is as if the force of its collision with nature has pushed it abruptly backward in a crushing blow, like a dashboard striking the forehead of a child.

But most of us act as if we don't perceive a collision at all, partly because the crushing and shattering take place over a longer time span than we associate with a violent collision. We are not unlike the laboratory frog that, when dropped into a pot of boiling water, quickly jumps out. But when placed in water that is slowly heated, the frog will remain there until it is rescued.

The meaning of many patterns is conveyed by contrast as opposed to sameness. Sameness and gradual change often lull the senses, obscuring danger

from minds that reserve their alertness for sharp contrasts. If an individual or a nation looks at the future one year at a time and sees the past in the context of a single lifetime, a great many large patterns are concealed. When one considers the relationship of the human species to the earth, not much change is visible in a single year in a single nation. Yet if one looks at the entire pattern of that relationship, from the emergence of our species until the present, a sharp contrast beginning in the very recent past clearly signals the dramatic change to which we now must respond.

Another limiting factor is our normal spatial\* perspective. It is helpful to stand at some distance from any large pattern we are trying to comprehend. And that is difficult when we are standing in the middle of the pattern. As Ralph Waldo Emerson said, "The field cannot well be seen from within the field."

Hundreds of years ago, those who believed the earth was flat could point straight out to the horizon from wherever they stood and find convincing

evidence from their limited perspective. Whoever challenged that prevailing notion had to somehow go beyond their geographic limitations in order to imagine a global pattern much larger than the one their senses could directly perceive.

The same challenge confronts us now, as we try to comprehend what we are doing to the earth. Even though the pattern of our relationship to the environment has undergone a profound transformation, most people still do not see the new pattern—partly because it is global and we are not used to such a large, spatial perspective. The sights and sounds of this change are spread over an area too large for us to hold in our field of awareness. Thus the proverb holds true: “You can’t see the forest for the trees.”

\*crumple: to collapse

\*rain forest : a thick forest where there is heavy rainfall

\*spatial : of or relating to space

Since children come into the world not knowing how to behave, they need guidelines and rules that are at first externally placed on them by someone who is older and wiser and able to be fair, firm, and consistent. As the child matures, however, he should be allowed to be a part of the rule-making process, and shown why rules are important.

Children can sense whether we impose rules on them for their own good, or merely because we want to stay in control or are engaged in a power struggle. They have an enormous capacity for fairness and are willing to cooperate when they are allowed to take part in the decision-making process.

Too often, we adults simply assume that “We know best” and convey this to our children with “Do it because I said so.” This attitude does not invite the child’s cooperation. In fact, it may anger her to the point of open defiance and rebellion. If, however, we ask the child for her help and input in setting up rules,

we have not only helped her practice the skills of communication and compromise, but we've also given her a real motivation to see that these rules are maintained. After all, they are hers, for she helped make them, and has an investment in seeing that they work.

Gradually the child's need for externally placed rules should become less necessary. She will be able to set up rules for herself because she understands the reasons behind them, and has developed enough self-control to live by self-imposed rules. This is our goal for children: to help them move from control that is external to that which is internal.

In our busy household, we had a rule that whenever anyone left, he would leave a note saying where he was. My youngest son kept forgetting. One day I said, "Marc, we've got to get this straight. We have got to know where you are. How can I help you remember?" (Not "I'll tell you what to do or I'll do it for you," but "How can I help?") He said, "Well, you could hit me. I won't ever tell on you!" I said, "No.

Sorry. What else could we try?" He said, "Well, I could stay in for thirty days." "Thirty days! Would it take a month?" "Well, maybe e day." "Okay," I said. "How about this? How about if you stay in tomorrow? Maybe that will help you remember."

Staying in was torture for Marc — he wanted to be outside with his friends. The next afternoon he got some index cards and on them he wrote "I'm at Jeff's (telephone number)" "I will be at Matt's (telephone number)" "I am in the field playing ball." He made a whole filing system. After that he selected the appropriate card and put it on the counter. He used those cards for years. He came up with a creative way to solve his own problem. Children can be so much more inventive than we are, if we just give them the chance.

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**175** [1996-3]

In the behavior and habits of human beings there

are many examples of marked asymmetry, the most obvious deriving from the fact that most people are right-handed. The right hand is controlled by the left side of the brain and the left hand by the right side of the brain, so right-handedness is actually a phenomenon of left-brainedness. At one time it was thought that babies are born with no genetic tendency to favor either hand; that the handedness of a child is solely the result of parental training. This view is strongly expressed by Plato.

“In the use of the hand we are, as it were, maimed by the folly of our nurses and mothers,” Plato writes in Book Seven of his *Laws*\*, “for although our several limbs are by nature balanced, we create a difference in them by bad habit.” Favoring one hand over the other is of little consequence, the Greek philosopher goes on to say, in such tasks as playing the lyre\*, which must be held in one hand and pulled with the other. But in such sports as boxing and wrestling, especially in hand-to-hand battle combat, it is essential that a man learn to use both hands with

equal skill. For this reason, he argues, children should be trained to use both hands equally for all tasks.

Today we know that Plato was badly mistaken. As Aristotle correctly pointed out, our arms are *not* balanced by nature. An inherited tendency for most people to favor the right hand is universal throughout the human race and for as far back as history provides reliable evidence. Cultural anthropologists\* have yet to find a society or even a local tribe in which left-handedness is the rule. Native Americans, Maoris, Africans — all are right-handed. The ancient Egyptians, Greeks, and Romans were right-handed. Of course, if you go far enough back in history the evidence for right-handedness becomes scanty and indirect. It has to be deduced from such clues as the shapes of tools and weapons, and pictures showing men at work and in battle. In drawing a face in profile, a right-handed person finds it easier to draw the face facing left, a fact that also serves as a clue to the handedness of prehistoric men. Anthropologists who have investigated the handedness of primitive man do

not agree among themselves, so no firm conclusions can be drawn, but there is no disagreement about the right-handedness of all societies since the beginning of recorded history.

\* *Laws*: 『法律』 というプラトンの作品

\* lyre: 古代ギリシャの豎琴

\* cultural anthropologist: 文化人類学者

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176 [1997-2]

Many people have wondered how best to describe the 20th century, which comes to a close in less than five years. I would call it a “century of innovations.” After all, essential parts of our daily lives — from automobiles to countless electronic appliances — are all products of the 20th century. Actually, it is thanks to an endless stream of innovative products and innovation in the production process that the 20th-century economy has been able to grow in a sustained

fashion. In this sense, we may also call the 20th century a “century of growth.”

In 1798, Robert Malthus wrote his famous essay, “On the Principle of Population.” In it, he argued that population increases in a geometric ratio while the food supply only increases in an arithmetic ratio, so food shortages put a constant check on population increases.

The world’s population at the end of the 18th century was estimated at 900 million. A century later, in 1901, it stood at about 1.6 billion. In other words, the global population increased by less than 80 percent during the 19th century, or a mere 0.6 percent per year. At such a low rate of increase, the food crisis predicted by Malthus never materialized.

In the 20th century, the global population grew at a breath-taking rate. By 1950 it had risen to 2.5 billion. That brought the annual growth rate in the first half of the century to 0.9 percent. As it has been estimated that world population will rise to 6.1 billion by the end of the century, the growth rate has doubled to 1.8

percent. But there is still no prospect of a world-wide food shortage in the near future.

It has become fashionable to dismiss the Malthusian prophecy. Malthus was completely wrong, many say. Was he? True, Malthus made a number of false assumptions, the most noticeable of which is that he did not take innovation into account. Without the increases in food supply made possible by advances in agricultural technology, and without the expansion in the job market that came with industrialization, the world could hardly hold more than, say, 2 billion people. But innovation has come in leaps and bounds, at a speed never thought possible in the past. As a result, the size of the population the world can hold has expanded vastly, and the consequence is a sharp increase in the actual population.

According to United Nations figures, the world's population is likely to increase beyond 10 billion by the year 2050. If the rush of innovations we have witnessed in this century continues, the Earth's capacity to house and feed people will expand and

there is no doubt that the world's population will go past this 10 billion mark.

Innovation has its limits, however, when it comes to one specific industry: electric appliances or computers. The time will come when the speed of innovation will slow down as this industry matures. With that, its function as an engine of economic growth vanishes.

More specifically, the time will come when the art of manufacturing technology will reach a stage of near perfection and demand will flatten out as its products will have already found their way to most consumers. It would not be an exaggeration to say that we are now witnessing such a maturing stage in regard to consumer goods like automobiles, home appliances, computers and all the electronic machinery that makes office work less tedious. If that is the case, what lies ahead in the 21st century? What will develop into the new "fountainhead of innovation" as we move toward the new millennium?

The most likely candidate, I think, is the

information and communications industry. Consider the mobile telephone. The demand for all types of mobile phones is rising sharply, and is likely to outstrip that for all other manufactured goods. Multimedia equipment, too, is likely to see a major boom in a few years, and innovations of all types will follow. Telephones which allow speakers to see each other on a television screen may become yet another hit product in the future. In short, innovation in the information and communications industry will most likely serve as a new driving force of economic growth down the road.

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**177** [1998]

I have found myself rather amused by the storm of media attention following the resounding defeat of chess master Garry Kasparov by IBM Deep Blue in the sixth and final game of their recent match. The picture of Kasparov burying his face in his hands in

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dismay was widely picked up by TV networks and newspapers around the world, symbolizing what many journalists have purported to be the machine's triumph over man. A mere computer, goes the refrain, has beaten the best of the human beings at his own game.

While not wanting to discredit IBM's Deep Blue team, I would stress that this event was really not that important or remarkable. Indeed, it was more or less a matter of time before Something like this happened. The fact that the game of chess is nearly as old as recorded human history and is dear to millions of people around the world appears to have stirred strong emotional reactions to an event that actually signifies very little.

In reality, man was beaten by the computer ages ago, probably in more ways than I care to count. As a student in the 1960s, I put myself through college by helping my professor run a large computer program, known as the Monte Carlo simulation, which used an esoteric statistical sampling technique to calculate

probabilistic approximations to a particular problem, such as the random movements of atomic particles. The program, while often taking all night to run, could do in just 24 hours what would have taken a man several years.

The fact is, a great deal of what we see and use in our daily life would simply be impossible to build without the help of powerful computers capable of performing man-year magnitude computations in a matter of seconds or minutes. Without computers, we would not have today's airplanes, satellites, skyscrapers, pharmaceuticals, integrated circuits, autos and so on. In this regard, humans are no match for machines.

Are we thus destined to be replaced by computers? Well, yes, but only in a very limited way. Simply put, computers are capable of performing literally billions of systematic computations every second. In the game of chess, though the number of possible moves seems infinite to us, it is not. Rather, the number just dauntingly large. The speed of

computers has now improved to a level where a large portion of possible moves can be computed within the allotted time of a chess game, in this particular case with some intervention from the Deep Blue team of engineers. Sooner or later, a computer will be made that can cover all the possible moves by itself, making it impossible for a man to beat, or, for that matter, any other computer as long as it has the first move with the white pieces.

Nevertheless, computers are still incapable of performing some of the simpler human functions. What Kasparov can do, and not Deep Blue, is disregard the bulk of chess moves in an instant, even without thinking, as losing moves. This has to do with the way our brain accumulates and makes use of learned experience. We do not go through the same logical sequences as computers do, to counter certain actions. Furthermore, one has to consider the aural and visual aspects of human functions. Although computers are extremely capable of analyzing stationary two-dimensional visual images, such as

satellite weather photos, they are totally worthless when it comes to looking at three-dimensional moving images and analyzing the meaning of a given situation. For example, if we are driving along and a ball rolls out from behind a parked car, we know instinctively that there may be a child chasing the ball. We slow down or stop the car. Try entrusting a computer to perform this simple function. Unfortunately, it would probably be too late before the computer even recognized that it was looking at a parked car. This is why we still need airline pilots, and will continue to do so for a long time to come.

Artificial intelligence specialists are trying hard to develop computers that can emulate the deductive reasoning power of the human brain. However, the fact is, if all the supercomputers around the world were hooked up, they would probably not even come close to matching a small child in terms of recognizing the physical world and making the decisions and judgments that we make so casually.

In the 1960s, there was a fear in the United

States that a large portion of the work force would be idled by computers. In some ways, this fear has proved well-founded. For example, accountants would be in even stronger demand if it were not for computers. On the other hand, it has turned out that far more jobs were created than lost thanks to computers. Indeed, the phenomenal recovery of the U.S. economy that we are now seeing clearly owes a big nod to vastly improved per-capita productivity. These gains have come on the back of the use of computers and other electronic devices that help redirect human resources away from repetitive menial work and toward more productive and creative tasks.

Now, we have the opportunity to make the same improvements in our lives outside the office. Computers are helping us begin to reduce, or eliminate entirely, our commute, as well as time spent shopping. Our children are learning to access the archives of human knowledge without spending hours looking for books and flipping through countless pages. Whether we view computers as a threat to humankind

and our livelihood, or a divine gift to better our lives, depends on how well we know and use them.

My sympathy goes out to Kasparov, but the world has probably benefited from the defeat he suffered — although I cannot help but root for him to avenge his defeat, without having to resort to pulling Deep Blue's plug.

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**178** [1999]

The law cannot force people to make good choices. It can, however, encourage people to develop new ways of thinking, seeing and feeling. Habits and practices we initially adopt to conform to authority can start to make sense to us over time. Sometimes it may take the pressure of an external demand to force us to see the value in a choice or a way of life we might otherwise dismiss. So, even though the law cannot compel us to make good choices, it can help us, at least indirectly, to change and grow morally. Someone who

says it is impossible to legislate morality may be technically correct, but the law can certainly make a morally important difference in people's lives.

But maybe the objection to legislating morality is that there is so much moral disagreement in our society that no consensus can be reached and that we might be imposing moral convictions on people who do not accept them.

The fact is, though, that we do this all the time. Some people may believe that it is morally appropriate to kill those who belong to rival crime families. The law says it is not. Some people believe that it is morally appropriate to employ people in sweatshops under slave-like conditions. The law says it is not. Some people believe it is morally acceptable to cheat on their taxes. The law says it is not.

We cannot avoid making judgments — moral judgments — about what is true and false, about what is appropriate and inappropriate, what is acceptable in this country and what is not. Every time we determine what constitutes criminal behavior and

what does not, what quality of education we will provide our public school students, what tax policies we will adopt — every time we make such a policy decision we are making moral judgments. That we disagree about issues of fundamental importance does not relieve us from deciding what we have to do and what we cannot do morally. Making moral judgments is a forced option for societies, just as it is for persons.

The days are long gone when an abusive husband or father could claim that legal authorities had no right to challenge his actions because they occurred in the privacy of his home. But we continue to act as if the harm some people do can be ignored because confronting them might require us to legislate private morality. I firmly believe that it is important to avoid bureaucratic intrusions. I am saying that if we want to live well together, we have to make choices about the kind of community we want to be and the kinds of persons we want to be.

That will mean tackling tough issues. It will almost always mean making moral judgments.

Necessarily, then, it will mean legislating morality. That's not something we need to find embarrassing. It simply means being deliberate and sensible, courageous yet cautious, as we carefully craft policies that will address all the threats that face us and our families, as we try to construct a better society for our children who inherit the world we leave behind.

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**179** [2000]

According to Stanley Coren, the author of *The Intelligence of Dogs*, dogs can understand about one hundred and fifty of our words, signs, and signals, and in turn produce some thirty or forty sounds that we can understand. Add to that their multitude of looks and gestures, and you have the basis for genuine communication — if not quite cocktail-party conversation. An example: Your dog goes over to the bedroom fireplace every night at about ten o'clock and looks up, and you know he wants a glass of water. You

once gave him water from a glass on the mantel, and with that initial interaction, he trained you to understand.

Indeed, we may be so intimate with our animals precisely because they do not speak. They listen to us, and they communicate with us, but they do not have the capability to use words that can cause misunderstandings. Alan Beck and Aaron Katcher, in their book *Between Pets and People*, say that when people interact with pets, they are calmer than when interacting with other humans. A number of studies have shown that blood pressure rises during human-to-human conversation, but it drops when we are touching and talking to pets. The fact that the animal cannot speak is one reason that the bond is so relaxed. Animals keep conversation going by giving knowing looks, full of feeling and acknowledgment. “They are intimates because they cannot talk,” write Beck and Katcher. “They ask no questions. They say no words that hurt. They offer no advice.” Despite all the talking animals in myths, fables, and children’s

stories, they conclude, “we prefer them without words.”

Cathy Hermann, a speech therapist and actress, has always been amazed at the way her cats’ faces seem to reveal their thoughts and feelings. Once, she says, she came home with a Persian, and her two other cats were outraged by the intrusion. They would look at her with disdain, she says, “as if to say, ‘You’re a nice lady, but what were you thinking when you brought this ugly, boorish thing into the house?’” She says their expressions allow her to read their minds: “A facial expression, a tilt of the head — you know exactly what they’re thinking.”

Such a liberal interpretation of a cat’s body language is not simply wishful thinking, according to Michael W. Fox, a specialist on animal behavior. “There is a continuum of consciousness between animals and people,” he says.

Cats also communicate audibly, of course. In *Understanding Your Cat*, Fox writes that sixteen voice patterns have been found in cats. They fall into three groups: murmur patterns, such as purring, which are

made in a friendly, relaxed state; vowel patterns, more articulated sounds, like the meow used to ask for food; and strained, intense sounds, such as the hiss and growl, reserved for attack, defense, or mating. The sound most associated with cats is purring, yet, Fox says, there is no good explanation for it, except that it always signals contentment. Sometimes when cats are stressed, they will even purr as a way to relax themselves. Since purring first occurs during nursing, he says, it may have evolved as a signal to the mother to let down milk.

Fox, who also wrote *Understanding Your Dog*, says dogs express contentment quite often through sighing, which has a similar role to purring. When they lick people, he says, they are showing caregiving: “It comes from the animal’s desire to give affection.”

Not all communication between pets and people is about love and kindness, of course. Sometimes our animals make clear their displeasure by hiding or turning their backs on us, or even snarling or hissing.

If they seem stressed, there is a reason for their behavior. If they are acting oddly, your goal is to figure out why. For instance, if your dog is lifting his leg indoors, he is communicating something — perhaps that the house is *his* territory, a perception that may reflect feelings of insecurity or dominance. A similar message from your cat may reflect upset over a change — like moved furniture — or be a sign of illness.

The messages our animals send us are relatively straightforward once you understand them. In fact, the more you project your own feelings or needs onto your animals, the greater the chance for misunderstandings and confusion. Guilt is one emotion that's often projected onto pets, according to Coren. It's not something animals have the capacity to feel, but other basic emotions like happiness, depression, anger, fear, and excitement are quite real; they have been bred into pets during centuries of domestication. "Animals have the traits that we've trained them to have, including responsiveness," says Coren. "A dog that cannot communicate will not

survive in a human environment.”

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180 [2001]

Not long after my father's first book, *Childhood and Society*, was published, I witnessed a dramatic transformation in how people related to him and an equally dramatic transformation in how he related to them. He became the luminous center of attention at most social and professional gatherings, where people crowded around him, obviously excited, doing their best to make conversation with one another while awaiting their turn to engage with *him*. In his presence they became mysteriously childlike: animated, eager, deferential, anxious to gain his interest and approval.

Friends and admirers all seemed intent on idealizing my father, seeing in him someone much more important and powerful than themselves. People would ask me, “What is he *really* like?” and I

knew they wanted their fantasies confirmed, not an honest answer about a real human being. Or, upon first learning that he was my father, someone might say “Really? Can I touch you?” — conveying even more directly what magical power they ascribed to his very being. At such moments I became little more than a conduit for my father’s magic; this was one of the many ways in which his fame diminished me and my sense of my own place in the world.

My father was a tall man with an impressive shock of white hair, which gave him a distinctive and dignified look. He had kindly eyes and a gentle face. He appeared to be the perfect father figure: concerned, compassionate, and knowing. With the advent of his fame he acquired a larger-than-life social aura, a special air of confidence, which nourished people’s fantasies about him and suggested that he felt as wise and as comfortable with himself as they perceived him to be. His words, even his most casual remarks, were heard as profoundly meaningful, because of the reverence felt toward their source. And people often

felt deeply understood by him even in the course of a brief conversation — the power of his sympathy was magnified by his aura.

Once, when I gave a party for some college friends, I saw the excitement in their faces the moment my father walked into the room, and I saw the transformation in him the moment he became the center of their attention. There was electricity in the air — a sense that something out of the ordinary was about to happen. And because of the anticipation on both sides, something did happen. It was a charged dance between people with an intense need to idealize and a person who needed just as intensely to be idealized. Once this dance had begun, I found myself wondering why I had ever thought the occasion would be enjoyable for me. I felt deflated by my father's fame — not enhanced, as I had always hoped to feel, but momentarily invisible.

The idealization that accompanied my father's fame seemed the more mysterious to me because he did not seem *personally* different after he became

famous. To those close to him my father was — and continued to be — a life-size human being, suffering from all the same difficulties in living that had plagued him in the years before his celebrity. Despite his brilliance as an analyst and writer, and his great charisma, he was an insecure man, described as “exceedingly vulnerable” by an analyst friend after his death. He evoked in those closest to him a wish to comfort and reassure him; to make him feel that he was worthy and lovable; to help him wrestle with his lifelong feelings of personal inadequacy, his punishing self-doubt.

Once, during my adolescence, when Dad and I were alone together, I burst into tears — brokenhearted over the abrupt ending of a teenage romance. I remember the look of terror and grief on his face — terror because in the context of the family he did not feel like an adult with the ability to soothe and comfort. For these vital functions he looked always to my mother, who was in his eyes the ultimate source of strength and wisdom within the family (if

not the universe), the *real* healer, the solver of all problems both practical and personal. On this occasion he could not call to her, as he normally would in anything at all like a crisis, “*Joan!*” Grief was in his face precisely because he felt so powerless to comfort someone he loved who clearly needed and longed to be comforted by him.

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**181** [2002]

Although it is possible to achieve happiness, happiness is not a simple thing. There are many levels. In Buddhism, for instance, there is a reference to the four factors of fulfillment, or happiness: wealth, worldly satisfaction, spirituality, and enlightenment. Together they embrace the totality of an individual’s quest for happiness.

Let us leave aside for a moment ultimate religious or spiritual aspirations like perfection and enlightenment and deal with joy and happiness as we

understand them in an everyday or worldly sense. Within this context, there are certain key elements that we conventionally acknowledge as contributing to joy and happiness. For example, good health is considered to be one of the necessary factors for a happy life. Another factor that we regard as a source of happiness is our material facilities, or the wealth that we accumulate. An additional factor is to have friendship, or companions. We all recognize that in order to enjoy a fulfilled life, we need a circle of friends with whom we can relate emotionally and trust.

Now, all of these factors are, in fact, sources of happiness. But in order for an individual to be able to full utilize them towards the goal of enjoying a happy and fulfilled life, your state of mind is key. It's crucial.

If we utilize our favorable circumstances, such as our good health or wealth, in positive ways, in helping others, they can be contributory factors in achieving a happier life. And of course we enjoy these things — our material facilities, success, and so on. But without the right mental attitude, without attention to the mental

factor, these things have very little impact on our long-term feelings of happiness. For example, if you harbor hateful thoughts or intense anger somewhere deep down within yourself, then it ruins your health; thus it destroys one of the factors. Also, if you are mentally unhappy or frustrated, then physical comfort is not of much help. On the other hand, if you can maintain a calm, peaceful state of mind, then you can be a very happy person even if you have poor health. Or, even if you have wonderful possessions, when you are in an intense moment of anger or hatred, you feel like throwing them, breaking them. At that moment your possessions mean nothing. Today there are societies that are very developed materially, yet among them there are many people who are not very happy. Just underneath the beautiful surface of wealth there is a kind of mental unrest, leading to frustration, unnecessary quarrels, reliance on drugs or alcohol, and in the worst case, suicide. So there is no guarantee that wealth alone can give you the joy or fulfillment that you are seeking. The same can be said

of your friends too. When you are in an intense state of anger or hatred, even a very close friend appears to you as somehow sort of frosty, or cold, distant, and quite annoying.

All of this indicates the tremendous influence that the mental state, the mind factor, has on our experience of daily life. Naturally, then, we have to take that factor very seriously.

So, leaving aside the perspective of spiritual practice, even in worldly terms, in terms of our enjoying a happy day-to-day existence, the greater the level of calmness of our mind, the greater our peace of mind, the greater our ability to enjoy a happy and joyful life.

I should mention that when we speak of a calm state of mind or peace of mind we shouldn't confuse that with a totally apathetic state of mind. Having a calm or peaceful state of mind doesn't mean being totally spaced out or completely empty. Peace of mind or a calm state of mind is rooted in affection and compassion. There is a very high level of sensitivity

and feeling there.

As long as there is a lack of the inner discipline that brings calmness of mind, no matter what external facilities or conditions you have, they will never give you the feeling of joy and happiness that you are seeking. On the other hand, if you possess this inner quality, a calmness of mind, a degree of stability within, then even if you lack various external facilities that you would normally consider necessary for happiness, it is still possible to live a happy and joyful life.

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**182** [2003]

Many people believe that nature's value cannot be put into dollars and cents. That is, they value the natural world for its own sake, regardless of what services or benefits it provides for humans. Yet this notion is fundamentally at odds with the economic system we've created.

We live in a world that is increasingly dominated by a global economy, where it is assumed that everything of value has a price tag attached. If something can't be quantified and sold, it is considered worthless. The president of a forest company once told me "A tree has no value until it's cut down. Then it adds value to the economy."

So how do we reconcile our economy with ecology? The Earth provides us with essential natural services like air and water purification and climate stability, but these aren't part of our economy because we've always assumed such things are free.

But natural services are only free when the ecosystems that maintain them are healthy. Today, with our growing population and increasing demands on ecosystems, we're degrading them more and more. Unfortunately, remedial activities and products like air filters, bottled water, eye drops and other things we need to combat degraded services all add to the GDP, which economists call growth. Something is terribly wrong with our economic system when poor

environmental health and reduced quality of life are actually good for the economy!

But what if we did put a price tag on things like clean air and water? If we assigned a monetary value to natural systems and functions, would we be more inclined to conserve them? Yes, according to an international group of ecologists writing in the latest edition of the journal *Science*.

The group argues that humanity will continue to degrade natural systems until we realize that the costs to repair or replace them are enormous. So we must find a way to place a dollar value on all ecosystem assets — natural resources such as fish or timber, life-support processes such as water purification and pollination, and life-enriching conditions like beauty and recreation.

Most of these assets, with the exception of natural resources, we already exploit but do not trade in the marketplace because they are difficult to price. But this is changing. For example, this spring an Australian organization became the first conservation

group to be listed on a stock exchange. The company buys and restores native wildlife and vegetation, while earning income from tourism and wildlife sales.

In New York City, officials recently decided to buy land around watersheds and let the forest and soil organisms filter water instead of building a massive new filtration plant. Until recently, this potential to use natural services rather than technology to solve problems has been largely overlooked, even though natural approaches may provide greater benefits to communities such as lower costs, reduced flooding and soil erosion and aesthetic benefits.

In Canada, forests are primarily valued for the timber they provide. But this leads to conflicts. For instance, a recent report from the Department of Fisheries and Oceans found that logging roads in British Columbia continue to devastate fish-bearing streams, even though legislation is supposed to protect them. In fact, our forests provide many services, including habitat for plants and animals, recreation and others that, if assigned a monetary

value, could completely change the way we use them.

As just one species out of perhaps 15 million, the notion of assigning value to everything on Earth solely for its utility to humans may seem like an act of incredible arrogance. But the harsh reality of today's world is that money talks and economies are a central preoccupation. At the very least, assigning monetary value to ecosystem services may force us to take a hard look at all that nature provides. Maybe then we'll stop taking it for granted.

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**183** [2004]

Only in 1979 were bonobos recognized as a distinct species of ape, and even in the 1980s many people considered them to be merely small chimpanzees. Consequently, when the National Academy of Science suggested that bonobos were an important local species that should be protected and cultivated in Congo, some scientists maintained that

bonobos were not sufficiently different from chimpanzees to deserve such special treatment. Thus, three bonobos were captured from the wild, with the permission of the Congolese government, and taken to the Yerkes Regional Primate Center in Atlanta, Georgia, where researchers were to determine whether they, in fact, differed sufficiently from chimpanzees to warrant separate treatment. If so, it was hoped that a special center for their study would be set up in Congo.

It is clear that with regard to their social behavior and group structure, bonobos resemble human beings more than other living apes do. Their temperament and hesitant but curious nature set them apart from other apes. At times, as I watch them, I seem to be staring into my own distant past and seeing in front of me “quasi-persons” — not people, but “near people.” The feeling is as though, in a mysterious and inexplicable way, I am watching a species that is not the same as me yet is connected to me — is part of me. Even after many years of watching and studying

bonobos, I still cannot help but sense that I am witnessing the birth of the human mind, the dawn of our peculiarly human perspective and feeling.

Certainly these creatures cannot plan ahead as we do, organize large societies, create calendars, or establish religions. Yet for me, there is more to being human than such abstract intelligent actions. There is a kinship I recognize when I interact with young children that does not depend on these abstract skills. It is a kinship based on an awareness that others share some of my feelings and I theirs. I know, at least in part, how other people feel, and they know how I feel.

With bonobos, I experience a similar mutual understanding. I know how they feel, and they know how I feel. This is possible because of the expressions on their faces, the way they interpret the feelings of others, the depth of their commitment to one another, and the understanding of one another that they share. Their sharing of emotional perspective is of a peculiarly human sort, and I relate to it, and am

bound into their feelings, in a natural human manner, without effort. A human does not need to read a catalogue of bonobo facial or vocal expressions to understand the bonobo. When I observe a bonobo, it is as though I am peering deep into some distant part of myself. This is a perception I cannot shake off or dissuade myself from, no matter how often I try to tell myself that I have no definitive scientific basis for these impressions.

According to our current understanding, bonobos and common chimpanzees went their own evolutionary ways some two to three million years ago, some time after our own ancestor split off from the common lineage. We are more distantly related to gorillas and orangutans, as they diverged from the line that led eventually to human beings some six to eight million years ago. There is no current evidence that suggests that we are more closely related to the bonobo than to the common chimpanzee. Yet the bonobo shares with people an emotional capacity for understanding the feelings of others that can only be

described as almost human.

The arrival of the three bonobos who had traveled from the depths of Congo to the small, cramped, and dim cage on the end of the Yerkes great ape wing never led to the establishment of a center for bonobo breeding and research in Congo as the National Academy of Science had hoped. Many primate researchers protested the importation and potential use of a rare and endangered species in any sort of research. Their attention damped international interest in the project; as a result, the people of Congo still, even today, have no understanding of their significant and unique indigenous resource, the bonobos.

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**184** [2005]

In 1898, in “The War of the Worlds,” H. G. Wells imagined Earth invaded by space ships bearing monstrous conquering Martians. All human defenses

prove impotent, but the Martians sicken and die when attacked by Earth's humblest living creatures, microbes. This nifty science-fiction insight is suddenly relevant in the real world. We are invading Mars and planning to bring materials back. Are the tables turned? Could our planet be destroyed by forms of Martian life? We can hope that any organisms dwelling on Mars will have originated and evolved so differently that they cannot survive, reproduce and threaten living beings here. But we cannot be sure.

Certainly, the idea that Mars once harbored life no longer seems absurd: Mars used to have briny ponds. And though the place now seems dead, there are several reasons to suppose that life, if it was ever there, could persist to this day. The place may still have water. Beneath the surface, it looks as though there might even be lakes, raising the possibility that Martians might be thriving underground.

Perhaps the strongest reason to think the planet could be home to something is that over the past 20 years, we've learned that many inhabitants of Earth

live in environments as peculiar as those on Mars. Here, some organisms exist inside rocks — in the chilly wastes of Antarctica, or a mile deep in the ground. Others live in ice sheets, or breed in the strongest acids. If it can happen here, it could possibly happen on Mars, too. Finding life on Mars obviously would be thrilling. It would, in a small way, ease our loneliness. In addition, it might illuminate that great mystery, the origin of life on Earth. But the possibility of life on Mars also suggests that we should approach the place with caution. If something is living there, then bringing Martian rocks back to Earth could be a mistake if not undertaken very carefully.

The history of first-time meetings between organisms is a sobering one. When the Spanish came to the New World, they brought smallpox and measles, which killed 90 percent of the people in Mexico within 50 years. Nor is it just viruses that are troublesome. When animals and plants arrive in a new place, they can have devastating effects.

Given this, it seems rash even to entertain the

notion of bringing Martian rock samples to Earth. So what's the argument in favor? The main one is that we could do a much more exhaustive analysis of the rocks here than robots sent to Mars could do on our behalf. We would therefore be much more likely to find life, or evidence of it. Moreover, some say the exercise can't be that risky because we've already been exposed to Martian soil: roughly 90 pounds of rocks from the planet hit Earth every year.

This shouldn't necessarily be taken as a sign that Martians aren't dangerous, however: arriving in a nice comfortable space ship should offer a better chance of survival than a fiery ride through Earth's atmosphere. Of course, maybe nothing would happen if we did bring rock samples back. The planet may, in fact, be home to no one. Even if it holds life, the organisms might not find Earth to their liking. Besides, no one is suggesting opening a box and releasing Martians in the middle of the rain forest.

But what if something went wrong? There could be an accident on arrival or problems with the

containment facility. The scale of the disaster could be spectacular. Even if Martians didn't cause human diseases, they might irrevocably destroy earthly ecosystems.

And, in the end, doesn't the experiment seem a little premature? It's impossible to overstate our ignorance of life, even life on Earth. We continue to find microbes living in places that we didn't think could support life, and many of these organisms get their energy in ways we never imagined were possible. In February 2004, for example, the journal *Nature* reported the discovery of bacteria that seem to live off electrons directly obtained from metallic iron. Our chances of recognizing Martians, whatever they are, will surely be greater when we know more about life here. So for the time being, let's cancel our invitation to the Martians and concentrate on exploring our own planet and understanding the amazing diversity of life forms on Earth.

Work on bees illustrates beautifully the time sense of these insects and the application of such a time sense to their amazing ability of direction-finding. Man has long recognized the direction-finding ability of the bee, and, in fact, the term “beeline,” meaning a straight line between two points on the earth’s surface, was coined in recognition of the fact that a bee returns directly from the source of the food to the hive. The bee’s ability to tell time has not been of such common knowledge, although over sixty years ago a Swiss doctor by the name of Forel made observations on this ability. His observations have been amply confirmed and extended by recent research.

Bees can be trained not only to feed at a particular place at a particular time of day, but they can be trained to feed at two different places at two different times of day or even three different places at three different times of day. If the investigator places

a circle of identical feeding trays some distance away from, but completely around a hive of bees, he may then perform the following experiment. Let us say he places food in the tray northwest of the hive at 10 o'clock each morning, in the tray east of the hive at 12 o'clock each day, and in the tray southwest of the hive at 4 o'clock each afternoon. After a few days, by making observations without placing any food on any of the trays, he may demonstrate that the bees have been trained to go in the correct direction at the right time of day. The bees come to the experimental tray at the correct time of day, and in such numbers that there can be no question that they are expecting food at the right place and time.

Furthermore, if during the night the entire hive is moved to a new location with new landmarks, the bees still search in the direction and at the time of day to which they had been trained. In addition, if, while the bees are feeding at a tray, one covers the entire tray with its bees and moves the tray to a new position and then uncovers the bees, they will leave the feeding

tray and try to find the hive in the direction that would have been expected from the old position. Under these circumstances, the only obvious landmark the bees have for finding direction is the sun. If one covers feeding bees with a black box in the morning and releases them in the afternoon, the bees head directly toward the hive even though the sun has changed position in the meantime. Their time sense has enabled them to allow for the change in position of the sun during the intervening dark period. An interesting experiment was performed with a hive of honeybees in which the bees were trained in New York to feed in a given direction. The entire hive with its bees was then transported by jet plane to California. On being released the bees did not head in the same geographical direction because their internal clock was still operating on New York time. It took the bees several days to adjust to the new local time.

The bees' known and fascinating ability to communicate with one another also employs the biological clock. When a scout bee locates a group of

nectar-laden flowers, it is of obvious advantage to the hive to know about this. Upon returning to the hive the scout goes into a “tail-wagging” dance during which she informs the other bees of the direction and distance of the flowers from the hive. Through observation ports in the hive it has been possible to study and interpret this dance. During the dance the bee indicates the location of the sun in relation to the source of nectar and, even after several days spent without being able to see the sun, the bee will still correctly plot the sun’s position in its communication of the direction of the last known source of food. While it is clear that bees have an accurate sense of time and navigate to a rich food source using the sun as a compass, it is also true that they may use a prominent landmark to supplement their direction-finding.

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**186** [2007]

On the evening of 15 February 1894, a man was

discovered in the park near the \*Royal Observatory at Greenwich in a most distressing condition: it appeared that he had been carrying or otherwise handling some explosive which had gone off in his hands. He later died from his injuries. The fact that he had been in Greenwich Park naturally provoked speculation: was he attempting to blow up the Observatory? Around this puzzling and ambiguous incident \*Joseph Conrad constructed, in *The Secret Agent*, a story of a double agent who had been instructed by a foreign power to blow up the Greenwich Observatory and so provoke outrage at what would be perceived as an attack on science or technology itself, the idea being that this would be a much more subtly unsettling attack on society than any assault on a prominent individual or group of innocent people.

By 1894, Greenwich had acquired a peculiar significance: it not only marked 0° longitude, it also stood for the standardization of time. For much of the nineteenth century different towns in Britain kept

their own time, and travellers from one place to another would often have to reset their portable \*timepieces on arrival. But the development of the railways made it increasingly important to dispose of these local variations, and 1852 saw the introduction of a standard 'Railway Time', as it was called. Finally, in 1880, Parliament passed the Definition of Time Act, which introduced a universal time, this being defined by the time on the Observatory clock at Greenwich. This, as we might imagine, could well have induced in some quarters the same resentment as the idea of a single European currency does in others today, though whether feeling ran sufficiently high as to motivate the blowing up of the Observatory is a matter for debate.

The idea of a standard time implies a standard timepiece, which raises the question of what it is for a timepiece to be entirely accurate. I discover that the \*grandfather clock is slow by noticing a discrepancy between it and my 1950s wristwatch. But on comparing my wristwatch with your digital watch,

bought only last week, I discover that my watch is losing a few minutes every day. And were we to judge your timepiece against the standard of a \*caesium clock, we should no doubt discover some further discrepancy. But this process must have a limit. Eventually, we arrive at a means of measuring time that we take to be as accurate as anything can be, and we take this to be our standard, according to which all other timepieces are to be judged. Now, does it make sense to inquire, of this standard, whether it is truly accurate? This may strike one as a strange question. Surely, one can ask of any means of time-measurement whether it is truly accurate or not, a truly accurate clock being one that judges two adjacent periods (for example, successive swings of a pendulum) to be of the same duration when and only when they are indeed of the same duration. But here we come up against a problem. There is simply no way of telling, for certain, that anything meets this requirement. We can only compare one timepiece with another.

Although we can perform a test that will show some kinds of timepiece to be more accurate than others, it is impossible to tell whether an instrument is 100 per cent accurate since all one has to judge accuracy by is other instruments, whose accuracy can always be called into question.

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**187** [2008]

As we look at the world and ourselves, we do it through a set of filters. Think about what a filter is. A filter is a mechanism that lets some things flow in, but screens other things out. Depending on what the filter is made up of, it can also alter whatever is looked at or passes through it. Sunglasses are a good example of a visual filter. But, obviously, I'm not talking here about some physical apparatus that we can put on and take off, like a pair of glasses. In fact, the filters I'm talking about are not really visual in nature; they are internal and are mental, emotional, verbal, and

perceptual in nature. Through them, we process and assign a weight and meaning to every event in our lives. Some things flow in, others are screened out, but everything is affected. Our filters affect not just what we “see,” but what we “hear” and believe.

Now, because we trust ourselves to be honest and because we think we don't lie to ourselves, we tend to believe that our filtered perceptions are an accurate depiction of reality. Whatever passes through the filter, accurate or not, is what we tend to believe. As a result, if and when our filtered perceptions lie, we get suckered. We walk around believing that an upside-down world is the real one. So here's a warning: When it comes to any of your untested and unchallenged perceptions, you should be afraid, be very afraid. You could very well be seeing your self in a distorted light.

I say that because our perceptual filters have the unfortunate tendency of being highly sensitive to the negatives, while screening out the positives. It's just human nature.

All of us are subject to distorting the truth or

missing the truth, particularly when we are dealing with a situation in which we are physically or emotionally threatened. For example, research shows that a person being held at gunpoint will fixate, not surprisingly, on the weapon, as opposed to a door or some other opportunity for escape or safety. Why? Because negatives invariably scream louder than positives and the more extreme the negative, the louder it screams. We tune into the negatives, the threats, and the problems because we are programmed to protect ourselves, so if someone or something is perceived to threaten us (a gun), that threat can and will drown out all other events and inputs. The fear of the weapon galvanizes your attention, completely overwhelming and excluding any other data. The building could have fallen down around you and you wouldn't have known it. Such is the power of the human mind when it becomes fixated on a negative.

Let's move to a more likely scenario, one that may be much closer to home. In your life right now, there

may be lots of people who believe in and encourage you. Your “supporting cast” may number in the hundreds, yet I’d be willing to bet that if you have even one or two critics, those “noisy” few can command your full attention, often drowning out the effects of all of the positive input. Why? Because it pays to be rejected, criticized, and attacked and we pay attention to pain. As with the robber’s pistol, your filters are sensitized to painful threats and you see those threats to your self-concept more vividly and memorably than you see anything else. Just as importantly, they linger: Those negatives tend to stay with you for years. Think about an actor on the stage: hundreds of adoring fans can be respectfully and adoringly rapt in their attention, yet one heckler can dominate the performer’s entire experience and memory of the night.

Sailors have long known that whales make strange musical noises. Yet it wasn't until recording techniques were developed that anyone could listen to whale songs in their entirety. It was, in fact, military science that first collected the evidence. During the cold war, the US government conducted secret research into how sound travels underwater. The Americans were looking for ways to locate enemy submarines, and to hide their own. They knew that sound travels five times faster underwater than it does through the air, but they also found that it travels at different speeds in different layers of the ocean, fastest of all at the bottom. This may seem surprising, but as David Rothenberg explains: "The denser the medium, the faster the molecules shake as the sound wave goes through it."

While listening to the ocean, the scientists heard low \*moaning and rumbling noises that they gradually learned to identify (and dismiss) as the

sound of living creatures. These turned out to be great whales communicating with one another in the deep sound channels, where their utterances travelled across hundreds, even thousands of miles.

By listening to \*\*humpback whale songs through underwater microphones, scientists discovered that whales do not cry and moan randomly. The songs always sung by males had long-range structures, sometimes lasting for hours. They were shaped like any good musical composition, with \*\*\*themes, phrases, climaxes, resolution, and dying away. Moreover, the songs were repeated after a pause. They seemed to be transmitted to other whales living in the same area who sang them too. Different groups in other oceans had their own distinctive songs. The songs were too long and formal merely to be passing on simple information about females, food or the ocean floor. Strangest of all, they underwent slow but continuous evolution. Researchers who came back summer after summer noticed subtle changes in the songs each year, all the whales in the area picking up

the changes. This means that whales are very different from birds, those other well-known singers of the natural world, whose songs remain stable over time. Whereas today's nightingales may sound very similar to the ones that Shakespeare heard, a whale researcher will complain that the great whale singers of the 1970s have gone now, and that the music favored by today's youngsters is entirely different.

Whales became big, so to speak, when endangered species caught our imagination in the 70s. The idea that the world's largest creatures were singing at the bottom of the ocean had great emotional power. Some musicians even went out in boats to play to them. Did the whales respond? The musicians thought so. It was all meant to be a homage, an inter-species get-together, but it had to stop when the Marine Mammal Protection Act forbade anyone from harassing the animals and classed music as a form of harassment.

Some people warn that because of motorized shipping and \*\*\*seismic exploration of the ocean

floor by oil companies, the seas are getting much noisier. There is evidence that whales are trying to sing louder to make themselves heard; furthermore, recent sonar tests have been known to kill whales.

We know that whale songs are complex messages, but we still don't know what they mean or what we could learn from them, and now they may be under threat.

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**189** [2010]

In our culture, time has long been equated with the position of the hands on a clock. Our reliance on mechanical clocks may have weakened our ability to sense our inner time. In any case, sensible people have tended to dismiss the seemingly incredible notion that a natural clock could synchronize all processes in the body, even though scientists found evidence nearly three centuries ago that biological clocks guide every living being through the day.

In the early eighteenth century, the French astronomer Jean-Jacques de Mairan was struck by the way the mimosa plants on his windowsill raised their leaves toward the sun at the same time every day. An effect of the light? Mairan placed the mimosas in a dark cellar, but the leaves kept right on unfurling every morning and closing back up every evening. He repeated this experiment again and again, with the same result. In 1729, he reported his findings to the Paris Academy of Sciences. His publication boldly declared, “The activity of the plant is related to the keen sensibility that enables bedridden invalids to tell the difference between day and night.” In his day, most hospitals were dark vaults.

The news of Mairan’s discovery spread quickly. Soon afterward, Carolus Linnaeus, who had detected similar behavior in other plants, set out to plant a flower clock in his garden. By arranging a circular formation of selected species of twelve flowering plants that opened and closed at different times, his “clock” told the time accurately to within a half hour.

Of course Mairan and Linnaeus did not have the slightest idea what timekeeping mechanisms were at work in these plants. And they could not begin to imagine that the biological clock was one of the earliest inventions of nature. It is found even in simple creatures such as the \*euglena. These tiny creatures have inhabited the earth for over a billion years — far longer than flowering plants have existed. A thick green covering on a pond indicates the presence of a mass of these one-celled organisms. In the genealogy of nature, euglena can be found at the very beginning of the long line of ancestors of the animal kingdom, although they also possess plant characteristics such as \*\*photosynthesis, as is evident in their green color.

An odd spectacle often occurs at the mouth of a river: At low tide, one-celled euglena, ascending to the surface toward the light, color the water green, but as soon as the tide comes in, they vanish. The euglena burrow down in the mud so as not to be washed away by the water. When the tide recedes, these organisms

reemerge, and the spectacle begins anew. Does this primitive creature sense the approach of the ebb and flow? We know that is not the case because the euglena ascend and burrow down even in the absence of tides. If we collect some green-covered mud and examine it in a laboratory, we find that the euglena continue to ascend every six hours and burrow down for the next six hours. And although the euglena appear to have a simple sense organ for light (their name's Greek origin is "good eyeball"), the succession of light and darkness is not what causes this behavioral pattern. Like the mimosa, the euglena stick to this pattern even in complete darkness. Hence, the simple rhythm of the euglena must originate within the organism itself. And sure enough, even this tiny organism contains a biological clock.

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**190** [2011]

Newborns swaddled in a blanket are likely to cry

when someone opens the blanket to expose them to the cooler temperature of the room. This cry should not be regarded as a sign of fear or anger because it is a biologically prepared reaction to the change in temperature. Moreover, genes whose products influence limbic sites\* are not yet active in newborns. Nor should we call a crying six-month-old who dropped her rattle *angry* because this emotion presumes knowledge of the cause of a distressed state. Charles Darwin, who kept a diary on his child, made that mistake when his seven-month-old son screamed after the lemon he was playing with slipped away. The father of evolutionary theory assumed a biological continuity between animals and infants and projected the state he felt when he lost a valuable object on to both animals and his young son. Many contemporary psychologists attribute a state of fear to seven-month-olds who cry at the approach of a stranger and to forty-year-olds who notice a large amount of clotted blood in their saliva. But the states of these two agents cannot be the same because of the profound biological and

psychological differences between infants and adults. The infant's distress is an automatic reaction to the inability to relate the unfamiliar features of the stranger to his or her knowledge; the adult's state follows an appraisal of the meaning of the blood for his or her health.

The infant's behavioral reactions to emotional incentives are either biologically prepared responses or acquired habits, and the responses are signs of a change in internal state that is free of appraisal. The structural immaturity of the infant brain means that the emotions that require thought, such as guilt, pride, despair, shame, and empathy, cannot be experienced in the first year because the cognitive abilities necessary for their emergence have not yet developed.

The restriction on possible emotions extends beyond infancy. Children less than a year old cannot experience empathy with another or shame, whereas all three-year-olds are capable of these states because of the emergence of the ability to infer the state of others and to be conscious of one's feelings and

intentions. This extremely important developmental change, due to brain maturation, adds a qualitatively new reason for actions, especially the desire to preserve a conception of self as a good person. This motive, which has an emotional component, is a seminal basis for later behaviors that are called altruistic. Furthermore, children less than four years old find it difficult to retrieve the past and relate it to the present and, therefore, cannot experience the emotions of regret or nostalgia. Even preadolescents have some difficulty manipulating several representations simultaneously in working memory because of incomplete maturation of the connectivity of the dorsolateral prefrontal cortex\*\* to other sites. This fact implies that seven- to ten-year-olds are protected from the emotions that emerge from a thoughtful examination of the logical inconsistency among their personal beliefs. Older adolescents, by contrast, are susceptible to the uncertainty that follows recognition of the inconsistency between their experiences and their childhood premises about

sexuality, loyalty, God, or the heroic stature of their parents. The desire to repair the inconsistency requires some alteration in the earlier beliefs and the evocation of emotions denied to younger children. The cognitive immaturity also means that ten-year-olds are protected from arriving at the conclusion that they have explored every possible coping response to a crisis and no adaptive action is possible. As a result they cannot experience the emotion of hopelessness that can provoke a suicide attempt. Hence, we need to invent a vocabulary for the repertoire of states experienced by infants and young children. These terms do not exist.

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**191** [2012]

Accommodation theory states that when people talk to each other, they adjust their behaviour and manner of speech to take account of (to accommodate themselves to) the topic, the circumstances, and the

other people engaged with them in the conversation. For two simple examples: people talk more slowly to foreigners, and use baby talk when interacting with infants. The way people communicate with each other is central to the kind of social interaction at issue. Thus, friends or lovers (and especially people in the process of becoming friends or lovers) make every effort to converge in manner, accent, tone and topic. Conversely, someone wishing to keep his distance or disagree will almost always adopt a manner of speaking expressly different from that of the other party.

These ideas matter because it is clear that the difficulties experienced by immigrants and foreigners everywhere arise in part from the difference of their speech mannerisms, and the limits to their ability to “converge” with native speakers when trying to communicate. As the world globalizes further at an increasingly rapid pace, and as major migrations of people, especially from the southern to the northern hemisphere, continue, so the problems and too often

the frictions increase: accommodation theory, for all its surface simplicity, gives insights into how miscommunication and misinterpretation happen and how matters can be improved.

Communication difficulties do not only affect immigrants and foreigners everywhere. They affect our own fellow-citizens. Social expectations and beliefs about class, intelligence and status are influenced by accent and other speech mannerisms, and therefore certain people from certain classes or regions can be disadvantaged when seeking jobs (especially away from their home localities) by the methods of communicating they learned when young.

Lack of accommodation is thus the source of problems for members of any group identified in given circumstances as an out-group of some kind.

Accommodation theory was devised in the early 1970s by Howard Giles, whose first insights into communication came while working in a medical clinic in Wales, his native country. He wrote, “The patients I took to the physicians just had to open their

mouths and speak and I could predict the manner in which the physicians were going to deal with them.” The ideas he developed have been applied by advertisers and party-political researchers in thinking about the most effective ways of getting messages across to target audiences, and by business management trainers advising clients on how to behave in foreign countries.

The limits of accommodation are illustrated by the latter. Studies found that efforts made by Western businessmen who over-accommodated in order to please potential clients or partners among Japanese businessmen were in fact counterproductive. The danger is that behaviour which appears to involve mimicry of another can look like mockery, or at very least appear condescending; in the Japanese case, the businessmen from Japan preferred the foreigners to be foreigners — and thus, presumably, to meet their own expectations and to conform to their own planned mode of interaction.

Accommodation theory is of particular value for,

among other things, thinking about ways of integrating immigrant communities into host communities, where “integration” is a term neutral between assimilation and multiculturalism, and just means providing a way for immigrants to get along with the host community while succeeding economically. With mass immigration has come the realization that it is ineffective to expect immigrants to do all the accommodating; and that has resulted in host community adjustments to take account of linguistic and cultural factors in front-line provision of health care, education, social work, policing and legal services.

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**192** [2013]

In the late 1960s, the psychologist Walter Mischel began a simple experiment with four-year-old children. He invited the kids into a tiny room containing a desk and a chair and asked them to pick

a treat from a tray of marshmallows, cookies, and pretzel sticks. Mischel then made the four-year-olds an offer: They could either eat one treat right away or, if they were willing to wait while he stepped out for a few minutes, they could have two treats when he returned. Not surprisingly, nearly every kid chose to wait.

At the time, psychologists assumed that the ability to delay gratification in order to get that second marshmallow or cookie depended on willpower. Some people simply had more willpower than others, which allowed them to resist tempting sweets and save money for retirement. However, after watching hundreds of kids participate in the marshmallow experiment, Mischel concluded that this standard model was wrong. He came to realize that willpower was inherently weak and that children who tried to postpone the treat — gritting their teeth in the face of temptation — soon lost the battle, often within thirty seconds.

Instead, Mischel discovered something

interesting when he studied the tiny percentage of kids who could successfully wait for the second treat. Without exception, these “high delayers” all relied on the same mental strategy: These kids found a way to keep themselves from thinking about the treat, directing their gaze away from the yummy marshmallow. Some covered their eyes or played hide-and-seek underneath the desks. Others sang songs from *Sesame Street*, or repeatedly tied their shoelaces, or pretended to take a nap. Their desire wasn’t defeated, it was merely forgotten.

Mischel refers to this skill as the “strategic allocation of attention,” and he argues that it’s the skill underlying self-control. Too often, we assume that willpower is about having strong moral fiber. But that’s wrong. Willpower is really about properly directing the spotlight of attention, learning how to control that short list of thoughts in working memory. It’s about realizing that if we’re thinking about the marshmallow, we’re going to eat it, which is why we need to look away.

What's interesting is that this cognitive skill isn't just useful for dieters. It seems to be a core part of success in the real world. For instance, when Mischel followed up with the initial subjects thirteen years later — they were now high school seniors — he realized that their performance on the marshmallow task had been highly predictive on a vast range of metrics. Those kids who had struggled to wait at the age of four were also more likely to have behavioral problems, both in school and at home. They struggled in stressful situations, often had trouble paying attention, and found it difficult to maintain friendships. Most impressive, perhaps, were the academic numbers: The kids who could wait fifteen minutes for a marshmallow had an SAT\* score that was, on average, 210 points higher than that of the kids who could wait only thirty seconds.

These correlations demonstrate the importance of learning to strategically allocate our attention. When we properly control the spotlight, we can resist negative thoughts and dangerous temptations. We

can walk away from fights and improve our odds against addiction. Our decisions are driven by the facts and feelings bouncing around the brain — the allocation of attention allows us to direct this haphazard process, as we consciously select the thoughts we want to think about.

Furthermore, this mental skill is getting more valuable. We live, after all, in the age of information, which makes the ability to focus on the important information incredibly important. (Herbert Simon said it best: “A wealth of information creates a poverty of attention.”) The brain is a bounded machine, and the world is a confusing place, full of data and distractions. Intelligence is the ability to parse the data so that it makes just a little bit more sense. Like willpower, this ability requires the strategic allocation of attention.

One final thought: In recent decades, psychology and neuroscience have severely eroded classical notions of free will. The unconscious mind, it turns out, is most of the mind. And yet, we can still control the

spotlight of attention, focusing on those ideas that will help us succeed. In the end, this may be the only thing we can control. We don't have to look at the marshmallow.

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**193** [2014]

In Lake Superior\* lies a remote island, Isle Royale National Park, 134,000 acres of boreal and hardwood forests where a life-or-death struggle between wolves and moose\*\* has been the subject of the world's longest study of predators and their prey, now in its 55th year.

Moose first appeared on this Michigan island in the first decade of the 20th century, apparently by swimming from the mainland. With no predator to challenge them, the moose population surged and devastated the island's vegetation in search of food. Then wolves arrived in the late 1940s by crossing an ice bridge from Canada, and began to bring balance to

an ecosystem that had lurched out of control.

Today, moose are essentially the only supply of food for the wolves, and wolf predation is the most typical cause of death for moose. But the wolf population is small, and decades of inbreeding have taken their toll. The ice bridges that allow mainland wolves to infuse the island's wolf population with new genes form far less frequently because of our warming climate. With the number of wolves reduced to little more than a handful, they face the prospect of extinction.

The National Park Service is expected to decide this year whether to save the Isle Royale wolves — a decision that will test our ideas about wilderness and our relationship with nature. This is because the park is also a federally designated wilderness area where, under federal law, “man himself is a visitor who does not remain.” If we intervene to save the wolf, will we be undermining the very idea of not meddling that has been the guiding principle behind the protection of 109 million acres of federal land?

The park service has three options: conserve Isle Royale's wolf population by taking new wolves to the island to mitigate inbreeding, an action known as genetic rescue; reintroduce wolves to the island, if and when they go extinct; or do nothing, even if the wolves disappear.

As the lead researchers in the study of wolves and moose, we favor conservation or reintroduction. But more important than our view is the reasoning behind it.

Wilderness is conventionally viewed as a place where nature should be allowed to take its course, free of human interference. This is essentially the principle of nonintervention that has guided America's relationship with wilderness areas for roughly 50 years.

The principle of nonintervention touches on fundamental conservation wisdom. But we find ourselves in a world where the welfare of humans and the biosphere faces considerable threats — climate change, invasive species and altered biogeochemical

cycles, to name a few. Where no place on the planet is untouched by humans, faith in nonintervention makes little sense. We have already altered nature's course everywhere. Our future relationship with nature will be more complicated. Stepping in will sometimes be wise, though not always.

These realizations have led a number of environmental scholars to consider new visions for the meaning of wilderness. One is of a place where concern for ecosystem health is paramount, even if human action is required to maintain it.

The future health of Isle Royale will be judged against one of the most important findings in conservation science: that a healthy ecosystem depends critically on the presence of top predators like wolves when large herbivores, like moose, are present. Without top predators, prey tend to become overabundant and decimate plants and trees that many species of birds, mammals and insects depend on. Top predators maintain the diversity of rare plants and insects. The loss of top predators may disturb the

nutrient cycling of entire ecosystems. In addition, predators improve the health of prey populations by weeding out the weakest individuals.

Given that moose will remain on Isle Royale for the foreseeable future, the National Park Service should initiate a genetic rescue by introducing new wolves to the island.

In a world increasingly out of balance, Isle Royale National Park is a place with all its parts, where humans kill neither wolves nor moose, nor log its forests. Places like it, where we can witness beauty while reflecting on how to preserve it, have become all too rare.

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**194** [2015]

When we reach adulthood, we have the opportunity to look back over our lives, review our triumphs and regrets, and contemplate the story that we want to tell. Such stories or “life narratives” — the

content and the telling — are important. For the past several decades, psychological scientists have been exploring how the stories that we write about our lives shape the way we think about ourselves, influence our day-to-day behaviors, and impact our happiness. Having a coherent autobiography makes us feel more accepting about our past and less fearful about the future. In other words, we are better off if we are able to construct a life narrative of how we became who we are today and how our future will unfold — for example, by giving our life history a sense of orderliness and significance. For example, instead of regretting that we didn't spend more time with our sister when she was very ill, we come to understand how her battle with cancer propelled us to devote our life after that to helping others. We experience greater happiness and life purpose when we are able to interpret our lives as more than just a collection of isolated, fleeting moments and can transform those moments into critical pieces of a significant journey. We are better adjusted when we have the capacity to

convert an uncertain future into a series of predictable events.

In the 1957 Ingmar Bergman film *Wild Strawberries*, the protagonist, a seemingly benevolent elderly Swedish physician, is haunted by past regrets and images of his own impending death. Forced to reevaluate his life, he undertakes a literal and metaphorical journey, during which he visits people and places that remind him of all the key turning points in his life — his admired but actually mean-spirited mother, his childhood on the seaside, the sweetheart he loved who married his brother instead of him, and his bitterly quarrelsome marriage. Recognizing himself in these memories and in the people in his life, the doctor gradually gains a sense of self-acceptance and is able to infuse in his life a coherence and significance that it didn't have before.

The Swedish physician achieves something that we should all aim for; researchers call it autobiographical coherence. Achieving it may require mental time travel — to moments of our earliest youth,

for example, finding there the seeds of our present failures and successes as partner, grandparent, worker, and friend. Bergman reportedly got the idea for *Wild Strawberries* during a long car trip across Sweden. After stopping in Uppsala, the town of his birth and childhood, and driving past his grandmother's old home, he imagined what it would be like to open the door and walk back into his childhood. What if we could do that with different periods of our lives?

Research shows that by simply writing about the past, people are able to gain a sense of meaning and order about their significant life events, thus affording them the chance to come to terms with these events and reconcile themselves to their regrets. Such writing can help us reconnect to the people, places, and activities from our pasts and give us a sense of autobiographical coherence. Such writing involves not only describing our biographical facts ("I was mistreated," "I lived in Pennsylvania"), but going beyond the facts by selectively reconstructing particular memories or

aspects of our experiences (e.g., cherished memories or symbolic family traditions) in a way that makes sense to us. In doing so, instead of dwelling on all the ways we could have acted more virtuously or more wisely, we will make our past life experiences and events come alive and add meaning to our lives.

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**195** [2016]

Everyone knows that we Brits treat our dogs better than our children, and we are often reminded that the Society for the Prevention of Cruelty to Animals (SPCA) was founded in 1824, sixty years before the National Society for the Prevention of Cruelty to Children. Is it deeply meaningful that the SPCA went on to become the Royal Society (RSPCA) while the children's society still waits for that honor?

What, then, lies behind this remarkable but apparently sincere attachment we have to our dogs? The truth is, we seem more able to freely express ourselves with animals than we are with other people.

Kate Fox, the British social commentator, pondering on this aspect of the Brits' relationship with their pets, explains convincingly, "unlike our fellow Englishmen, animals are not embarrassed or put off by our un-English displays of emotion."

The word *dog* itself is peculiarly native to Britain and comes from an obscure Old English past. The alternative Germanic term, *hound*, refers mainly to hunting dogs. In feudal society, such dogs might be given special treatment by their lordly master and be fed from his table. But lesser dogs out in the yard had a rougher time, and our language is crammed with phrases suggesting that a dog's life, at least up to the nineteenth century, was a miserable fate: *dog-tired*, *dogsboddy*, *going to the dogs*, *die like a dog*, and so on. For the most part, dogs were treated with contempt and sometimes cruelty. Even the question, "What was it like?" might produce the answer, "An absolute dog!" No positive qualities here, then.

In curious contrast, the modern reality is that the British treat dogs with huge affection, looking on

them as beloved companions and having lifelong bonds with them. The British adore the legendary image of a dog's faithfulness and literal doggedness.

Nature seems to provide plenty of evidence to justify this attitude. Endless anecdotes suggest that dogs are strangely and deeply attuned to their owners, with some observers believing their pets have psychic powers. The researcher and scientist Rupert Sheldrake, for example, has conducted surveys to demonstrate that dogs (among other pets) waiting at home *know* the moment their owners leave the office and begin their homeward journey.

So what is a British dog's life like these days? Some commentators think the sense of the phrase has gradually changed and now means to have a cosseted and comfortable existence, rather than the opposite. I am quite sure the Queen's corgis would agree with that.

However, this cozy impression is not borne out by our behavior in the real world. According to a 2013 survey, the incidence of stray and abandoned dogs in

England was estimated at around 111,000. What's going on here? Two extremes of behavior meeting in a confused national psyche? It does seem that, in their attitudes to animals and children, we find one of the paradoxes of the British temperament.

All the same, there is one common expression which continues to suggest a bond between human and animal that is more than mere friendship: "Love me, love my dog." Or rather, in practice, "Love my dog, love me." Watch dog owners meeting in a public park and you will see how it works. Better than a dating agency any time.

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**196** [2017]

Translation is everywhere — at the United Nations, the European Union, the World Trade Organization and many other international bodies that regulate fundamental aspects of modern life. Translation is part and parcel of modern business, and

there's hardly a major industry that doesn't use and produce translations for its own operations. We find translations on the bookshelves of our homes, on the reading lists for every course in every discipline taught at college, we find them on processed-food labels and on flat-pack furniture instructions. How could we do without translation? It seems pointless to wonder what world we would live in if translation didn't happen all the time at every level, from bilingual messages on cash machine screens to confidential discussions between heads of state, from the guarantee slip on a new watch we've just bought to the classics of world literature.

But we could do without it, all the same. Instead of using translation, we could learn the languages of all the different communities we wish to engage with; or we could decide to speak the same language; or else adopt a single common language for communicating with other communities. But if we balk at adopting a common tongue and decline to learn the other languages we need, we could simply ignore people who

don't speak the way we do.

These three options seem fairly radical, and it's likely that none of them figures among the aspirations of the readers of this book. However, they are not imaginary solutions to the many paradoxes of intercultural communication. All three paths away from translation are historically attested. More than that: the refusal of translation, by one or more of the means described, is probably closer to the historical norm on this planet than the culture of translation which seems natural and unavoidable around the world today. One big truth about translation that is often kept under wraps is that many societies did just fine by doing without.

The Indian subcontinent has long been the home of many different groups speaking a great variety of languages. However, there is no tradition of translation in India. Until very recently, nothing was ever translated directly between Urdu, Hindi, Kannada, Tamil, Marathi and so on. Yet these communities have lived cheek by jowl in a crowded

continent for centuries. How did they manage? They learned other languages! Few inhabitants of the subcontinent have ever been monoglot; citizens of India have traditionally spoken three, four or five tongues.

In the late Middle Ages, the situation was quite similar in many parts of Europe. Traders and poets, sailors and adventurers moved overland and around the inland seas picking up and often mixing more or less distantly related languages as they went, and only the most thoughtful of them even wondered whether or not they were speaking different “languages,” or just adapting to local peculiarities. The great explorer Christopher Columbus provides an unusually well-documented case of the intercomprehensibility and interchangeability of European tongues in the late Middle Ages. He wrote notes in the margins of his copy of Pliny in what we now recognize as an early form of Italian, but he used typically Portuguese place names — such as Cuba — to label his discoveries in the New World. He wrote his

official correspondence in Castilian Spanish, but used Latin for the precious journal he kept of his voyages. He made a “secret” copy of the journal in Greek, however, and he also must have known enough Hebrew to use the *Astronomical Tables* of Abraham Zacuto, which allowed him to predict a lunar eclipse and impress the indigenous people he encountered in the Caribbean. He must have been familiar with lingua franca — a “contact language” made of simplified Arabic syntax and a vocabulary mostly taken from Italian and Spanish, used by Mediterranean sailors and traders from the Middle Ages to the dawn of the nineteenth century — because he borrowed a few characteristic words from it when writing in Castilian and Italian. How many languages did Columbus know when he sailed the ocean in 1492? As in today’s India, where a degree of intercomprehensibility exists between several of its languages, the answer would be somewhat arbitrary. It’s unlikely Columbus even conceptualized Italian, Castilian or Portuguese as distinct languages, for they

did not yet have any grammar books. He was a learned man in being able to read and write the three ancient tongues. But beyond that, he was just a Mediterranean sailor, speaking whatever variety of language that he needed to do his job.

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**197** [2018]

For 2,000 years, there was an intuitive, elegant, compelling picture of how the world worked. It was called “the ladder of nature.” God was at the top, followed by angels, who were followed by humans. Then came the animals, starting with noble wild beasts and descending to domestic animals and insects. Human animals followed the scheme, too. Women ranked lower than men, and children were beneath them. The ladder of nature was a scientific picture, but it was also a moral and political one. It was only natural that creatures higher up would have dominion over those lower down.

Darwin's theory of evolution by natural selection delivered a serious blow to this conception. Natural selection is a blind historical process, stripped of moral hierarchy. A cockroach is just as well adapted to its environment as I am to mine. In fact, the bug may be better adapted — cockroaches have been around a lot longer than humans have, and may well survive after we are gone. But the very word evolution can imply a progression, and in the 19th century, it was still common to translate evolutionary ideas into ladder-of-nature terms.

Modern biological science has in principle rejected the ladder of nature. But the intuitive picture is still powerful. In particular, the idea that children and nonhuman animals are lesser beings has been surprisingly persistent. Even scientists often act as if children and animals are defective adult humans, defined by the abilities we have and they don't. Neuroscientists, for example, sometimes compare brain-damaged adults to children and animals.

We always should have been suspicious of this

picture, but now we have no excuse for continuing with it. In the past 30 years, research has explored the distinctive ways in which children as well as animals think, and the discoveries challenge the ladder of nature. Frans de Waal has been at the forefront of the animal research, and its most important public voice. In his book, *Are We Smart Enough to Know How Smart Animals Are?*, he makes a passionate and convincing case for the sophistication of nonhuman minds.

De Waal outlines both the exciting new results and the troubled history of the field. The study of animal minds was long divided between what are sometimes called “scoffers” and “boosters.” Scoffers refused to acknowledge that animals could think at all: Behaviorism — the idea that scientists shouldn’t talk about minds, only about stimuli and responses — stuck around in animal research long after it had been discredited in the rest of psychology. Boosters often relied on anecdotes instead of experiments.

Psychologists often assume that there is a special

cognitive ability that makes humans different from other animals. The list of candidates is long: tool use, cultural transmission, the ability to imagine the future or to understand other minds, and so on. But every one of these abilities shows up in at least some other species in at least some form. De Waal points out various examples, and there are many more. Some crows make elaborate tools, shaping branches into pointed \*termite-extraction devices. A few Japanese monkeys learned to wash sweet potatoes and even to dip them in the sea to make them more salty, and passed that technique on to subsequent generations.

From an evolutionary perspective, it makes sense that these human abilities also appear in other species. After all, the whole point of natural selection is that small variations among existing organisms can eventually give rise to new species. Our hands and hips and those of our \*\*primate relatives gradually diverged from the hands and hips of common ancestors. It's not that we miraculously grew hands and hips and other animals didn't. So why would we

alone possess some distinctive cognitive skill that no other species has in any form?

As de Waal recognizes, a better way to think about other creatures would be to ask ourselves how different species have developed different kinds of minds to solve different adaptive problems. Surely the important question is not whether an octopus or a crow can do the same things a human can, but how those animals solve the cognitive problems they face, like how to imitate the sea floor or make a tool with their beak. Children and chimps and crows and octopuses are ultimately so interesting not because they are smart like us, but because they are smart in ways we haven't even considered.

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**198** [2019]

We have a problem to solve whenever we want to do something but lack the immediate means to achieve it. Most of the goals we reach in our everyday

life do not require problem solving because we have a habit or some prior knowledge that allows us to achieve them. Getting to work, for example, requires a series of decisions and actions that might be quite complex but are generally routine and executed automatically. We know how to start our cars, which route to drive, and so on. But if the car will not start one morning, or our usual route is blocked, *then* we have a problem to solve. Like many real world problems these are *ill-defined*, lacking clear procedures or rules for their solution. For example, if the car will not start, a variety of strategies and solutions may be tried. If the battery is flat, we may jump-start it from another car. Or we may borrow a car from a partner or friend, or decide to use public transport.

Ill-defined problems may be quite easy for a human to solve but would be next to impossible for a computer, unless it knew all the things that we know. By contrast, some problems — including many studied by psychologists — are *well-defined*. This

means that there is a clear set of rules that can be applied to get from where you are to where you want to be. Artificial problems usually have this nature. Examples would be an anagram to solve (which we may encounter in doing a crossword), a sudoku puzzle, or a chess problem which requires you to find a checkmate in three moves. If a problem is well-defined, a computer program can in principle be written to solve it.

Problem solving is clearly a key feature of human intelligence. Animals have generally evolved with fixed behaviour patterns. Some of the things they do may seem very clever. For example, birds and other animals may migrate thousands of miles, arriving (usually) in the right place. Honey bees can signal the location of nectar to their fellow creatures using a sophisticated code. Predator animals follow complex strategies to trap their prey, and so on. But these behaviours have been acquired slowly through evolution and cannot be varied by the individual animal. If the environment changes, it will not be

possible for an individual to adapt its behaviour. While there is some evidence of intelligent use of tools to solve novel problems in some animals, the solution of novel problems is what generally marks our species out as different from both animals and earlier hominids. Neanderthals\* had very sophisticated skills — in manufacturing tools and hunting prey, for example — but these skills were isolated from each other. Hence, they could not adapt their tool making if different kinds of prey were encountered. By contrast, our own species, *Homo sapiens sapiens\*\**, was able rapidly to adapt the design of artefacts to achieve changing goals, which is probably the reason that we are the only hominid species to make it to the present day.

Human intelligence does not, in the main, rely on behaviour patterns fixed by evolution, and nor does it depend on habit learning. Humans can and have solved a whole range of novel problems, which is why we have been able to develop such advanced technologies. If we want to understand human

intelligence, then we need to study how it is that humans can solve both ill-defined and well-defined problems. Not all problems have a uniquely correct solution, but that does not mean that we should give them up. For example, no human or machine can guarantee to compute the best chess move in most positions, but they can certainly identify moves that are much better than others. Our best scientists are like grandmasters, because science also cannot provide knowledge that is certainly true. Even great scientific theories, like Newton's mechanics, can be later shown to be incorrect or limited in certain respects. In Newton's case, the inaccuracies cannot be detected in systems moving much slower than the speed of light, and Newton's physics was close enough to the truth to allow all manner of technologies to be developed using its principles.

Science and technology: we tend to think of them as siblings, perhaps even as twins, as parts of STEM (for “science, technology, engineering, and mathematics”). When it comes to the shiniest wonders of the modern world — as the supercomputers in our pockets communicate with satellites — science and technology are indeed hand in glove. For much of human history, though, technology had nothing to do with science. Many of our most significant inventions are pure tools, with no scientific method behind them. Wheels and wells, cranks and mills and gears and ships’ masts, clocks and rudders and crop rotation: all have been crucial to human and economic development, and none historically had any connection with what we think of today as science. Some of the most important things we use every day were invented long before the adoption of the scientific method. I love my laptop and my iPhone and my Echo and my GPS, but the piece of technology I would be

most reluctant to give up, the one that changed my life from the first day I used it, and that I'm still reliant on every waking hour — am reliant on right now, as I sit typing — dates from the thirteenth century: my glasses. Soap prevented more deaths than penicillin. That's technology, not science.

In *Against the Grain: A Deep History of the Earliest States*, James C. Scott, a professor of political science at Yale, presents a plausible contender for the most important piece of technology in the history of man. It is a technology so old that it predates *Homo sapiens* and instead should be credited to our ancestor *Homo erectus*. That technology is fire. We have used it in two crucial, defining ways. The first and the most obvious of these is cooking. As Richard Wrangham has argued in his book *Catching Fire*, our ability to cook allows us to extract more energy from the food we eat, and also to eat a far wider range of foods. Our closest animal relative, the chimpanzee, has a colon three times as large as ours, because its diet of raw food is so much harder to digest. The extra caloric value we

get from cooked food allowed us to develop our big brains, which absorb roughly a fifth of the energy we consume, as opposed to less than a tenth for most mammals' brains. That difference is what has made us the dominant species on the planet.

The other reason fire was central to our history is less obvious to contemporary eyes: we used it to adapt the landscape around us to our purposes. Hunter-gatherers would set fires as they moved, to clear terrain and make it ready for fast-growing, prey-attracting new plants. They would also drive animals with fire. They used this technology so much that, Scott thinks, we should date the human-dominated phase of Earth, the so-called Anthropocene, from the time our forebears mastered this new tool.

We don't give the technology of fire enough credit, Scott suggests, because we don't give our ancestors much credit for their ingenuity over the long period — ninety-five percent of human history — during which most of our species were hunter-gatherers. “Why human fire as landscape architecture doesn't register

as it ought to in our historical accounts is perhaps that its effects were spread over hundreds of millennia and were accomplished by ‘precivilized’ peoples also known as ‘savages,’” Scott writes. To demonstrate the significance of fire, he points to what we’ve found in certain caves in southern Africa. The earliest, oldest strata of the caves contain whole skeletons of carnivores and many chewed-up bone fragments of the things they were eating, including us. Then comes the layer from when we discovered fire, and ownership of the caves switches: the human skeletons are whole, and the carnivores are bone fragments. Fire is the difference between eating lunch and being lunch.

Anatomically modern humans have been around for roughly two hundred thousand years. For most of that time, we lived as hunter-gatherers. Then, about twelve thousand years ago, came what is generally agreed to be the definitive before-and-after moment in our ascent to planetary dominance: the Neolithic Revolution. This was our adoption of, to use Scott’s

word, a “package” of agricultural innovations, notably the domestication of animals such as the cow and the pig, and the transition from hunting and gathering to planting and cultivating crops. The most important of these crops have been the cereals — wheat, barley, rice, and maize — that remain the staples of humanity’s diet. Cereals allowed population growth and the birth of cities, and, hence, the development of states and the rise of complex societies.

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**200** [2021]

Is any environment more secluded from our imagination than the seas surrounding Antarctica? Icebergs grind above a seabed dotted with salps, sea squirts, sponges, and other barely animate organisms. The sun scarcely rises for half the year. Under the elemental conditions at these latitudes, Antarctic blue whales exist in a world defined by bioacoustics. Blue whales, Earth’s largest animals, call to others of their

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kind, though exactly what these cries communicate remains a mystery. Whether to attract a mate, to repel a rival, or for some other social purpose, the sounds blue whales make are less song, more drone — a tectonic rumble on the furthest edge of human hearing. That the sounds of blue whales seem simple might suggest they are unchanging across generations. But these atonal sounds have begun evolving. Since at least the 1960s, their pitch has downshifted the equivalent of three white keys on a piano. Scientists have theories as to why — some worrisome, some hopeful, all involving humans.

The deepening of Antarctic blue whales' sounds is not unique to the subspecies. Groups of pygmy blue whales found near Madagascar, Sri Lanka, and Australia, as well as fin whales, which live in seas around the world, have also dropped their pitch. (Even before this change, fin whales emitted sounds so low as to be nearly imperceptible to humans; the wavelengths of their calls were often longer than the bodies of the whales themselves.) In a study last year

that analyzed more than 1 million individual recordings of whale calls, scale shifts were found across species, and among populations that don't necessarily interact with one another. Which is to say, whatever has triggered the change doesn't seem to have a specific geographic origin.

The underwater clamor caused by maritime traffic and extractive industries might seem a likely culprit. After all, such noise is known to interrupt whales' foraging and interfere with their vocal interactions. But although some whales do adapt, in limited ways, to artificial sounds in the ocean — by pausing their calls to avoid competing with the passage of cargo ships, for example — scientists don't believe that the deepening whale calls are a response to sonic pollution. They have identified lowered pitches even across populations of whales that live in seas without major shipping routes, where mechanical noise is negligible.

Another possible explanation for the change in whale calls is the achievements of global conservation

efforts. At the start of the 20th century, an estimated 239,000 Antarctic blue whales occupied the Southern Ocean. By the early 1970s, decades of commercial whaling — initially by Norwegian and British whalers, and later by illegal Soviet fleets — had decreased the blue-whale population in the region to a mere 360. But since protection of the subspecies began in 1966, that number has begun to rebound. Scientists have speculated that the whale's anatomy determines that the louder it gets, the higher the pitch of its calls. As populations have grown, then, the whales may have decreased their volume because they are more likely to be communicating over short distances. In other words, Antarctic blue whales may be lower-toned today than in previous decades simply because they no longer need to shout.

Last year's study of whale calls also suggests a more ominous reason for the drop in pitch, however: Perhaps whales don't need to be so loud because sound waves travel farther in oceans made acidic by the absorption of carbon dioxide.

Carbon dioxide in the atmosphere, meanwhile, may indirectly influence whale voices in other ways. Recent monitoring of Antarctic blue whales shows that, during the austral summer, their pitch rises. Researchers have hypothesized that in warmer months, the whales must use their forte volume to be heard amid the cracking ice — a natural sound amplified by unnatural processes, as rising temperatures exacerbate ice-melt. So the impacts of a warming planet may modulate animal sounds even in remote places with barely any humans, and where the most thunderous notes come not from ships, but from the clatter of breaking ice.

We may not yet know what the sounds of blue whales mean. But whether through our intent to preserve these creatures, or as a result of refashioning their environment, our deeds echo in their voices.

(Giggs, Rebecca. “Whale songs are getting deeper.” *The Atlantic*, October 2019.)

Take a moment to pay attention to your hands. It will be time well spent, because they are evolutionary marvels. Hold one up and examine it. Open and close it. Play with your fingers. Touch the tips of your four fingers with your thumb. Rotate your wrist. You should be able to turn it 180 degrees with ease. Ball your hand up into a fist until your thumb lies on top of and lends support to your index, middle, and ring fingers. That is something no ape can do.

Twenty-seven bones connected by joints and ligaments, thirty-three muscles, three main nerve branches, connective tissue, blood vessels, and skin equipped with highly sensitive touch receptors are behind the most delicate and most complex tool for grasping and touching that evolution has ever produced. The palm is protected by a massive sheet of fibrous tissue that makes it possible to grip things powerfully. The fingers are slender and small-boned, partly because they contain no muscles. They are

controlled remotely, like puppets hanging from strings. But those strings are highly flexible \*tendons attached to muscles found not only in the palm of the hand and forearm but also all the way up to the shoulder.

Between this equipment and our complex brains, we can do things no other creatures on the planet are capable of doing: kindling fire, gathering the finest kernels of grain from the ground, knitting, cutting, knotting nets, turning tiny screws, typing on a keyboard, or playing basketball or a musical instrument.

Our thumbs have a special role to play in our dexterity. We can easily match them them up with any finger. That allows us to feel and touch, to grab and hold. The saddle joint at the base of the thumb rotates like a ball joint. Our thumb is much longer, more powerful, and more flexible than that of our nearest relatives, the great apes. It allows us to execute a delicate grip as easily as a powerful pinch. Chimpanzees can also clamp small objects between

the sides of their thumbs and their fingers, but much less forcefully and without any sensory input from their fingertips. That means they have no means to hold or move tools such as pens or screws precisely between the tip of their thumb and their other fingers.

A great ape holds larger tools — a stick, for example — pressed into their palm at right angles to their forearm. There are not many other options available to them. In contrast to chimpanzees and gorillas, we have highly flexible wrists that allow us to hold an object so that it becomes an extension to our forearm. This intensifies the force of a blow. It also means enemies and dangerous animals can be kept at arm's length. If an animal does come within range and full advantage is then taken of the extra \*leverage, bones can be broken.

It is not only the flexibility granted by the fully opposable thumb that makes the human hand so special, but also its extraordinary ability to feel and to touch. It operates almost like an independent sensory organ. We use it to feel the temperature of a breeze

and of water. With its help we are able to fit a key directly into a lock, even in the dark. We can detect uneven surfaces with our fingers that we cannot see with our naked eye. With a little bit of practice, we can use our fingers to tell real silk from synthetic silk or real leather from fake leather, even with our eyes closed.

Our sense of touch detects delicate differences and sends this information via a dense network of receptors and neural pathways to our spinal cord and from there to our brain. Our fingers can even replace our eyes as ways to perceive the world, as the Dutch paleontologist Geerat Vermeij, who has been blind since the age of three, can attest. A specialist famous for his work on marine \*mussels and their ecosystems, he has never seen a fossil. Out in the field, he feels the complex structures of mussels and of the rocks in which they are found. With his fingers, he “sees” details many sighted scientists miss. There is no doubt about it: our hands are an exceptional development in the history of evolution.

(Bohme, Madelaine, Braun, Riidiger & Breier, Florian.  
2020. *Ancient bones: Unearthing the astonishing new  
story of how we became human* (Jane Billingham,  
Trans.) . Greystone Books より一部改題)

\*tendons : 腱

\*leverage : てこの作用、力

\*mussels : ムラサキイガイ

## 14 長文総合 〈後期〉

202 [2000]

The images of America and the West that appear in contemporary Japanese advertising startle many Westerners when they come across them for the first time. Their accidental encounter by an American tourist or businessperson on a visit to Japan often evokes surprise, confusion, and misunderstanding. Such encounters were not the ones the makers of the advertisements had in mind when they constructed the images and ideas in them.

The extraordinary number of foreigners appearing in contemporary advertising is one of the most distinctive features. First-time Western visitors to Japan notice this; even Westerners who have lived there a long time continue to talk about it. But the foreign models do not cause so much reaction from the Japanese, who are accustomed to it.

In the years immediately following World War II, Western models and images were held in awe as icons

of abundance and success. In the seventies, advertisers began to replace unknown Western models with celebrities. The first of these was Charles Bronson, who advertised toiletries for men. He was followed in successive years by a long list that includes Paul Newman, Audrey Hepburn, Arnold Schwarzenegger, Sylvester Stallone, Madonna and more recently, Mark McGwire. Advertisements featuring these celebrities are seldom seen outside Japan. It would indeed be an oversimplification of the current situation to say that the use of these celebrities is an effort to further Westernize Japan. A more correct interpretation would appear to be that in modern, cosmopolitan Japan these celebrities are internationally known figures who happen to be Western. Their use lends a more international quality to the advertisements in which they appear and to the products which they support.

In contrast, the use of unknown Western models is somewhat more complex. There seems to be a view within Japan that Western clothes often look better

on Western models and that products associated with origins abroad create an exotic atmosphere by association with foreigners. It is no simple matter, and any effort to provide a single answer would not only be simplistic but probably wrong.

The association of Western models with action, freedom, and flexibility is also made in the signs and symbols contained in the advertisement. The models might have been Japanese, but they are not. They simply help construct the contrast between Japan and the West, between order and flexibility, between studied behavior and spontaneous action.

This use of Westerners to present a condition to the expectations and conventions of Japanese society is repeated and significant. It is emphasized in the wording of advertising as well as in the direct imports of Western popular culture — films, television, and music. It is also this freedom from the limitations of one's own customs and traditions that constitutes the appeal of Europe and America as tourist destinations for the increasingly wealthy traveling public.

And so it is that when we encounter Japanese advertisements for the first time, we are likely to react to them in various and complex ways. Most of all, we cannot but find a difference between how we are represented in these and what we think about ourselves. Although we recognize the aspects of our culture that are selected for use in the Japanese advertisements, the emphasis given to them is unusual. But like other stereotypes, these have bases in reality. It is their exaggeration we are likely to reject. Therefore, as we react to such representations of America and the West, we must ask ourselves, “Is this not what we have done in our advertisements to peoples and cultures that are defined as ‘other’?”

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**203** [2001]

When we speak of dreams, the first thing that tends to come to mind is the presence of unusual and fantastic events in them. In our dreams we encounter

people who have been dead for years. We suddenly find ourselves in far-off lands. Animals speak to us, and we ourselves possess powers that would strike us as completely impossible in waking life. If someone were to tell us that he had similar experiences when awake, we would doubt his sanity.

Let us begin by describing the most important characteristics of dreams more precisely. The dreamer finds himself in surroundings that often change abruptly, although sometimes a change of scene occurs more gradually. Scenes and people from our past appear. Obviously the laws of space and time are suspended in dreams. Another important trait of dreams is their riveting nature. Our attention is captured by certain events or objects, from which we cannot free it; we cannot choose to direct our thoughts to something else. The American sleep researcher Allan Rechtschaffen made the paradoxical but correct observation that dreams are lacking in imagination. When we dream, our mind does not wander, as it does when we are awake. The dream's images fill the

dream entirely, and no room remains for other reveries. This “single-mindedness” of dreams accounts for that peculiar feeling that dreams take place in a self-contained world of their own. Although other people appear in them, we feel fundamentally alone and cannot communicate our experiences to anyone else. We are entirely in the grip of the experience, unable to reflect on it or evaluate it. As a result we accept the most astonishing circumstances in dreams without surprise and never exclaim or protest, “But that’s impossible!”

The following account of a dream, from an ancient Chinese text, illustrates strikingly the paradoxical closed world of dreams:

Once upon a time, I dreamt I was a butterfly, fluttering hither and thither, to all intents and purposes a butterfly. I was conscious only of following my fancies as a butterfly and was unconscious of my individuality as a man. Suddenly I awaked, and there I lay, myself again. Now I do not know whether I was

a man dreaming I was a butterfly., or whether I am now a butterfly dreaming I am a man.

Generally speaking, the world of dreams vanishes on awakening, leaving a vague memory at the very most. We are often aware in the morning of having had a dream, but cannot remember what it was about. If we recall that one to two hours of every night are spent in REM sleep, when dreams frequently occur, then the extent to which memory of the dream disappears seems quite remarkable. If we wake up just after dreaming about something and still have the images of this dream clearly in our minds, we find it difficult to describe those images, and our attempts to do so are seldom satisfactory. Even if we do succeed in giving an accurate account of what happened in our dream, it is still usually impossible to recall to mind the peculiar atmosphere of the dream and to communicate it to another person. As the Swiss poet Carl Spitteler said, "Dreams cannot be told; they dissolve when the rational mind tries to grasp them in

words.”

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**204** [2002]

The universe is in a perpetual state of change. The stars are in constant motion, growing, cooling, exploding. The earth itself is not unchanging; mountains are being worn away, rivers are altering their channels, valleys are deepening. All life is also a process of change, through birth, growth, decay, and death. Even what we used to call “inert matter” — chairs and tables and stones — is not inert, as we now know, for, at the submicroscopic level, they are whirls of electrons and protons. If a table looks today very much as it did yesterday or as it did a hundred years ago, it is not because it has not changed, but because the changes have been too minute for our coarse perceptions.

To modern science, there is no “solid matter.” If matter looks “solid” to us, it does so only because its motion is too rapid or too minute to be felt. It is solid

only in the sense that a rapidly rotating color chart is “white” or a rapidly spinning top is “standing still.” Our senses are extremely limited, so that we constantly have to use instruments such as microscopes, telescopes and speedometers to detect and record occurrences that our senses are not able to record directly. The way in which we happen to see and feel things is the result of the peculiarities of our nervous system. There are “sights” we cannot see, and, as even children know today with their high-frequency dog whistles, “sounds” that we cannot hear. It is absurd, therefore, to imagine that we ever perceive anything “as it really is.”

Inadequate as our senses are, with the help of instruments they tell us a great deal. The discovery of microorganisms with the use of the microscope has given us a measure of control over bacteria; we cannot see, hear, or feel radio waves, but we can create and transform them to useful purpose. Most of our conquest of the external world, in engineering, in chemistry, and in medicine, is due to our use of

mechanical contrivances of one kind or another to increase the capacity of our nervous systems. In modern life, our unaided senses are not half enough to et us about in the world. We cannot even obey speed laws or compute our gas and electric bills without mechanical aids to perception.

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**205** [2003]

Cloning is reproduction of an organism by cell division. A cell-nucleus from the organism to be reproduced is transferred to an unfertilized egg whose own cell-nucleus has been removed. Where this is successful, the resulting organism has the same genetic make-up as the original one. If we develop techniques for cloning humans, should we use them?

If we think of producing a single offspring by cloning, there seems to be only one, rather speculative, objection. Perhaps there would be psychological problems, because of the special position of being a

cloned offspring. But, if these problems are minor or non-existent, the production of a single cloned person seems unobjectionable.

When people are repelled by the thought of clones, they usually have in mind the creation of whole batches of people of identical composition. This is unattractive because of the value we place on having a wide variety of different people. In an extreme case, where a town was entirely populated by one male clone and one female clone, there would be practical problems. (People might have problems telling who they were married to.) But the practical drawbacks are not central. We feel our lives would be impoverished by the loss of variety. And our present degree of variety has genetic advantages. A very diverse gene pool makes it more likely that some of us will survive biological disasters such as the spread of some new and deadly disease.

We might expect cloning to change our relationships. Bernard Williams (in a different context) discusses what it would be like to love

someone just as an instance of a type rather than as an individual person. He says,

We can dimly see what this would be like. It would be like loving a work of art in some reproducible medium. One might start comparing, as it were, performances of the type; and wanting to be near the person one loved would be like wanting very much to hear some performance, even an indifferent one, of Mozart.

These engaging thoughts about this disturbing possibility might never be actualized, because of the extent to which a relationship between two people depends on a history of shared experiences, and of their responses to each other. Perhaps cloning will alter relationships less than we might first think. (I wonder what it is like now to love someone who has an identical twin?) And any changes of a disturbing kind might be matched by compensating advantages. Members of a clone might develop special bonds of

closeness and empathy.

It is hard to guess how far cloning would change relationships, or whether any changes would be on balance for better or worse. The central objections have to do with the narrowing of the gene-pool, and the impoverishing uniformity involved. These objections are so strong that any substantial use of cloning batches of people could only be justified by some very pressing reason, of a kind not now apparent.

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**206** [2004]

Getting animals used to the presence of humans is at the heart of zookeeping. The key aim is to diminish an animal's flight distance, which is the minimum distance at which an animal wants to keep a perceived enemy. A flamingo in the wild won't mind you if you stay more than 300 yards away. Cross that limit and it becomes tense. Get even closer and you trigger a flight reaction from which the bird will not

cease until the limit is set again. Different animals have different flight distances and they judge them in different ways. Cats look, deer listen, bears smell.

Our tools for diminishing flight distance are the knowledge we have of an animal, the food and shelter we provide, the protection we afford. When it works, the result is an emotionally stable, stress-free wild animal that not only stays put, but is healthy, lives a very long time, eats without fuss, behaves and socializes in natural ways and — the best sign — reproduces.

Yet there will always be animals that seek to escape from zoos. Animals kept in unsuitable enclosures are the most obvious example. Every animal has particular habitat needs that must be met. If its enclosure is too sunny or too wet, if its perch is too high or too exposed, if the ground is too sandy — and many other ifs — then the animal will not be at peace. It is not so much a question of constructing an imitation of conditions in the wild as of getting to the *essence* of these conditions. Everything in an

enclosure must be just right — in other words, within the limits of the animal's capacity to adapt.

Wild animals that are captured when they are fully mature are another example of escape-prone animals; often they are too set in their ways to reconstruct their subjective worlds and adapt to a new environment.

But even animals that were bred in zoos and are perfectly adapted to their enclosures will have moments of excitement that push them to seek to escape. All living things contain a measure of madness that moves them in strange, sometimes inexplicable ways. This madness can be saving; it is part and parcel of the ability to adapt. Without it, no species would survive.

Whatever their reason for wanting to escape, animals don't escape *to somewhere* but *from something*. Something within their territory has frightened them — the intrusion of an enemy, the assault of a dominant animal, a startling noise — and set off a flight reaction. Animals that escape go from

the known into the unknown — and if there is one thing an animal hates above all else, it is the unknown. Escaping animals usually hide in the very first place they find that gives them a sense of security, and they are dangerous only to those who happen to get in the way before they reach such a place.

Consider the case of the female black leopard that escaped from the Zurich Zoo in the winter of 1933. She was new to the zoo and seemed to be getting along with the male leopard, but various paw injuries hinted that she wasn't, and one night she escaped from the cage and vanished. The discovery that a wild carnivore was free in the city created an uproar. Traps were set and hunting dogs were let loose. But not a trace of the leopard was found for *ten weeks*, when she was discovered 25 miles away and shot. That a big, black, tropical cat managed to survive for more than two months in a Swiss winter without being seen by anyone, let alone attacking anyone, is clear evidence that escaped zoo animals are simply wild creatures seeking to fit in.

A proverb is a traditional saying which offers advice or presents a moral in a short and concise manner.

Proverbs fall readily into three main categories. Those of the first type take the form of abstract statements expressing general truths, such as *Absence makes the heart grow fonder* and *Time is money*. Proverbs of the second type, which include many of the more colourful examples, use specific observations from everyday experience to make a point which is general; for instance, *You can take a horse to the water, but you can't make him drink* and *Don't put all your eggs in one basket*. The third type of proverb comprises sayings from particular areas of traditional wisdom and folklore. In this category are found, for example, the health proverbs *After dinner rest a while, after supper walk a mile* and *Feed a cold and starve a fever*. These are frequently classical maxims rendered into the vernacular. In addition,

there are traditional country proverbs which relate to farming, the seasons, and the weather, such as *April showers bring forth May flowers* and *When the wind is in the east, it's neither good for man nor beast*.

It is sometimes said that the proverb is going out of fashion, or that it has become worn out. Such views overlook the fact that while the role of the proverb in English literature has changed, its popularity has remained constant. In medieval times, and even as late as the seventeenth century, proverbs often had the status of universal truths and were used to confirm or refute an argument. Lengthy lists of proverbs were compiled to assist the scholar in debate; and many sayings from Latin, Greek, and the continental languages were drafted into English for this purpose. By the eighteenth century, however, the popularity of the proverb had declined in the work of educated writers, who began to ridicule it as a vehicle for dull, conventional wisdom.

It is easy to see how proverbs came into disrepute. Seemingly contradictory proverbs can be paired — *Too*

*many cooks spoil the broth* with *Many hands make light work*. *Absence makes the heart grow fonder* with its opposite *Out of sight, out of mind*. Proverbs could thus become an easy object for satire in learned circles, and are still sometimes frowned upon by the polished stylist. The proverb has nonetheless retained its popularity as a homely commentary on life and as a reminder that the wisdom of our ancestors may still be useful to us today. This shift is reflected in the quotations which accompany the entries in the dictionary: recent quotations are often taken from the works of minor writers, or from newspapers and magazines, while earlier quotations are more frequently from the works of major writers. It is a reflection of the proverb's vitality that new ones are continually being created as older ones fall into disuse. Surprisingly, neither *A change is as good as a rest* nor *A trouble shared is a trouble halved* are recorded before the twentieth century; the popular saying *A watched pot never boils* first occurs as late as 1848. The computer world has recently given us a potential

classic, *Garbage in, garbage out*, and economics has supplied us with *There's no such thing as a free lunch*. Proverbs continue — as the early collectors never tired of stating — to provide the sauce to relish the meat of ordinary speech.

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208 [2006]

“What are we celebrating today?”

I asked the above question at the beginning of every one of my classes. Sometimes I asked it a little differently, as in, “Who has good news?” or “Who has something good to say?” However I put it, it always meant the same thing. It was a call for celebrating life, for focusing on what's right and what's good. And it was always fun! It was part of a life-affirming ritual that started by accident in the 1970-71 school year and continued until I stopped classroom teaching in 2001 — thirty years of celebrating!

Believe it or not, this little ritual started as the

result of two things that usually have a negative nuance, especially with students: current events and homework. At the high school level I often taught courses in United States history and in American government. Whenever I taught either of these two subjects, there was a nightly homework assignment in current events. The average high school kid is sadly uninformed about anything unrelated to music, sports, and other forms of entertainment, so reading the actual news section of a newspaper was a completely new experience for most of them.

Within a few weeks they got the hang of it and were actually surprised at their newly developed ability to carry on an intelligent conversation about what was going on in a world they hardly knew existed just a short time before. Just as we were settling into our routine, a student's innocent comment jolted me. He said, "You know, for being such a positive teacher, you sure give a negative homework assignment." Somewhat startled, I replied with, "What do you mean?" He simply stated that most of

the news was bad news.

We had a long class discussion about this, and agreed on one thing: We needed to receive more good news. This is something I thought over for quite some time. By requiring my students to read all this bad news I was jeopardizing my reputation with many of them as “Mr. Positive.”

I was now more determined than ever to prove to my students that there was something to celebrate every day and to work a daily dose of good news into our learning environment. So the next day at the beginning of class I asked, “What are we celebrating today?” They thought I meant that it was some day of historical significance, and they should know it. So, I said, “Let me ask it a different way: Who has good news? Who has something good to say?” Since this was the first time I’d started class that way, they were a bit puzzled. I said, “Since you’re having such a hard time finding good news in the newspaper, let’s see if we can find some in our own lives.”

Over the years of doing this, we heard just about

every bit of good news possible. Some were small things, some were huge things. But most important was that my students learned to look for the good in everyday life and then to share it with others. This simple little ritual also had a build-up effect. Each day we added to the good news of the previous day, and so on. And each day my students increased their awareness of all the good news going on around them all the time. They looked for it, they found it, and they celebrated it by sharing it with others.

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**209** [2007]

A fly can do one thing extremely well: fly. Recently a team of British scientists declared that the common housefly is the most talented aerodynamicist on the planet, superior to any bird, bat, or bee. A housefly can make six turns a second; hover; fly straight up, down, or backward; land on the ceiling; and perform various other show-off maneuvers. And it has a brain smaller

than a sesame seed.

Michael Dickinson, who studies fly flight in his lab at the California Institute of Technology, says the housefly isn't actually the best flier. "Hoverflies are the be-all and end-all," he says. They can hover in one spot, dash to another location, and then race back to their original hovering point — precisely.

Scientists, engineers, and military researchers want to know how creatures with such small brains can do that. Maybe they could reverse-engineer a fly to make a robotic device that could reconnoiter dangerous places, such as earthquake zones or collapsed mines.

Dickinson's laboratory works with fruit flies. Researchers put them in chambers and manipulate the visual field, filming the flies in super-slow motion, 6,000 frames a second. Dickinson is interested in knowing how flies avoid collisions. He has found that certain patterns, such as 90-degree turns, are triggered by visual cues and two equilibrium organs on their backs that function like a gyroscope.

Flies have only a dozen muscles for maneuvering, but they're loaded with sensors. In addition to their compound eyes, which permit panoramic imagery and are excellent at detecting motion, they have wind-sensitive hairs and antennae. They also have three light sensors on the tops of their heads, which tell them which way is up. Roughly two-thirds of a fly's entire nervous system is devoted to processing visual images. They take all this sensory data and boil it down to a few basic commands, such as "go left" and "go right."

Imagine if you didn't utter an opinion until you had read hundreds of books, magazines, newspaper articles, and blogs, and then issued a statement based on a few basic notions. That's how a fly approaches flying. Only the fly is a speed reader. The information processing takes a fraction of a second. This mode of operation is called a "sensor-rich feedback control paradigm."

Given that flies have evolved for hundreds of millions of years, we shouldn't be surprised that

they're such good fliers. "They just don't have brains like ours. Studying flies," says Dickinson, "is like traveling to another planet."

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**210** [2008]

There's a burglary every 15 seconds in the United States — and more than 6 million home break-ins every year.

The good news: Your house doesn't have to be one of them. There's plenty you can do, experts say, to make it tougher for housebreakers to make off with your hard-earned, perhaps irreplaceable stuff. A few smart moves within the house can keep a burglar out — or at least minimize the amount of things he can steal.

Put lights and a radio or a television on timers. "People who leave the lights on all day might as well put out a sign in their front yard saying they're out of town," says Ann Lindstrom of an alarm-system

company. Look for the type of timer that can be set for random on and off times. Otherwise, it's too easy for crooks to get wise to the fact that your lights are coming on at the same time every night.

Don't rely on your dog. You'd like to believe that your "vicious" golden retriever will scare off burglars. And though barking may persuade them to skip your house, you shouldn't count on it. "Most of us train dogs to be friendly to strangers," says an expert for the Discovery Channel's\* burglary-prevention show. Some thieves even bring dog biscuits.

Close most shades. If a thief can't see inside, he won't know whether there's anything worth stealing, says Lauren Russ, executive director of the nonprofit Burglary Prevention Council. But keep a few shades open on the second floor to make it look as if someone is home.

Lock up valuables. It may sound obvious, but thieves know we all like to hide our most important things under the bed, in a coffee tin, or behind a bookcase. So keep passports, Social Security cards\*\*,

and the like in a bank safe-deposit box or in a heavy-duty combination safe you can bolt to the floor in a closet.

Keep two jewelry boxes. Store inexpensive pieces in the nice case on your dresser. Stash the good bits in a safe. A thief may be fooled by the “cheap box” and not bother looking for more.

Make your stuff harder to sell. Use an engraving pen (sold at hardware stores) to mark big-ticket items, like electronics and computers. Prominently engrave your initials and driver’s-license number on the back. Since many pawnshops\*\*\* won’t accept ID-engraved items or are required by law to report them to the police, burglars may pass on them. At the very least, you’ll have a better chance of recovering them.

Get an alarm system. A recent survey by Temple University researchers found that alarms, when used in combination with other precautions, reduce the likelihood of burglary by as much as 66 percent.

All monitored electronic security systems operate through phone lines. More recent types have

backup service that uses cellular technology or digital radio, so if the line is cut or the power goes out, you're still protected. This can add a few hundred dollars to the bill, but experts say it's a must. Expect to pay at least \$350 for installation and \$35 a month in monitoring fees.

\* ケーブルテレビのチャンネルの一つ

\*\* 社会保障番号カード(身分証明書に当たるもの)

\*\*\*質屋

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211 [2009]

Many climatologists and scientists say arctic ice melt and other changes in the Earth's climate are the result of an increase in the world's temperature, a trend widely called global warming. Global warming experts say the phenomenon, if unchecked, is capable of altering the world's climate and geography. In the worst-case scenario, experts say oceans could rise to overwhelming and catastrophic levels, flooding cities

and altering seashores. Other scientists and observers, a minority compared to those who believe the warming trend is something threatening, say it is simply the latest shift in the cyclical patterns of a planet's life.

Most of the scientific community believes that some warming is occurring across the globe and through some layers of the atmosphere. But why it is occurring and what that means for the future is scientifically and politically under debate. The Earth's temperature was relatively unchanged from 1880 to 1910, and rose till about 1945, then cooled until about 1975 and has been rising steadily to the present day. There are several possible reasons for the warming, scientists say. For example, a change in the Earth's orbit or the intensity of the sun's radiation could trigger warming or cooling.

The reason most cited — by scientists and scientific organizations — for the current warming trend is an increase in the concentration of greenhouse gases, which are in the atmosphere

naturally and help keep the planet's temperature at a comfortable level. The amount of carbon dioxide in the atmosphere, for instance, has increased by 35 percent since the dawn of the industrial age, according to the United Nations' Intergovernmental Panel on Climate Change, commonly referred to as the IPCC.

Many scientists and experts who have studied global warming believe the increase is primarily the result of human activities, like the burning of fossil fuels, emissions from vehicles and the clearing of forests. "For the last 30 years, there's no way there's anything natural that can explain it," Stephen Schneider, a professor of environmental studies at Stanford University in California, said. "A vast bulk of the knowledgeable and honest community . . . will say the science is settled and humans are at least a majority of the reason behind the warming," he added. Many scientific organizations share Schneider's view, ranging from the national academies of the countries that comprise the G8 to the National Research Council, the American Meteorological Society and the

American Geophysical Union.

However, there are those who do not share his view, and among the skeptics is Richard Lindzen, a professor of atmospheric sciences at the Massachusetts Institute of Technology. “We’ve suddenly taken to reading tea leaves,” he said. “When we saw cooling from 1940 to 1970, we were asserting global cooling. Since then, there’s been a fraction of an increase in global temperature, so we’re asserting global warming.” He believes the current warming trend is the result of natural variability, where a planet goes through phases of warming and cooling and the human contribution to it is minimal.

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**212** [2010]

Haptics is the study of the sense of touch. And touch, it turns out, is incredibly complicated. When you touch or lift an object, your fingers send important signals to your brain about how the object feels.

The way something feels depends on its weight, texture, and temperature. When you pick something up, it feels different than it does if you simply push it or rub your fingers along its surface. Sensory cells throughout your body send messages relating to touch to your brain, and your brain knows how to interpret those messages.

A better understanding of the sense of touch could lead to major advances in medicine, space exploration, robotics, and even video games. Someday, for example, people on Earth might be able to control \*space probes that are millions of miles away by using robotic tools that allow them to actually feel what they're doing. That could help them conduct delicate experiments or perform repairs.

You use your sense of touch to interact with the world around you. Someday, scientists might be able to feel things on distant planets without leaving Earth. And while some game systems already use touch technology (for example, to make you feel as if you're playing baseball or fighting with a sword), future

systems might be even more realistic.

Visual systems that allow people to work remotely already exist. Without ever putting their hands inside a patient, surgeons can use robotic devices to remove \*\*tumors or repair wounds that are deep in the body. To help them maneuver robotic tools inside patients' bodies, the doctors put cameras on the tools. On video screens, they can see what they are doing with their tools.

But these visual systems have flaws. For one thing, doctors can't always tell if they're pulling too hard or not pushing hard enough. In other words, they lack the sense of touch. To fill that gap, researchers at Johns Hopkins University are adding a sense of touch to a robotic surgical device called the da Vinci system. They've developed sensors that measure how much pressure the robot is applying to the body. Red circles and other visual clues then appear on a computer monitor to tell the user whether that level of pressure is too little or too much.

The researchers have also developed a physical-

feedback system for the device. It lets the user not only see but also feel how much pressure is being applied.

For now, one of the limits of touch technology is how quickly computers can process data. To accurately mimic how the world feels to us, computer programs would have to constantly update information based on our tiniest movements. Right now, they're not fast enough to do this.

There's also a lot to learn about touch itself. Researchers are still trying to get a better sense of how things actually feel to us. Touch, though very sensitive, is not quite perfect. To our fingertips, for example, two small pins will feel like one pin if they are spaced 1 millimeter apart or less.

As technologies improve, however, scientists envision artificial limbs that give users a sense of touch, robotic space probes that let people on Earth feel as if they are touching the surfaces of other planets, and video games that make players feel they're truly fighting enemies or racing cars.

Someday, you might be able to hug your grandparents from hundreds of miles away, and you'll be able to feel them hug you right back.

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\*space probes 宇宙探査機 \*\*tumors 腫瘍

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213 [2011]

Coffee is universal in its appeal. All nations do it homage. It has become recognized as a human necessity. It is no longer a luxury or an indulgence; it is a corollary of human energy and human efficiency. People love coffee because of its two-fold effect — the pleasurable sensation and the increased efficiency it produces.

Coffee has an important place in the rational dietary of all the civilized peoples of the earth. It is a democratic beverage. Not only is it the drink of fashionable society, but it is also a favorite beverage of the men and women who do the world's work, whether

they toil with brain or brawn. It has been acclaimed “the most grateful lubricant known to the human machine,” and “the most delightful taste in all nature.”

No “food drink” has ever encountered so much opposition as coffee. Given to this world by the church and dignified by the medical profession, nevertheless it has had to suffer from religious superstition and medical prejudice. During the thousand years of its development it has experienced fierce political opposition, unreasonable fiscal restrictions, unjust taxes, irksome duties; but, surviving all of these, it has triumphantly moved on to a foremost place in the catalog of popular beverages.

But coffee is something more than a beverage. It is one of the world’s greatest adjuvant foods. There are other auxiliary foods, but none that excels it for palatability and comforting effects, the psychology of which is to be found in its unique flavor and aroma.

Men and women drink coffee because it adds to their sense of well-being. It not only smells good and tastes good to all mankind, heathen or civilized, but

all respond to its wonderful stimulating properties. The chief factors in coffee goodness are the caffeine content and the caffeol. Caffeine supplies the principal stimulant. It increases the capacity for muscular and mental work without harmful reaction. The caffeol supplies the flavor and the aroma — that indescribable Oriental fragrance that woos us through the nostrils, forming one of the principal elements that make up the lure of coffee. There are several other constituents, including certain innocuous so-called caffetannic acids, that, in combination with the caffeol, give the beverage its rare gustatory appeal.

The year 1919 awarded coffee one of its brightest honors. An American general said that coffee shared with bread and bacon the distinction of being one of the three nutritive essentials that helped win the World War for the Allies. So this symbol of human brotherhood has played a not inconspicuous part in “making the world safe for democracy.” The new age, ushered in by the Peace of Versailles and the Washington Conference, has for its hand-maidens

temperance and self-control. It is to be a world democracy of right-living and clear thinking; and among its most precious adjuncts are coffee, tea, and cocoa — because these beverages must always be associated with rational living, with greater comfort, and with better cheer.

Like all good things in life, the drinking of coffee may be abused. Indeed, those having an idiosyncratic susceptibility to alkaloids should be temperate in the use of tea, coffee, or cocoa. In every high-tensioned country, there is likely to be a small number of people who, because of certain individual characteristics, can not drink coffee at all. These belong to a minority of the human family. Some people can not eat strawberries, but that would not be a valid reason for a general condemnation of strawberries. One may be poisoned, says Thomas A. Edison, from too much food. Horace Fletcher was certain that over-feeding causes all of our ills. Over-indulgence in meat is likely to spell trouble for the strongest of us. Coffee is, perhaps, less often abused than wrongly accused. It all depends. A

little more tolerance!

Trading upon the credulity of the hypochondriac and the caffein-sensitive, in recent years there has appeared in America and abroad a curious collection of so-called coffee substitutes. They are “neither fish nor flesh, nor good red herring.” Most of them have been shown by official government analyses to be sadly deficient in food value — their only alleged virtue. One of our contemporary attackers of the national beverage bewails the fact that no palatable hot drink has been found to take the place of coffee. The reason is not hard to find. There can be no substitute for coffee. Dr. Harvey W. Wiley has ably summed up the matter by saying, “A substitute should be able to perform the functions of its principal. A substitute to a war must be able to fight. A bounty-jumper is not a substitute.”

Good coffee, carefully roasted and properly brewed, produces a natural beverage that, for tonic effect, can not be surpassed, even by its rivals, tea and cocoa. Here is a drink that ninety-seven percent of

individuals find harmless and wholesome, and without which life would be drab indeed — a pure, safe, and helpful stimulant compounded in nature's own laboratory, and one of the chief joys of life!

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**214** [2012]

“Time” has been established as the most widely used noun in the English language. It is not surprising therefore that our everyday communication is full of references to time. The same word, however, is used to convey a multitude of very different meanings that are grounded in a variety of implicit theories of time. We speak of clock time and winter time, of opening times and bad times, of the right time for action and the timing of an interaction. We refer to the time of things and processes, to a time that flies and a time that takes its toll. We move freely between all these senses of time and know them intimately without [differences, giving, much, their,

thought, to]. Yet it is quite clear that they entail diverse qualities and the attribution of different meanings to the common term. Time for us is not exhausted by the clock-time measure. It is multifaceted: it is involved in physical processes and social conventions, in the abstract relations of mathematics and in the concrete relations between people. We measure it in units of clock time, by celestial motion, with the aid of recurrent events, and through changes in our bodies. We utilize it as a medium of exchange for goods and services, or as a means of payment. We use it as a resource of nature, of society, of people, and of institutions, each in turn constituting a boundary within which choices and selections for action have to be made. The minute, the hour, the week, the day, the phase of the moon, the year, Christmas and Easter, cycles of production and growth, generations and the lifetime of a person all form time frames within which we plan and regulate our daily lives. The parameters of birth and death, the rhythms of nature, and the recurrent patterns of socially structured events

together constitute the temporal matrix by virtue of which we can live in time.

Looking at these different times more closely, we can identify a “time when”: when the banks are open, when the children are expected to go to bed, when we were young, when we had social unrest, when the storm demolished the sea defences and the roof of our house. In Western societies this “when” is likely to be based on a time grid provided by the calendar, the clock, or both, but clocks and calendars are unlikely to be the only sources for the timing and temporal location of these social activities and natural phenomena. While bank opening times, for example, are unimaginable without the aid of clocks and calendars, the latter are not the sole regulators of this particular banking convention. Not only are bank opening times co-ordinated with the daytime working activities of those likely to use the bank’s services, they are also guided by the law of the land, which regulates other opening times, and by considerations relating to internal work schedules and tradition.

Likewise, children may be told that it is bedtime because it is getting dark outside or because a specific television programme has finished. For children these are far more persuasive arguments than the fact that it is eight o'clock in the evening.

Furthermore, the existence of clock and calendar time does not prevent us from locating the past, present, and future with reference to events, processes and social relations. Dates and clock time may not feature at all when we remember our childhood, a period of social unrest, or a particular storm. This means that, quite contrary to Evans-Pritchard's\* portrayal of fundamental difference, the Nuer\*\* would have found much common ground with our Western selves in terms of the "when" of social activities, events and traditions. Notwithstanding conventional analyses that polarize "traditional" and "modern" societies, clock and calendar time are not our only sources of reference and cannot therefore be contrasted with natural, social, and religious times. We need to recognize that considerations relating to

social interaction and to the physical environment have not been replaced by the rationalization of time. They still play an important part in deciding when it is time for certain events to take place. Our social actions can, if necessary, be internationally organized and coordinated through a standardized network of time that spans the globe, and this time is deeply embedded in the fabric of our society. But its existence does not obliterate the rich sources of local, idiosyncratic and context-dependent time-awareness that are rooted in the social and organic rhythms of everyday life. The abstract, qualified, spatialized time of clocks and calendars forms *only one aspect* of the complex of meaning associated with Western time.

注 Evans-Pritchard\* 英国の社会人類学者  
the Nuer\*\* スーダンのナイル川流域に暮らす牧畜  
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The news that Bo, a language from the Andaman islands, has finally died out, will be greeted with a weary shrug by professional linguists. There are many critically endangered languages among the 7,000 or so that still exist, and they are vanishing at a rate of one every couple of weeks. Language death is, sadly, not all that unusual.

But as anyone who heard the recording of Boa Sr singing on the radio this morning would recognise, the loss of each one is a small tragedy. It represents the passing into nothingness of a culture, evolved over thousands of years, complete with games, fables and folk songs that will never be heard again. Records of some of them will survive of course, but in libraries, or as MP3s, or on microfiche\*: not as lived experience.

Having said that, there are also bad reasons to mourn the disappearance of a language. It makes no sense, for example, to describe Bo as “one of the world’s oldest” as Sarah Montague did on the Today

Programme\*\*. You're reading this post in one of the world's oldest languages. English as we speak it now is just the latest phase of a "language" that may have been spoken on the Eurasian Steppe around the fifth millennium BC. That language would have had its own forebears, going right back to the murky point at which humans first made sounds into words and words into sentences. Languages are not like stone tablets — they change from one generation to the next until there has been a complete turnover of sounds and structures within a few millennia. There is no sense in which the Bo of Boa Sr is anything like the language spoken by her ancestors 65,000 years ago.

Neither do I buy the idea that the language we speak determines the way we think. If that were the case, you'd worry that each language extinction might mean the loss of a unique way of seeing the world. This is called the Sapir-Whorf hypothesis, and it's fun, but doesn't really stand up to scrutiny. Benjamin Whorf was a fire-insurance inspector who became obsessed with Native American languages. He studied

them mainly from books, and as a result came up with some quirky ideas about the way Native Americans actually thought, contrasting this with a mentality created by what he called “standard average European”. Because of the way their sentences were structured, Whorf thought that Hopi\*\*\* speakers had “no general notion of time as a smooth flowing continuum in which everything in the universe proceeds at an equal rate, out of a future, through a present and into a past”. This now sounds like an almost mystical idealisation of Native Americans. The structure of language is a reflection of the way we perceive our environment, and Hopi speakers have the same brains as all the rest of us.

This doesn't mean we should abandon languages to their fate. It takes a fairly cold cast of mind to say: “Just as the extinction of several European currencies ultimately yielded economic and practical advantages, the same applies — to a certain extent — to the extinction of languages.” It's difficult to dismiss the cultural benefits that have come, for example, in the

wake of rescuing Welsh — which was rushing headlong down the slippery slope to extinction before intervention in the second half of the 20th century put its future on a sounder footing.

Endangered languages aren't the same as endangered species. Their greatest value isn't scientific, but cultural. For me, the most poignant aspect of Boa Sr's story was the loneliness she felt for the last 30 years, having no one to share tales, to pun or joke with in her mother tongue. The death of a language is the most obvious symptom of an acute human crisis: the loss of a store of wisdom, and a sense of community. We should work, wherever we can, to prevent it.

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\*microfiche 多くの資料を縮小して保存する記録媒体の一種

\*\*Today Programme イギリスのBBC放送のラジオ番組

\*\*\*Hopi アメリカ先住民の部族のひとつ及びその

216 [2014]

Watching a group of 5-year-olds chasing each other in a park, it is easy to forget that child's play is a serious business. Through play children figure out how to interact socially, practise problem-solving and learn to innovate, skills that will be indispensable to them as adults. But if experiences gained during play are so crucial for cognitive development, what would it mean if a species had a shorter childhood?

This is exactly the case for our closest relatives, the Neanderthals. Behaviourally they were very similar to us, with some important differences which may stem from their childhoods.

Neanderthals evolved in Europe some 250,000 years ago, spread to the Middle East and eventually went extinct about 30,000 years ago. Much like their human counterparts they made complex tools and

hunted large animals. They had language, created fire, and sometimes buried their dead. The single greatest difference between Neanderthals and humans that we can see in the archaeological record, however, lies in both the quantity and nature of the artefacts they imbued with an obvious symbolic dimension.

Humans today live in what we call a symbolic culture. All the objects around us have a symbolic dimension. The clothes we wear, for instance, send out signals about us that are unrelated to their practical function. We form symbolic relationships where no biological relationship exists, with a husband or sister-in-law, for example. Language, of course, is another key example: the relationship between the words and the objects and concepts to which they refer is completely arbitrary and that is the essence of a symbol.

Neanderthals created few symbolic artefacts. A few Neanderthal sites dating from 50,000 to 30,000 years ago contain some beads and indirect evidence for feathers — all presumably for some kind of body

decoration.

But these artefacts pale next to the record of symbolic material culture created by early humans who first evolved in Africa 200,000 years ago. Even if we focus on just the period 50,000 to 30,000 years ago we find that early humans created bone flutes, the cave paintings of Chauvet in France, ivory beads carved to look like shells, and figurines with geometric patterns. Two examples that stand out for me are the lion-human statues from the Swabian Jura region of Germany and the painting of a bison-woman from Chauvet, both fantastical, imaginary creatures.

The ability to reproduce a three-dimensional form on a two-dimensional surface, or to “see” a figure in ivory, requires a completely different way of imagining the world. Neanderthals created nothing like these artefacts and I believe this can be explained by the games they played, or more correctly did not play, as children.

In 2010, Tanya Smith from Harvard University and colleagues studied Neanderthal and early human

teeth, counting daily growth lines to calculate the exact age. By comparing this to the individual's patterns of growth, Smith concluded that Neanderthals grew relatively rapidly and spent less time dependent on their parents.

Why should this make a difference to the minds of Neanderthals compared to modern humans? To understand this, we need to take a closer look at childhood. In general, species like us, with longer dependency periods, tend to play more and engage in many more types of play. This influences our minds, because play is an important part of the healthy cognitive development of many animals, not just humans, and being deprived of opportunities to play can be detrimental. Play shapes the brain. But the kind of brain we have also shapes the type of play we engage in.

Humans are unique in that we engage in fantasy play, part of a package of symbol-based cognitive abilities that includes self-awareness, language and theory of mind. Its benefits include creativity,

imagination and the ability to plan. Being able to imagine novel solutions to problems and to work out their consequences before implementing them would have been an enormous advantage for our early human ancestors — this is exactly what we are practising when we play “what if” games. From what we can tell, it is unlikely that Neanderthals were able to engage in fantasy play, and it is this level of imagination that underlies the differences in material culture between Neanderthals and early humans.

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**217** [2015]

The North American sky, according to historical accounts, was once black with passenger pigeons. Hunters, however, saw to it that the sky was clear of the birds by the second half of the nineteenth century. Martha, the last individual of the species, expired in the Cincinnati Zoo in 1914. Writers have long mourned this vanished bird. The great

conservationist-philosopher Aldo Leopold issued the most moving tribute in his 1949 book *A Sand County Almanac*. But what if we could once again see those victorious birds sweeping their path across the March skies?

Leopold could not have known that only a handful of decades after he wrote his book we would be on the verge of a scientific revolution in efforts to reverse the death of species. The “de-extinction” movement — a prominent group of scientists, futurists and their allies — argues that we no longer have to accept the finality of extinction. By applying techniques such as cloning and genetic engineering, they believe that we can and should return lost species such as the passenger pigeon to the landscape. This is the goal of the San Francisco-based Long Now Foundation, which is actively supporting scientific efforts to recreate the lost bird within its “Revive & Restore” project. But it does not stop there. Scientists in Spain say they are close to cloning the Pyrenean ibex, a mountain goat that took its last breath in 2000. Other

species have also been targeted, including the Tasmanian tiger and even the woolly mammoth.

The de-extinction movement makes persuasive arguments. The most powerful among them appeal to our sense of justice: de-extinction is our opportunity to right past wrongs and to atone for our moral failings. Advocates also point to the sense of wonder that the revival of extinct species could encourage among the public. De-extinctionists argue further that the revived species will restore lost ecological functions and enhance the diversity of ecosystems.

At the same time, the de-extinction proposal raises considerable concerns. Revived species could create problems in contemporary environments and for native species that have evolved in the absence of the vanished ones. As with the introduction of any species into a new environment, there are risks of disease transmission and biological invasion. Some conservationists also express the fear that, given decades of ecological change and human development, the environment won't be able to support the revived

populations.

And there is also the particularly distressing concern that such aggressive manipulation of wildlife might actually end up diminishing our desire (and our limited resources) to conserve extant species — and that it would be harmful interference in the lives of animals. The most troubling aspect of de-extinction, however, is what it might mean for us. Attempting to revive lost species is in many ways a refusal to accept our moral and technological limits in nature.

Leopold was aware of our tendency to let our gadgets get out in front of our ethics. “Our tools,” he cautioned in the late 1930s, “are better than we are, and grow better faster than we do. They suffice to crack the atom, to command the tides. But they do not suffice for the oldest task in human history: to live on a piece of land without spoiling it.” The real challenge is to live more lightly on the land and to confront the moral and cultural forces that drive unsustainable and ecologically destructive practices.

That is why there is great virtue in keeping

extinct species extinct. Meditation on their loss reminds us of our fallibility and our finitude. We are a wickedly smart species, and occasionally a heroic and even exceptional one. But we are a species that often becomes spellbound by its own power.

It would be silly to deny the reality of that power. But we should also cherish and protect the capacity of nature, including those parts of nature that are no longer with us, to teach us something profound about human limits and about the value of self-restraint. Few things teach us this sort of earthly modesty any more.

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**218** [2016]

If you look in a mirror you'll see a face that looks at first sight bilaterally symmetrical. Your eyes are about equidistant from your nose. Your nose itself seems like a symmetrical structure. The same can be said of your mouth. Of course your hairline may be

asymmetrical due to a right-hand or left-hand parting. But that's fashion or habit, not biology, and such a parting can easily be shifted into the centre.

If you look more closely, though, either at your own face or at anyone else's, you'll notice that the symmetry is far from perfect. I don't think I know anyone whose nose is perfectly straight. If you were to make precise measurements on various facial features you'd find the same thing — very few of them are *perfectly* symmetrical. And there's no need to restrict our attention to the face. Try turning your hands palm side up and looking at the veins in your wrists that are carrying blood back to the heart. You'll notice that the pattern of spacing of these veins in one wrist is an approximate mirror-image of the pattern in the other wrist — but again close inspection or measurement will reveal that the symmetry is imperfect, and that the 'approximate' label is indeed justified.

This phenomenon, in which supposedly bilaterally symmetrical structures are not perfectly so, extends to all other bilaterian animals — there's

nothing special about humans in this respect. Whether we are dealing with dogs, birds, flies or frogs, measurements will reveal that their bilateral symmetry is imperfect.

Many studies have been undertaken in this area of departures from perfect symmetry. The existence of these departures, and the fact that they vary among individuals of the same species, whether human or otherwise, has been encapsulated in the unfortunate phrase *fluctuating asymmetry* (often abbreviated to FA). The reason I'm calling it unfortunate is that for most people 'fluctuating' refers to something changing in upward and downward directions over time, which is absolutely not what is being examined by students of FA. Rather, they typically examine differences between individuals within a species in their degree of departure from perfect bilateral symmetry; so the comparisons they are making are in space rather than in time.

Because of this unfortunate choice of phrase — a bad choice that got made a long time ago and then

became embedded in the technical literature — I won't use it any more here. I had to mention it because there's a huge body of work on FA in the relevant scientific journals and books, and if you want to find it then the offending phrase that is often abbreviated to FA is a useful route in; but that's all, its usefulness extends no further.

While the phrase may be annoyingly inappropriate, the phenomenon itself is very interesting. There have been several findings in this area that appear to be general ones rather than species-specific ones — and these are always the more interesting to scientists, given that generalization is at the heart of the scientific endeavour.

One of these general findings is that, within a species, individuals that develop under more stressful conditions exhibit greater departures from perfect bilateral symmetry than those developing under less stressful ones. Care is needed here, though, because of the multiple uses of the word 'stress'. What is intended in the present context is physical rather

than mental stress. An example should help to illustrate the kind of stress involved further.

Suppose that you are a biologist interested in this issue of departure from perfect bilateral symmetry. Suppose further that you want to do some rearing experiments to measure it and that, for ethical reasons, you decide to do these on insects rather than on mammals. So you rear flies of the same species at a range of temperatures and you use some simple measure of asymmetry such as the difference between the length of the left wing and the length of its right counterpart. The bigger the difference in these two measurements, the greater the asymmetry.

As you've probably guessed, this is not a 'just suppose' story at all. The experiment described has been done, with the following result. The further the rearing temperature is from the optimal temperature for the species concerned, the more asymmetrical are the flies. One way to think of it is that the fly's developmental system is trying to make a perfectly symmetrical product, but its ability to do so becomes

progressively compromised, the more extreme, or stressful, the rearing temperature — in both hot and cold directions. Eventually, for any species, if we vary the temperature enough, there comes a temperature that is too hot (going upward) or too cold (going downward) for the developmental system to work at all — these two temperatures bracket the viable range for the species that is being studied.



Repeated reading makes the meaning clear.

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2022年 3月14日 初版

編集 スタディ・ラボ

発行者 (株)ドゥクエスト

〒662-0042

神戸市東灘区岡本 1-12-14