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TRIAL WITHOUT ERROR

Anticipation vs Resilience as Strategies for Risk Reduction



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Aaron Wildavsky



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Foreword

One of the essences of entrepreneurship, as Israel Kirzner reminds us, is that the successful entrepreneur is always discovering where errors have been made, and is always alert to ways of correcting those mistakes. In this Occasional Paper, Aaron Wildavsky examines the growing tendency, especially in wealthy Western societies, to protect the citizenry in advance from making errors. It is not now a matter of assisting them to see the errors of their ways, but more of not allowing them any ways to make errors. 'Nothing new should be done unless there is evidence it will do no damage.' This Professor Wildavsky calls 'trial without error'.

Safety laws, consumer protection regulations, and so on, are all familiar examples of the type of development he refers to. So what are the consequences for a society of trying to protect people from future unanticipated risks? Will this result, as Herbert Spencer points out, in filling the world with fools? Maybe, and it is his analysis of risk avoiding behaviour (normally by governments) that makes Professor Wildavsky's arguments so compelling.

If there is no error, then there is no entrepreneurship, no change, no growth and renewal. And importantly, 'there is no learning'. This, according to Professor Wildavsky, will both increase risk and bring with it the ever-increasing centralisation of power necessary to ward off the evils of possible future error. So the world does become filled with fools — except for those whose job it is to protect others from their (potential) folly.

The publication of this stimulating paper follows an address on similar themes given by Professor Wildavsky to a CIS audience in Sydney. We are pleased to bring Professor Wildavsky's ideas to the attention of a wider audience.

Greg Lindsay

The Author

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Trial without Error: Anticipation vs Resilience as Strategies for Risk Reduction

Aaron Wildavsky

In a different era, John von Neumann postulated that for any whole to endure it would need to be more reliable than its parts. Though any particular part might fail, a sufficient number and variety of alternatives would give the system as a whole a higher probability of performing than any of its constituent elements (von Neumann, 1968; Ashby, 1968). Redundancy would improve reliability. Western society appears to be moving in the opposite direction by seeking to insure each part against failure. Would society be safer under non-von Neumann conditions where each part is stronger than the whole?

I. NO TRIALS WITHOUT PRIOR GUARANTEES AGAINST ERROR

The model of risk aversion I will discuss — nothing new should be done unless there is evidence it will do no damage — may be called the rule of ‘trial without error’. If required to give a guarantee that future generations will be better off in regard to every individual action or that no harm will come of a particular development, the scientist (or the businessperson or the politician or the citizen) cannot so certify. Without trial there can be no error, but without error there is no learning. Science, its historians say, is more about rejecting than accepting hypotheses. Knowledge grows by criticising the failure of existing theory to explain or predict events in its domain of applicability. Rules for democracy say little about what one does in office, but much more about getting officials out

of office. 'Throwing the rascals out' is the essence of democracy. Similarly, in social life, it is not the ability to avoid error (even Goncharov's *Oblomov*, who spends his life in bed, cannot do that), but learning how to overcome it that is precious.

This mode of learning has seeped so far into collective consciousness that it has become a stock phrase — by trial and error. The debate on risk proposes a radical revision of this practice. If we have to guarantee no errors before we start, then we cannot start at all.

How can consensus be achieved, David W. Pearce asks, when damage may be cumulative and when technologies are 'introduced without first having solved the problems they create. This "reverse solution" phenomenon characterises the use of nuclear power, where waste disposal problems remain to be solved even though the source of the waste, the power stations themselves, forms part of whole energy programs' (Pearce, 1980:58). One could well ask whether any technology, including the most benign, could have been established if it first had to demonstrate that it did no harm.

In 1865, to take but a single instance, a million cubic feet of gas exploded at the London Gas-Works, killing ten people and burning twenty. The newspapers were full of claims that the metropolis faced a disaster.

If half London would be blown to pieces by the explosion of the comparatively small quantity of gas stored at Blackfriars, it might be feared that if all the gas holders in the metropolis were to 'go off,' half the towns in the kingdom would suffer, and to be perfectly secure, the source of danger must be removed to the Land's End. (*The Journal of Gas Lighting, Water Supply, and Sanitary Improvement*, 1865)

Could anyone who introduced gas heating or lighting have guaranteed the public there would be no explosions or that these would not cumulate to blow up the city? I think not.

In order to guard against the potential for harm from technology whose adverse consequences are not yet under control, Pearce suggests the active provision of information with experts on both sides and attention being paid to the possibility of not going ahead with a particular technology. By funding the opposition and by bringing in wider publics, Pearce hopes to insure that 'surveillance of new technology is carried out in such a way that no new venture is embarked upon without the means of control being "reasonably" assured in advance' (1980:63). This is not trial and error but a new doctrine: no trials without prior guarantees against error.

The best argument against learning by trial and error is that it

should not be used unless errors are small enough to permit new trials. If errors lead to irreversible damage to large populations, there may be no one around to take on the next trial. A strong statement of this view comes from the philosopher Robert E. Goodin (1980:418-419):

Trial and error and learning by doing are appropriate, either for the epistemic task of discovering what the risks are or for the adaptive task of overcoming them, only under very special conditions. These are conspicuously lacking in the case of nuclear power. First, we must have good reasons for believing that the errors, if they occur, will be small. Otherwise the lessons may be far too costly. Some nuclear mishaps will no doubt be modest. But for the same reasons small accidents are possible so too are large ones and some of the errors resulting in failure of nuclear reactor safeguards may be very costly indeed. This makes trial and error inappropriate in that setting. Second, errors must be immediately recognizable and correctable. The impact of radioactive emissions from operating plants or of leaks of radioactive waste products from storage sites upon human populations or the natural environment may well be a 'sleeper' effect that does not appear in time for us to revise our original policy accordingly.

There must be zero probability of error, in this view, before any trials can take place.

Has there, then, been no useful learning about nuclear energy? Yes, there has, Goodin writes (1980:418), but he draws a pessimistic conclusion:

Sometimes, once we have found out what is going wrong and why, we can even arrange to prevent it from recurring. Precisely this sort of learning by doing has been shown to be responsible for dramatic improvements in the operating efficiency of nuclear reactors. That finding, however, is as much a cause for concern as for hope. It is shocking that there is any room at all left for learning in an operational nuclear reactor, given the magnitude of the disaster that might result from ignorance or error in that setting.

Doing badly is forbidden and doing well is worse.

In an effort to bolster his position, Goodin argues that nuclear power plants are different because 'we would be living not merely with risk but also with *irresolvable* uncertainties' (1980:421). Others, like the author of this paper, claim that 'irresolvable uncertainty' is a condition of human life.

Aware of counter-arguments to his position, Goodin cites economists who contend that while it is all right for individuals to be risk averse, there is no reason for society to follow suit. Their reason is that while some projects turn out badly, others do well,

so that over time society can select the good ones, thus ending up better off. In response, Goodin argues:

This argument crucially presupposes that the risky venture is symmetrical in its payoff structure, admitting of both the possibility of worse-than-expected and better-than-expected payoffs. This seems to be missing in the case of nuclear power: what unexpected windfall might we imagine that would balance out the giant costs associated with a meltdown breaching containment walls. It is of course difficult to say for certain, but it seems extraordinarily likely that all the good that can ever come from nuclear power we can anticipate ahead of time, leaving only the evil to surprise us. Thus society should, contrary to economic advice, display the same aversion to large and uncertain risks of nuclear power as do individuals. (1980:425-426)

Let us try to help Goodin think of symmetrical payoffs. He rejects, wrongly I think, the suggestion that a partial switch to nuclear energy will decrease the cost of conventional fuels, thus improving living standards for poorer people. Many more people might be better off by mitigating malnutrition or reducing starvation through lower energy prices than would be lost in nuclear accidents.

If the trouble with the economic argument is that it lacks an apocalyptic vision, I can supply that too. Goodin has left political hazards out of his balance sheet. During the crisis surrounding the fall of the Shah of Iran, the United States Government, under President Jimmy Carter, warned that it would use nuclear weapons to prevent a loss of Persian Gulf oil. Is it too much to suggest that enhanced use of nuclear power might mitigate the danger of nuclear war over oil supplies?

The implication for seeking safety in energy policy would be not to rely exclusively on any single source or mode of generation so that, whatever happened to supplies or technology, we would be able to respond effectively. Solar energy, with its small size and independence of central coordination, is desirable to develop; it is less likely to be knocked out all at once with one blow. Yet it might prove vulnerable to climatic change or an unforeseen demand for continuous high bursts, capacities contained by nuclear power. Some scientists claim, for instance, that burning fossil fuels will increase carbon dioxide in the atmosphere, thereby warming the earth so that polar ice will melt. If and when this became apparent, we might wish we had nuclear power to substitute for fossil fuels so as to ward off what had become a greater danger. When the one sure thing is that we won't be able to predict important difficulties that the nation will face in the future, developing diversity and

flexibility, I shall argue, not sticking with what we have, is the best defence.

My intent is not to take sides on the nuclear power issue. If this were the only or the main issue of risk in our time, I would not have become interested in applying risk analysis. Rather it is the across-the-board character of the complaints about risk that have claimed my attention. The risk averse position that requires trials to give guarantees against error has spread over the whole spectrum of daily life. What is involved, we may ask, in adopting a criterion of choice that would restrict new technologies to those that meet Goodin's risk-averse criteria?

II. CONSEQUENCES OF RISK AVERSION

The direct implication of trial without error is obvious: if you do nothing without knowing first how it will turn out, you cannot do anything at all. Risking and living are inseparable. Almost any act may stand convicted when judged by the rule of no trial without prior guarantees against error. The indirect implication is not at all intuitive: if trying new things is made more costly, there will be fewer departures from past practice, and this very lack of change may increase risk.

Recent environmental impact statements in America may be read as saying that all the values being protected should remain constant. The environment is to remain inviolable in all its parts. No problem, at least not much: but when one adds health, safety, employment, inflation, urban, rural, and other impact statements, the world of public policy is then comprised of nothing but constants, with no variables.

Safety depends on learning and learning depends on error. Safety features found effective in one area may be adopted in others to their mutual betterment. Reliability is enhanced when, as in a submarine, there are numerous systems capable of replacing those that break down (Landau, 1969). This duplication depends on having sufficient resources to install additional units and sufficient diversity to create new approaches. Imposing innumerable uniform safeguards on all the parts, by contrast, inhibits them from either accumulating resources or trying out alternatives. When none is to be allowed to suffer a first-order effect, none takes on the task of accommodation to changing circumstance. The worst case is when the whole contributes uniformity and the parts rigidity. Then the scope for passing learning on to others or for discovering new configurations or for responding to the unforeseen is diminished.

Relative safety is not a static but rather a dynamic product of

learning from error over time. Pioneers pay the costs of premature development. First models are rarely reliable; as experience accumulates, bugs are eliminated and incompatibilities alleviated. Were history halted, development deterred, so to speak, risks for innovators would be markedly increased. The fewer the trials, so there are fewer mistakes to learn from, the more error remains uncorrected. As development continues into the second and succeeding generations, moreover, the costs of error detection and correction are shared to some extent with future practitioners, and the benefits passed back down to the originators. Forced to follow rules that tell us there will be no tomorrow, few would be willing to start up something new today. Needless to say, the second generation cannot learn from the first if there isn't one. Who, then, will want to be the first to face risks?

A risk of guarding against all conceivable risks is that the costs are raised to such a high level that the ability of small scale units to compete declines and with it the rate of innovation. Rules and regulations designed to provide protection also increase the cost and hence the size necessary to carry on the activity in question. Thus is it possible to rail against risk and large-scale organisation without realising that the one reinforces the other.

A preoccupation with rejecting risk leads to large scale organisation and centralisation of power in order to mobilise massive resources against possible evils. The probability that any known danger will occur declines because of risk-averse measures; but the probability that if the unexpected happens it will prove catastrophic increases, because resources required for response have been used up in advance.

By devaluing experience, the doctrine of 'trial without error' simultaneously increases the importance of theory and of theorists. Given the desire to avoid experience, the only way to know what to avoid, other than prohibiting all new developments, is to theorise about possible effects of proposed new technology. (Come to think of it, since it is often not clear what is new or not, hence conflict over patent rights, extensions of old technology may also be interdicted.) Theorising is a highly specialised activity, even more so when its purpose is precisely to avoid empirical tests. Not only would government grow larger in an effort to ward off danger, but there would be larger organisations in the private sector to meet the riskless criteria, and all of these organisations would have to have large numbers of theorists to argue their cases. This new breed of intellectuals-cum-scientists-cum-lawyers might not exactly be a modern form of Dostoevsky's Grand Inquisitor but they would be in a strong position to issue compelling commands. For this safety directorate could claim to make authoritative

pronouncements on doing this or forbidding that to protect our lives. If society asks, 'Who ought to allocate safety?', the only answer can be the experts on risk aversion. To the traditional unanswerable imperatives — there is no money, no time, God is opposed, and it is unnatural (Douglas, 1975; Weiner and Wildavsky, 1978) — there would be added no trial without prior guarantee against error.

On the one hand, risk aversion increases the demands for coordination among organisations; in order to prevent evils from occurring, coordinated action across a wide front of possibilities is necessary. Otherwise, what is done in one area, say replacing a suspected chemical carcinogen, will hurt another, say spoiling meat. Yet the growing size of organisations is bound to reduce their flexibility. The larger they are, the more they operate by rule, the less quickly they can move. The spur to change, of course, is error, which comes in the form of feedback, i.e., differences between what is desired and what occurs. Without tolerance of error, feedback must be reduced or eliminated. It is, after all, a uniformity of condition that is desired ('feed forward', so to speak, rather than 'feedback') so as to avoid danger to people and to the physical environment. To uniformity, therefore, the principle of 'trial without error' adds inflexibility. How, then, will these large and inflexible organisations deal with the change (or the challenges) that must occur despite their best efforts?

A policy of 'no trial' without prior guarantees against error' decreases safety by increasing vulnerability. The loss of wealth used up in guarding against the possibility of error, i.e., in defensive moves, decreases the surplus available for innovation. The decline in innovativeness reduces variety, which in turn exposes society to surprise. It is not that variety decreases the likelihood of surprise but rather that it enhances the prospects of being able to counter the unexpected when it occurs.

The consequences of removing the risks from all the parts are bad for the whole and bad for the parts. Recall the dilemma that faced Consolidated Edison before the New York City blackout of 1977. There were not one but two potential problems: reducing the risk that the entire city would be blacked out compared to the risk of a blackout for a single neighbourhood. The greater the willingness to 'dump' loads by blacking out a neighbourhood, the less the likelihood the entire city would be overloaded and all neighbourhoods break down. The safety of the whole is a function of the willingness to sacrifice a part, the particular part being unknown, and the occasion unforeseen. If there is unwillingness to risk a shutdown in any specific site, as events proved, the city system itself may be at stake, and all the parts suffer.

Thus it is wise to ask what will happen if a risk is not taken. It is known, for example, that early inoculation against mild diseases, such as German measles, may lead to susceptibility to much more serious illness later in life. And, if substitutes for risky substances are deemed essential, no one knows what their risks will be compared to the risks of substances given up (Clark, 1977; Wildavsky, 1979). If the consumer demands red foods, red dye number two, long in use as a food additive but now recognised as a potential carcinogen, may be forbidden only to be replaced by numerous other dyes about which much less is known. If some degree of risk is inevitable, suppressing it one place may merely move it to another.

It would make sense to anticipate and so avoid global catastrophic risks. But talking about catastrophic risks is not the same as identifying or knowing what to do about them.

Consider the costs of prediction associated with what Bertrand de Jouvenal calls 'the railroad track': a pattern has always obtained in the past, therefore projecting it is reasonable; but it can lead to absurd consequences because somewhere along the track it sets off a systematic reaction that had never occurred before (for whatever reasons that may be specific to the subject being examined). For example, suppose that the pattern that has always obtained in the past was the function of a social given (as in population dynamics). When something changes in the society, the pattern changes too. So far the relationship between wealth and safety has been linear: the more of one, the more of the other. Is it impossible that the cumulative result of radical environmental changes (some of which we will not see for 50 or 100 years) amount to a vector that will bend the curve?

Suppose it is so; something we have neglected turns out to be important, and dangerous. Suppose government seeks to protect the people against this possibility. Even so, anticipation is not necessarily the best policy. If we are working in the dark, we might choose a few potential disasters to try to avoid, even at high cost. But when the expectation of catastrophe becomes common, priorities among the potentially preventable have to be established or else there will be few resources left to respond to the unexpected. Knowing so little about whether the risk will materialise, we are in as much danger of harming as helping. How would government know which of an infinity of evils will be manifest? Many, which now appear dangerous, may actually turn out to be benign. Others may actually be a little dangerous but the consequences of trying to anticipate them may be much worse than letting them run their course. The most likely eventuality by far is that whatever happens will be unexpected. We might be better off, then, increasing our

capacity to respond, our resilience, than by dissipating our strength in efforts to ward off we know-not-what.

III. ANTICIPATION VERSUS RESILIENCE

Anticipation is a mode of control by central cognition; potential dangers are averted before damage is done. Resilience is the capacity to use change so as to better cope with the unknown; it is learning to bounce back. Are risks better balanced, we may ask, by attempting to anticipate them before they occur or by trying to mitigate their effects after they have manifested themselves?

Ecologist C. S. Holling (1979:17-18) compares control by anticipation with the capacity to cope resiliently:

Resilience determines the persistence of relationships within a system . . . Stability on the other hand, is the ability of a system to return to an equilibrium state after a temporary disturbance . . . With these definitions in mind a system can be very resilient and still fluctuate greatly, i.e., have low stability. I have touched above on examples like the spruce budworm forest community in which the very fact of low stability seems to introduce high resilience. Nor are such cases isolated ones, as Watt has shown in his analysis of thirty years of data collected for every major forest insect throughout Canada by the Insect Survey Program of the Canada Department of the Environment. This statistical analysis shows that in those areas subjected to extreme climatic conditions populations fluctuate widely but have a high capability of absorbing periodic extremes of fluctuation . . . In more benign, less variable climatic regions the populations are much less able to absorb chance climatic extremes even though the populations tend to be more constant.

To repeat: 'low stability seems to introduce high resilience.'

Though the language of Holling's theory is abstract, its policy implications can be made quite concrete: the experience of overcoming danger increases safety, whereas continuous safety is extremely dangerous to the survival of living species. Keeping 'out of harm's way' (something Don Quixote preached but never practiced, hence his longevity) is harmful. I stress the counter-intuitive implications of the superiority of resilience over anticipation as strategies for securing safety because they should guard us (and policy-makers as well) against the facile conclusion that the best way to protect people is by reducing the risks they face rather than by enabling them to overcome dangers.

The debate over regulation of risk reveals a strategic conflict between anticipation and resilience. J. C. Smith's elegant essay on

'The Process of Adjudication and Regulation, A Comparison' (1983) is about anticipation versus resilience under other names — regulation versus adjudication or the criminal versus the tort law. He is concerned, as I am, to compare mechanisms of social control, which he also calls 'institutional paradigms ... as methods of protecting people from the harmful consequences of action'. Tort law enforces obligation by awarding damages as compensation in order to protect personal and property rights. Far from settling conflicting claims over rights, the criminal law establishes certain behaviour as so harmful that it incurs penalties stipulated in advance. Functioning after the alleged harm has already occurred, civil or tort law is essentially a mode of resilience; the criminal law is anticipatory. According to Smith (1983:77,95),

The distinctive feature of criminal law is that it prohibits certain kinds of harmful acts ... because the harmful effects can be taken for granted, while the civil law tends to concentrate on the results or effects of actions ... The distinguishing feature of the process of regulation is that ... it prohibits a wide variety of acts by providing for fines, imprisonment, or both, irrespective of whether harm will in fact result.

Regulation is a form of anticipation. Consequently, because regulation cannot wait for evidence from actual events, it does not fit well with many particular circumstances within a general class. As Smith says,

When standards are established by regulations in general terms, they will inevitably be too high for some of the situations to which the regulations apply, and too low for others. Particularity is just not possible through regulation. Often where an adequate standard in general is too low for a particular situation, and a tragic accident takes place, the ensuing adverse publicity leads to the standard then being raised substantially higher than need be for most of the situations to which the regulations apply, in order to prevent a similar accident from again happening. In an unregulated situation where a serious accident has occurred, each individual actor or enterprise or industry will examine itself in the light of the particular circumstances, and in only those cases of a similar nature will corrective action need to be taken. (1983:79-80)

Where anticipation requires bureaucracy to enforce standards, resilience is based on self-regulation by the people who are closest to the scene and who, therefore, have the best information about what is happening.

It is hard to remember now, so harsh and vindictive has been the attack, that until the 1930s there was a doctrine of substantive due process protecting property rights. Under this doctrine, the courts

assumed that regulations affecting property rights produced initial harmful consequences so that the government, acting through the legislature and executive, had to accept the burden of proof in showing that the property rights of individuals have been turned aside for good reason. Today, all this is taken for granted in regard to the due process requirements that have to be met whenever interference with freedom of speech or assembly is contemplated. This protection, however, has been taken away from property rights, which have been given an inferior place. Thus, regulation itself, based on the legislative police power, has become the embodiment of due process to be challenged only if there was some flaw in the way in which the public will was manifested, whereas restraints on expression became subject to the same criteria of substantive due process that had heretofore protected property.

Observers of the American political scene will note that interest group activity flourishes as never before; by contrast, the economy, based on property rights, languishes. Once we understand that political participation has been allowed to become resilient by applying due process against governmental intervention, whereas property rights have been subject to anticipatory regulation, the reason for the anomaly becomes evident: resilience outperforms anticipation.

Anticipation emphasises uniformity: the less fluctuation, the better. Resilience stresses variability: one does not do so well in good times but learns to persist in the bad. As Holling sums up,

The very approach, therefore, that assures a stable maximum sustained yield of a renewable resource might so change these deterministic conditions that the resilience is lost or reduced so that a chance and rare event that previously could be absorbed can trigger a sudden dramatic change and loss of structural integrity of the system. (1979:21)

Resilience relies on variety. Instead of attempting to guard against every evil, only the most likely or most dangerous would be covered, fully expecting that whatever was missed would be countered as and after it occurred.

Of course, everyone would like to pick out the eyes from the potatoes of life, choosing to regulate only those that we have reason to believe will do considerable harm. Is it true, then, that governmental activity is geared towards using the knowledge of modern science to create priorities among possible dangers, choosing to eliminate or control those that promise to do the most harm? Since expenditures per accident or fatality averted vary from a few thousand to several hundred million, this claim can hardly be substantiated (Graham and Vaupel, 1981). Moreover, advocates of

anticipation via regulation to reduce harm to people and nature face a disconcerting anomaly: in the past, with a minimum of regulation, morbidity and mortality have shown dramatic improvement. Obviously, allowing things to go on as they were is far from deadly. 'We are not fully free', Hayek warns, 'to pick and choose whatever combination of features we wish our society to possess, or to . . . build a desirable social order like a mosaic by selecting whatever particular parts we like best . . .' (1973:59). The good and the bad are inextricably mixed; all we can do is choose a strategy that over time will leave us better rather than worse off. How shall we come down, then, for a preponderance of anticipation or of resilience?

Assessing a variety of efforts to manage resources, ecologist William Clark (1980:298) concludes that

In each case, uncertainty or variability in the natural system was initially viewed as a source of risk/hazard. Without exception, it was assumed that removal of the variability would be an unmitigated good, resulting in reduced risk and improved performance of the resource system . . . With that variability removed, [however,] relationships shifted to accommodate the new reality: people settled the unflooded floodplain, budworms spread through the undefoliated forest, brush accumulated on the unburned understory, and so on. As a result, *the decreased frequency of variation in the system was accompanied by increased vulnerability* to and cost of variation when it finally broke loose from managerial controls. [Emphasis added]

Again, loss of variability leads to decline of resilience.

Three Mile Island (I am aware it is used to 'prove' everything) is a case in point. It occurred after (not before) large numbers of safety measures were retro-fitted onto existing reactors. The idea was that by strengthening every part — pipes, valves, containment, alarms, etc. — the plants would be safer than ever. There was no effort to link the parts to the whole, i.e., to ask whether the relationship among parts was optimal in view of the hundreds of changes made. The point was to prevent failure. Training to respond to failure was minimal because that would have meant admitting that things could go wrong. When the some hundred warning lights and whistles went off, the staff became confused. The system lacked resilience because the staff had been taught to rely on anticipation (The President's Commission on the Accident at Three Mile Island, 1979).

There are also more subtle ways in which the belief that it is possible (because it is desirable) to control all dangers, by creating a false sense of security, compromises coping ability. The dependence of [San Francisco's] Bay Area Rapid Transit on a

computerised scheduling system that would make no errors, for example, led to a disregard for coping with breakdowns that were never supposed to occur.¹ There was no fail-safe.

A more restricted interpretation might be that unless risk is reduced across the board, in all elements of a system, due to a common increase in capability, holding it down here just makes it pop up there. 'Management efforts had changed the kinds of risks encountered', Clark writes, 'but not the fact of risk. More often than not, management shifted the risk structure from a sort people were accustomed to dealing with to one they had never before experienced' (1980:298). Shifting risks may be more dangerous than tolerating them both because those who face new risks may be unaccustomed to them and those who no longer face old ones may become more vulnerable when conditions change.

Left to their own devices, each element or part of society will seek its safety at the expense of others. So may individual entrepreneurs. Linked together by markets, however, capitalist firms cannot avoid the danger of loss. If they attempt to safeguard their sub-system, that is, to prevent loss without risk, others will undersell and outproduce them. Only when the reduction of risk is widely shared will it become feasible for any one firm to put 'safety first'. Instead of shifting dangers to others through sub-optimisation, there is a general advance. Were this not so, it would be impossible to explain why wealthier societies are safer (Wildavsky, 1980) or why encouraging risk-taking by some over time increases safety for others.

If there is merit in this line of argument — markets increase safety over time precisely because they need not respond to every sub-unit's demand for protection — the implications for decisions about risk are profound. Except where persuasive evidence and remedies exist, direct decisions should not be made about risk per se. Focusing on risk in itself is dangerous. It leads to sub-optimisation.

¹My sister tells of observing passengers carrying bathroom plungers on BART (Bay Area Rapid Transit, the San Francisco urban train system) in the early days. Since the system was assumed to operate without error (at high speed and with powerful brakes), it was believed that trains would succeed each other with great rapidity so no one would ever have to stand. Hence no provision was made for straps or handles to which passengers might attach themselves. As engines and brakes burned out and the all-seeing computer lost track of trains, passengers piled up in the remaining vehicles. Alas, they could not steady themselves while standing; nothing if not resilient, however, some brought plungers, stuck them on the ceilings, and got to their destinations in one piece.

Risk aversion by anticipation will do one thing it is supposed to, namely, reduce variability and increase uniformity. In the field of evolution, this sort of sub-optimisation by protecting the parts has a name of its own:

All evolutionary textbooks grant a paragraph or two to a phenomenon called 'overspecialisation,' usually dismissing it as a peculiar and peripheral phenomenon. It records the irony that many creatures, by evolving highly complex and ecologically constraining features for their immediate Darwinian advantage, virtually guarantee the short duration of their species by restricting its capacity for subsequent adaptation. Will a peacock or an Irish elk survive when the environment alters radically? Yet fancy tails and big antlers do lead to more copulations in the short run of a lifetime. Overspecialisation is, I believe, a central evolutionary phenomenon that has failed to gain the attention it deserves because we have lacked a vocabulary to express what is really happening: the negative interaction of species-level disadvantage and individual-level advantage . . . The general phenomenon must also regulate much of human society, with many higher-level institutions compromised or destroyed by the legitimate demands of individuals . . . (Gould, 1982:385)

'Individual-level advantage' is sub-system optimisation. Risk aversion is specialisation by anticipation. The best way to reduce risk of morbidity and mortality, for most people most of the time, is to enhance overall economic performance, i.e., 'species-level' advantage.

Given two processes — bureaucracies and markets — one of which tends to 'over' and the other to 'under' select dangers, which one would leave people better off? Ruling out Goldilocks's strategy of getting things just right as beyond cognitive and collective capacities, my last reformulation goes, would people be better off having their porridge too hot (i.e., too much risk) or too cold (too little risk)? Which horn of the dilemma of risk taking — anticipation or resilience — do we wish to grasp?

If the risks are being undertaken via private markets rather than public agencies, my view is that more people will be healthier by taking larger rather than smaller numbers and extents of risk. I come to this conclusion without believing that private industry is more competent, not to say altruistic, than public agencies. The advantages I believe inherent in private enterprise are several but above all include the possibility of failure. Companies, divisions, managers, and products may ultimately be (and frequently are) rejected. It is in high rates of failure, in the errors which result from innumerable trials, that advantages of markets reside.

The trade-offs between anticipation and resilience may come into

clearer focus if we shift the field from technological dangers to crime and defense. There is considerable evidence that much if not most strong-arm crime is committed by 'career criminals'. By the late thirties, when there are enough convictions to put them away for a long time, they are likely to be 'burned out'. If they could be gotten early, say in their teens, and put away for twenty years or so, society would be a lot safer and less fearful. So much for the advantages of a policy of anticipation. The disadvantage is that knowledge is insufficient to pick out habitual criminals early. Consequently, there would be many false positives, errors concentrated among minority groups. By contrast, a policy of resilience catches criminals too late to do society much good. But, because after the fact we are more knowledgeable, the injustice of wrongful incarceration compounded by racial selectivity is reduced. Is anticipation to be justified on the grounds that the evil prevented outweighs the evil done, as well it might on some scales, or is resilience preferable because it enables society to tailor the punishment to the crime?

Defence policy provides a useful contrast to health and crime. Whereas the administration of President Ronald Reagan supports resilience in the economy, preferring private enterprise to governmental regulation, it favours anticipation towards defense. The Soviet threat is deemed so great that massive efforts must be made to guard against it in advance. Otherwise, it will be too late to avoid destruction or conquest. Should some of these preparations prove unnecessary, or even detract from economic growth, that is believed to be a price worth paying.

Why the difference in strategies between the domestic economy and foreign policy? Because President Reagan supports markets, he favours resilience; because he supports the American system, he favours defense; because he believes time is running short, he wants to take anticipatory action. His trust in American institutions leads him to support private markets and governmental hierarchies in their respective spheres. No doubt the same sort of criticisms he levelled at anticipatory strategies in domestic policy — throwing money at problems, over-insurance, decline in productivity, organisational rigidity — apply to his defense policy as well. Indeed, the resemblance of the defense budget to a Chinese menu (three from group A, four from group B, two from group C), which is to say its lack of a cutting edge, is due to overprovision of resources. Doctrine is unnecessary if there is no need to choose.

As a strategy of social choice, anticipation is going to look quite different when it is applied to human health and environmental pollution than to national defense. If people prefer anticipatory action to defend what they value most, they may rely on resilience

when they are prepared to let things take care of themselves. The ubiquity of unanticipated consequences in human life becomes more understandable on the supposition that, if resilience is, on average, superior to anticipation, people are likely to protect what they care about less than what they work so hard to defend.

IV. REQUIREMENTS OF RESILIENCE

The behaviour in which we are interested is the intertwining of clashing consequences (for the human body and the natural environment) in the same technology. With good and bad inextricably mixed, it is not possible to have one without the other. If no new costs can be incurred, no new benefits can be gained. Economic progress, and the health benefits it has brought, would come to an end. Since humankind cannot progress by choosing only those consequences that enhance health (of people and nature), the question is how best to balance the costs and benefits so that, over time, health as well as wealth would improve? It is in this context of balancing opposed effects that governmental regulation versus market operations should be viewed.

The optimal arrangement, in my opinion, is for government to intervene only when there is substantial evidence of benefit. By this I mean that there must be more than a finding of actual (or potential) harm. In addition, there should also be knowledge of what to do and how to do it, so that the cure is not worse than the disease. For if anyone who feels threatened by an adverse consequence can stop the proposed technology dead in its tracks, all future benefits will be forgone, making it impossible to discover new arrangements better than those that now exist.

Nations could, of course license all new technology, requiring its proponents to prove that it will do no (or minimal harm) before it can be tried. This would be the institutionalisation of the doctrine of 'trial without error' that has been the subject of this paper.

Suppose, however, that laissez-faire would be the policy of the day, with no exceptions allowed. Evidently, certain opportunities would be forgone. Public health measures, to give the obvious example, are of overwhelming benefit compared to cost. From the standpoint of business, moreover, the costs are socialised over all taxpayers. The same thing occurs to a lesser but palpable extent in regard to other infrastructure — education, roads, sewers, etc. Such considerations may explain why there is no pure laissez-faire policy.

Were we to reformulate this market criterion slightly — allowing for public goods of immense benefit in whose production

government has a decided advantage — it would still leave out intervention to protect against specific disabilities brought about by new technology. Again, I reformulate my question to ask, 'Will people be better off, compared to *laissez-faire*, if there are specific governmental interventions designed to weed out the harmful from the helpful consequences of technology?'

The answer is question-begging: it all depends on whether and to what extent government is able to (a) guess right and (b) act effectively. For if government were to thrust at shadows, seeking to stop or regulate many substances or mechanisms that, if implemented, would turn out to be benign or even helpful, vast benefits would be forgone. However effective government might be in remedying real ills, it must fail unless it distinguishes the future consequences of current and proposed technology.

Choosing the wrong risks need not be so serious if there are mechanisms for discarding old solutions and trying out new ones. Yet this evolutionary approach (called trial and error) is precisely what advocates of risk aversion are trying to get away from. Political-bureaucratic processes, moreover, are characterised by slow adaptation: it is difficult to get on the list of technologies to be regulated and difficult to get off.

It is the effort to get government to provide guarantees against risk that characterises domestic developments during the 20th century. If we substitute 'security' for 'safety', social policy for technology, the desire for protection may be seen to be widespread. When one extends this protection to industry and its owners — 'socialism for the rich' (Reischauer, 1982) — the protection of the parts appears to be the ubiquitous phenomenon it is.

Since we do not know enough to identify and overcome each and every source of adversity, insurance may substitute for knowledge. Now the parts may be insured by the whole but who will insure the whole? If the parts are not risk-absorbers or risk-reducers but become risk-expanders and risk-exporters, how will the whole bear the burden? How can we build resilience into government?

The administrative analogue to markets is cybernetics, which originated as the theory of servo-control mechanisms. From the beginning, the role of the designer-adjuster has remained vague. Elements form a system. Within a level of tolerance postulated by this mysterious centre, each element is free to operate. Deviations above, below, or outside this level, sometimes called the governor, are initially to be met by each element's own efforts to dampen the oscillations, i.e., to return to the accepted level.

Coordination is kept to a minimum. Should one element (a program, an agency) create difficulties for another, this other unit is expected to take action on its own to contain the disturbance.

Although units may export their difficulties, this occurrence still accords with the rules of the game so long as there is sufficient variety so that some element of the system is able to cope. Each element gets lots of practice in coping. As the system matures, therefore, its elements should have learned how to manage an increasingly wider range of disruption. So far, so good.

Suppose, however, that disturbances can no longer be contained. Perhaps some elements no longer can carry their burden. Or perhaps the new disruptions are so novel or severe that existing adaptations cannot cope with them. Possibly the elements in the system no longer trust one another, unwilling to accept any redistribution of burdens.

Enter the centre. The governor must govern. But how?

Suppose every sub-group in society — farmers, workers, old people, youngsters, on and on — were guaranteed against risk. Supposing their safety would have to be secure, no matter what. Who then would pay penalties? Presumably risks would have to be allocated over the remainder. But if guarantees were extended until there were no one left unprotected, how would shocks be absorbed? How could risks ever be taken for causes however good if the losses could not be assigned to anyone? Where would the centre get surplus resources to respond to emergencies if it had to pay out to the parts but received no income in return? The system would cease adapting. The implications of legislating to remove risk are major disasters, from flood, famine and foreign take-over, to the material and technical poverty that has no means of climbing out of trouble.

Cybernetic solutions can work only if there is trust in institutions. That they work with minimal trust and coordination is their strength. But can they work without any?

Resilience requires trust. The organisational requirements of resilience are social and political as well as technological. If institutions are to wait until dangers manifest themselves, as resilience requires, they must have freedom to adapt quickly. It follows that resilient institutions are based on public trust; resilient institutions must have high legitimacy. But the risk-averse do not believe their institutions are resilient. They do not believe that their institutions can handle future problems. Therefore the 'establishment' must be made to anticipate now all the bad things that might happen. The risk averse demand cash in advance, the palpable evidence that action is being taken to prevent harm. The anticipatory strategy of demanding no trials without guarantees against error is self-fulfilling in that lack of trust lowers the resilience of institutions, thereby making them less effective to deal with problems as they emerge.

Looking back at the past quarter century, living standards have risen dramatically and, along with them, morbidity and mortality have undergone substantial improvements. Why, then, is there so much distrust of the Western institutions that have been, on any criterion of safety achieved anywhere in the world at any time, so successful? For the escalating concern over risk to the human body and natural environment stemming from technology is exactly a referendum on these institutions (Douglas and Wildavsky, 1982). Were they trusted to respond resiliently to future dangers, the kinds of concerns we witness every day would not occur. The beginning of wisdom about our controversial subject is that it is, first and foremost, our institutions that are at risk.

REFERENCES

- Ashby, W.R. (1968), 'Variety, constraint, and the law of requisite variety', pp 129-136 in W. Buckley (ed), *Modern Systems Research for the Behavioral Scientist*, Aldine Publishing Company, Chicago.
- Clark, W.C. (1977), 'Managing the unknown: An ecological view of risk assessment', paper prepared for the SCOPE-MAB Workshop on Identification of Environmental Hazards, Shrewsbury, Massachusetts.
- (1980), 'Witches, floods, and wonder drugs: Historical perspectives on risk management', pp 287-313 in R.C. Schwing and W.A. Albers, Jr. (eds), *Societal Risk Assessment: How Safe Is Safe Enough?*, Plenum Press, New York.
- Douglas, M. (1975), 'Environments at risk', pp 230-249 in *Implicit Meanings*, Routledge & Kegan Paul, London and Boston.
- Douglas, M. and A. Wildavsky (1982), *Risk and Culture: An Essay on the Selection of Technological and Environmental Dangers*, University of California Press, Los Angeles/Berkeley.
- Goodin, R.E. (1980), 'No moral nukes', *Ethics* 90 (April), 417-449.
- Gould, S.J. (1982), 'Darwinism and the expansion of evolutionary theory', *Science* 216(23 April), 380-387.
- Graham, J.D. and J.W. Vaupel (1981), 'The value of a life: Does it make a difference?', *Risk Analysis* 1, 89-95.
- Hayek, F.A. (1973), *Rules and Order*, vol. 1 of *Law, Legislation and Liberty*, University of Chicago Press, Chicago.
- Holling, C.S. (1979), 'Resilience and stability of ecological systems', *Annual Review of Ecology and Systematics* 4, 1-23.
- The Journal of Gas Lighting, Water Supply, and Sanitary Improvement* (1865), November 14, p 807.
- Landau, M. (1969), 'Redundancy, rationality and the problem of duplication and overlap', *Public Administration Review* (July/August), 346-358.
- Pearce, D.W. (1980), 'The preconditions for achieving consensus in the context of technological risk', pp 57-63 in M. Dierkes, S. Edwards, and R. Coppock (eds), *Technological Risk: Its Perception and Handling in the European Community*, Oelgeschlager, Gunn & Hain, Publishers, Cambridge, Massachusetts.
- The President's Commission on the Accident at Three Mile Island (1979), *The Need for Change: The Legacy of TMI*, final report, October.
- Reischauer, R.D. (1982), 'The federal budget: Subsidies for the rich', pp 235-262 in M.J. Boskin and A. Wildavsky (eds), *The*

- Federal Budget: Economics and Politics*, Institute for Contemporary Studies, San Francisco.
- Smith, J.C. (1983), 'The process of adjudication and regulation, A comparison', pp 71-96 in T. Machan and M.B. Johnson (eds), *Rights and Regulations*, Pacific Institute, San Francisco.
- von Neumann, J. (1968), 'The general and logical theory of automata', pp 97-107 in W. Buckley (ed.), *Modern Systems Research for the Behavioral Scientist*, Aldine Publishing Company, Chicago.
- Weiner, S. and A. Wildavsky (1978), 'The prophylactic presidency', *The Public Interest* 52 (Summer), 3-19.
- Wildavsky, A. (1979), 'No risk is the highest risk of all', *American Scientist* 67 (Jan/Feb), 32-37.
- (1980), 'Richer is safer', *The Public Interest* 60 (Summer), 23-39.

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Robert Albon

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Labour Market Regulation and Unemployment

CIS Policy Review

There is no doubt that Australia's exports suffer because of high labour costs. Australian consumers as well pay more than they should due to excessive labour market regulation. JOHN BURTON of London's Institute of Economic Affairs recommends a simple, one-time solution to the problem: deregulate.

The Hyper-Regulation of the Labour Market

SINCE the early 1960s, there has been a considerable growth of research by economists into the political economy of regulation. In the process, economists have increasingly come to realise that the modern state may be typified - in the terminology of the late Ian Tamin - as the redistributive state. Its main activity is to churn around (at substantial costs to both administration and compliance) the income and wealth of its citizen.

Only part of this churning occurs through the fiscal system. There is also a very considerable degree of surreptitious redistribution achieved through a mass of regulations, underpinned by an alphabet soup of regulatory agencies, commissions and quangos. The net redistributory effects of this florid regulatory jungle are unknown to economists, but there is

much evidence to suggest that its growth over recent decades has been associated with steadily declining economic performance, at least with respect to what otherwise might have been achieved. As with the tropical rain forest, the dense coverage of the modern regulatory jungle snags many new developments that might otherwise blossom and grow. It imparts the process of economic evolution and results in a system that changes rather slowly over time - again, compared to the alternative system of the free market - even if it has not yet become one of entirely stagnant equilibrium.

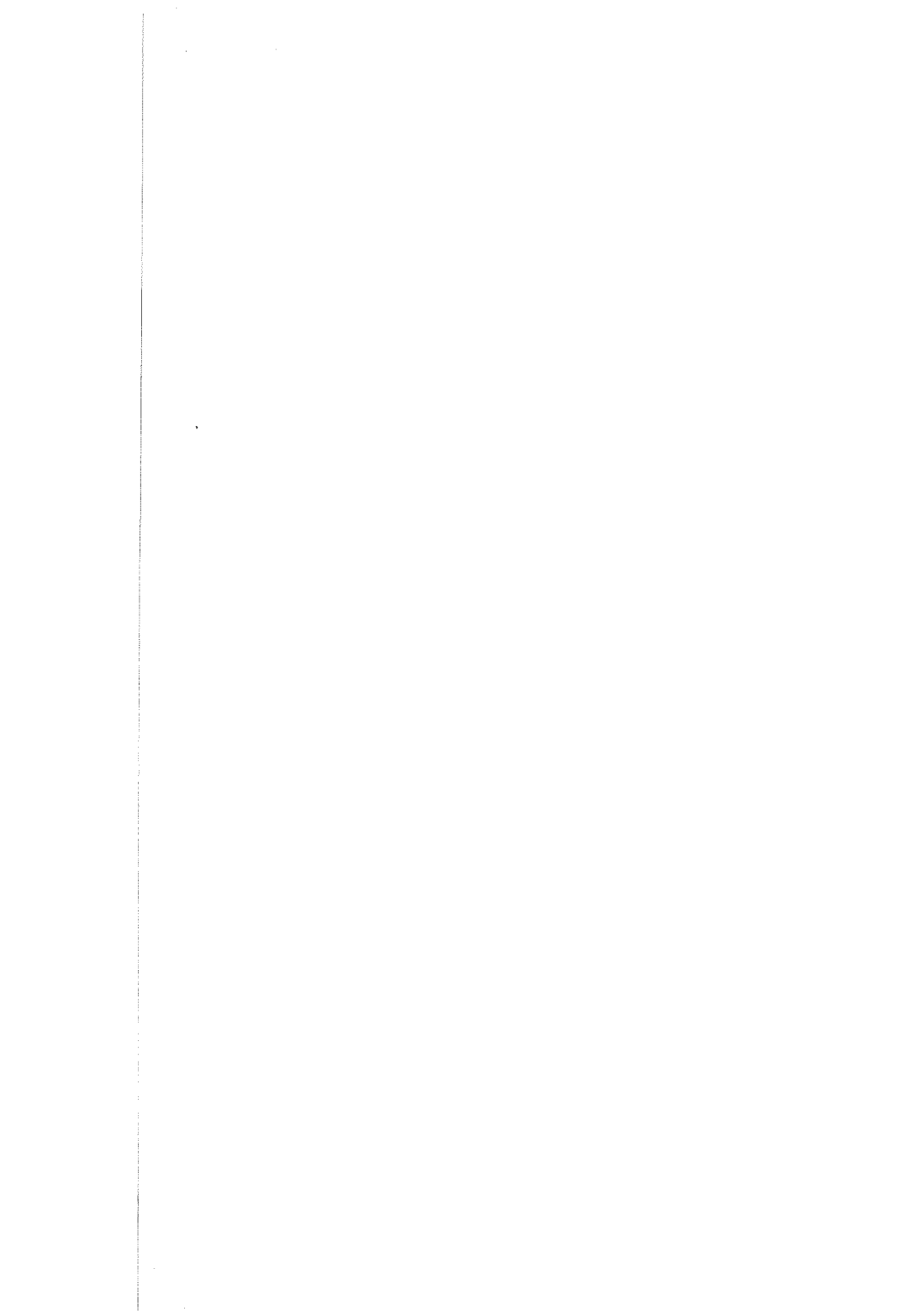
This is curious in that, of all markets, the labour market is typically the most regulated in the contemporary redistributive state.

Labour market regulation takes on myriad forms: mandatory unemployment insurance and state pension schemes; the provision of special privileges or legal immunities to trade unions such as exclusive representation (in the US) and immunity from tort actions when engaged in a trade dispute (as under the 1906 Trade Disputes Act in the UK).

In this issue:

- Labour Market Regulations
- Book Review
- Our Industrial Future
- Health Care Conference
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TRIAL WITHOUT ERROR

Anticipation vs Resilience as Strategies for Risk Reduction

Aaron Wildavsky

Safety regulations are proliferating at a great rate in society today, attempting to protect us from hundreds of known and unknown dangers. It is the unknown dangers that Aaron Wildavsky addresses here. Do restrictive regulations really reduce risk?

'Trial and error' is the cornerstone of science. Without trial there can be no error, but without error there is no learning. Regulations that prohibit even the testing of new technology, nuclear power technology for example, force innovators to guarantee before they start that there will be no errors. Even the most benign technology would never have been established if it first had to demonstrate that it did no harm.

Avoiding risk by trying to regulate it away has a surprising implication: making innovation more costly means there will be fewer departures from past practice, and this very lack of change may increase risk.

Aaron Wildavsky is Professor of Political Science and Public Policy and a member of the Survey Research Center at the University of California in Berkeley.

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