Working Paper

TECHNOLOGY AS CULTURAL PROCESS

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International Institute for Applied Systems Analysis
A-2361 Laxenburg, Austria

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I. INTRODUCTION

Just as there are political implications in the way nature is defined, so too in the way "technology" is defined. Although there is an apparently irresistible urge to use terms like Nature, Culture and Technology as if they were unitary entities (and perhaps that is always the fate of potent social symbols), public policy reflection is better served by examining the origins and implications of received definitions and their "interfaces".

There has been a long tradition of research on the social negotiation of nature and its complex relationship with culture [1]. What Thompson refers to as an eternal circle, of the the cultural construction of nature and the natural destruction of culture [2], leads to the apparent conundrum of the cultural destruction (via nature) of culture. The conundrum only appears, however, if we give the floor to the received approach to "Culture", which is to see it as a homogenous, monolithic whole--Western Culture, Islamic Culture, Traditional Culture, etc. Adopting a more modest notion of culture we can attend to the contending differentiations within (and elements of cross-"Cultural" identity between) such abstract monoliths, and link these to real beings, institutions and issues rather than moral ideals. We can see different social groups, their characteristic customs, belief systems, social interactions, as more or less discreet local cultures, maintaining their own identity and existence in relation to others, within the larger melting pot. Cultures are at the same time destroyed as active social constructs and

yet immortalised by being "naturalised" by their proponents.

The distinctive essence of "Culture" as a framework of analysis is the integrated wholeness of cognitive and material social dimensions of existence. Nature is worked on and manipulated through ideas of nature, society and technology which correspond with basic patterns of social relationships in that "Culture". This is not at all an approach antagonistic to conventional notions of social structure, institutions, power and economic relations: rather it may enlarge our vision of how such material social realities are maintained or changed [3].

In this paper I want to explore the notion of technology as cultural process in this sense, of embodying a differentiated set of cultures, each of which may be essential to the technology, but between which relations of power, communication and coordination may be problematic. It could well be asked, why use the term cultural rather than social, and I have indeed elsewhere tried to suggest the practical importance of seeing technology as social organisation [4]. However, without wishing to deny the importance of organisational, economic and physical elements of technology, I am trying here to emphasize the associated attitudes, images and belief systems which legitimate the social relations of technology. The ultimate goal is to shed a little light on the complex, brittle relationships between alienated "acceptance" and active attempted involvement (often via protest of some form) in the social direction of technology. This relationship is a key node in the dynamics of social and technological change and perhaps in the historic project to reembed technology in more democratic forms of control, but it is at the same time obscure and highly unstable. It is worth studying by methods less regimented than orthodox attitude surveys can offer [5].

Although the relationships between Technology and Culture have long been a topic of inquiry [6], the notion of Technology *as* (differentiated) Culture has been of far less concern. Suggestive but neglected work a decade ago by Edge on some cultural implications (e.g. the "dehumanisation" question) of technological metaphor acts as a springboard for my explorations [7]. I will attempt to relate some of his insights to recent work in cultural anthropology as developed to address some modern policy issues concerning technology [8].

First, however, I will outline a schema for treating culture more realistically, as a differentiated context of competing social-cognitive-metaphysical styles.

II. TOWARDS POLITICAL CULTURES

Several cultural anthropologists associated with Mary Douglas have developed an essentially 2-dimensional framework of socio-cultural atributes by which to define basic structural differences and comparisons between cultures. This "grid-group" comparative classificatory system may be applicable at various levels of aggregation from "national" cultures to individuals within sub-cultures. It has been well articulated elsewhere [9], so that only a brief outline is needed here. My aim is only to use the frame-work as a way of seeing in context the relationship between passivism and active protest. This may in passing go a little way to adding some needed social dynamics to the framework itself, but that is not my main objective here.

The approach starts from the not unusual premise that ideas of nature held by groups and individuals correspond with basic moral principles crucial to that group's self-maintenance. Egalitarian groups tend to "naturalise" and thus maintain moral equality by seeing biological equality in nature. Hierarchical

groups would tend to reflect their social hierarchy in perceptions of hierarchical processes in nature. This is standard fare. Cultural filters shape the perecption of nature in systematic ways, blocking inconsistent data and highlighting confirmatory data. These filters are not merely encrusted habits learned by rote and mindlessly enacted from one generation to the next; they are the product of active scheming to maintain a given cultural style or bias in contention with competitors. The theory of the cultural anthropology school associated with Mary Douglas is that from all social contexts there are only a few fundamental types which such cultural biases can take. These can be mapped on orthogonal axes, of "grid" and "group".

High-grid social relations involve a high level of external social prescription of the "individual's"* role. There is little or no autonomy, and the actor's experience is as a manipulated periphery to someone else's centre. Conversely low-(or negative-) grid relation involve high autonomy and anomie, and strong prescribing towards others.

High-group relations involve strong incorporation into sharply-bounded groups. This social demarcation between inside and outside is the key property. "Negative group" would mean active rejection of group boundaries.

It is the orthogonal combinations of these properties which provide empirically recognizable social groups, individuals and organisations. Thompson has described them as follows:

> "The group and grid axes have both positive and negative dimensions. Since group and grid can only be measured on ordinal scales, there are only five distinctions to be made within this social context space--one at the origin and one in each of the four quadrants. In each of these distinct social contexts we find a distinct social type: *the hermit*, free from coercive involvement in both group-

*More correctly, the social unit, which may be a group or individual.

formation and personal network-building; at the bottom left, *the entrepreneur*, spurning group involvement and central to a large personal network; at the top left, *the ineffectual*, excluded from social groups and peripheral to the personal networks of others; at top right, *the hierarchist*, strongly grouped and willingly subject to all the prescriptions that serve to maintain the ranked separation of his group from all the others within the group hierarchy; and at bottom right, *the sectist*, strongly grouped but rejecting hierarchy and all the prescriptions that are its inevitable accompaniment.

I trace these five stabilizable conjunctions of social context and cultural bias back to three distinctive kinds of organisation: *the ego-focused network*, *the hierarchy-nested group*, and *the bounded egalitarian group*. I further argue that this typology of organisations is exhaustive--that these are the only kinds of organisation that are socially viable."

This scheme is represented in Figure 1, where illustrative labels are given for the five basic social types, their typical cultural biases, moral justifications and ideas of nature.

If we apply this scheme to ideas of technology we can see corresponding patterns. A high grid view would emphasize highly structured forms, and high group would emphasize strongly bounded areas of technical control or consequences, i.e. strong boundaries of responsibility. Thus a combination of high grid and high group would yield a sense of well-ordered technical action with in-principle clearcut boundaries of consequences. If these are not actually clearcut then better forecasting and assessment can achieve this. Hence there is a sustained concentration bordering on the obsessional, with refined techniques for technological forecasting, risk management and technology assessment. High grid-low group, on the other hand, would yield an analogous

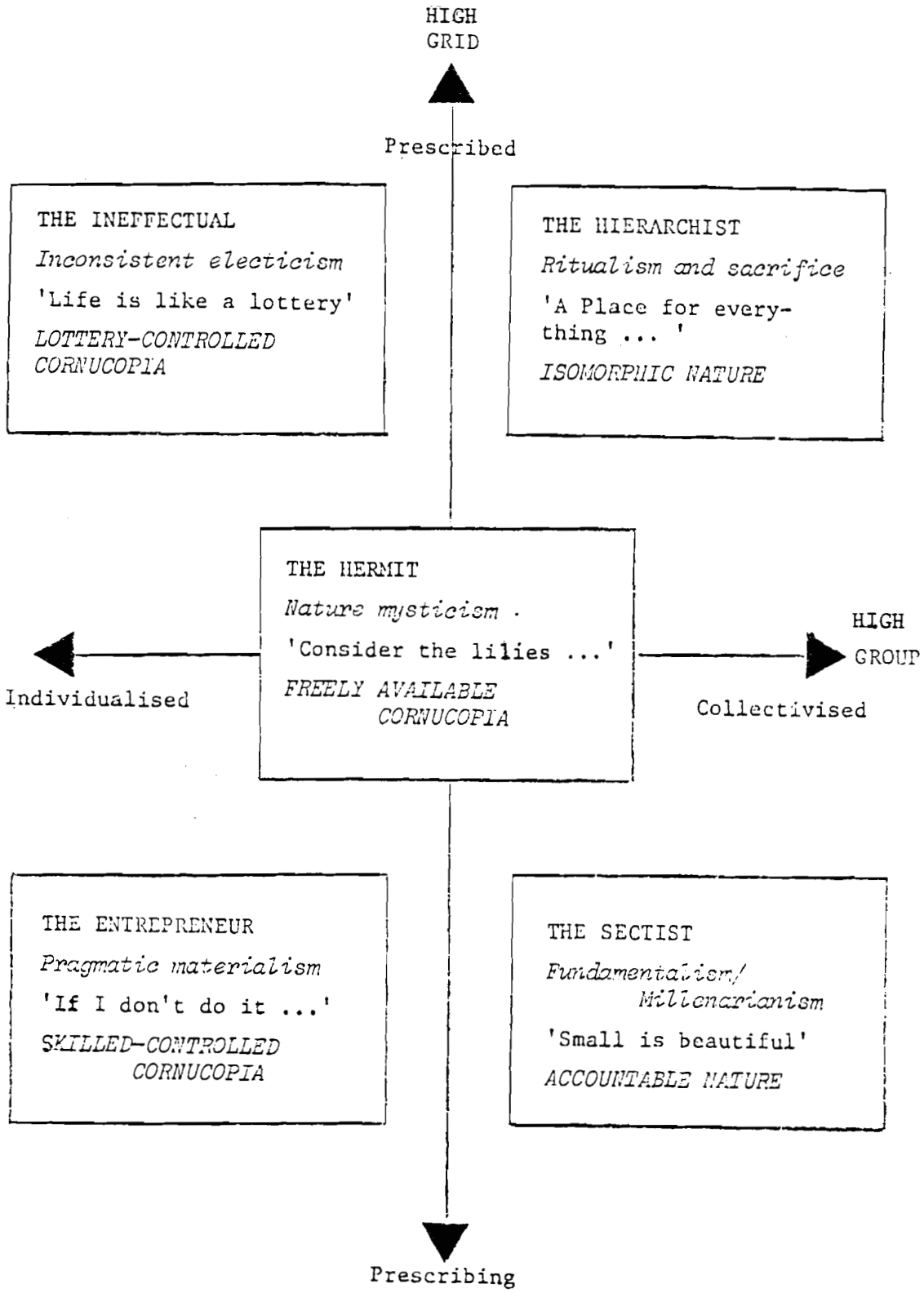

Figure 1. The GRID-Group Typolgy of Cultural Styles (Thompson, 1983): SOCIAL TYPES, *cultural biases*, 'justifications' and *IDEAS OF NATURE*.

sense of determinism in the direction of technology but an inaccessible determinism, out of reach of recognizable, organised human perception and management. Technology is well gridded, but outwith any recognizable moral community (group) because there is no strong group experience to frame that sense.

Low grid-low group, on the other hand, would entail a similar sense of unpredictability to the low group top left of Figure 1, but this time an unpredictability that was accessible, thus open to exploitation--sometimes this would pay off, other times not. Anticipation would be of limited value; it would be more a case of "ride the tiger" than manage in the conventional sense of cross-impact matrices, nth order consequence probabilities, etc.

Finally, the high group, low grid style would emphasize strong boundaries of responsibility, discontinuous consequence profiles (apocalyptic tendencies), and a low sense of external determination; that is a high moral responsibility to direct technology, but in more collectivist ways. Hence there would be an emphasis upon normative management, but more via collectivist styles of political organisation ("appropriate technology") than by conventional hierarchical forms of management. From this bias, technologies would tend to be evaluated according to perceived intrinsic moral qualities.

One can see how these ideas of technology tend to correspond with ideas of nature. Indeed within each cultural style the ideas of nature and technology interpenetrate and reinforce one-another. There is no clear boundary between nature and technology: indeed our publically certified knowledge of nature, namely science, is nowadays certified only via technology, i.e. as knowledge leading to greater technical control, and nothing else. Truth and manipulation have become culturally confused.

The existence and character of the *Hermit* type is subject to some conflict: and all the basic types are seen as mixed and nested in social reality. The grid-group classification can be applied at various levels of aggregation, from the individual, to specific groups, to whole occupational types, to national political cultures or whole societies. Although this has occasionally been treated as a sign of inconsistency in the schema, it is more relevant to view it as classificatory rather than of itself explanatory. It is a necessary preliminary to explanation. The "problem of levels" then becomes less serious, and indeed may be a positive source of development of the approach towards the more complex question of social change via the interactions of such basic types. For example, single organisations may contain a rich blend of entrepreneurs, hierarchs, sectists and ineffectuals. Within an overall hierarchical formal organisation, sectist groups may emerge and operate at a given level, say in response to moves to reorganize or discontinue their work. Entrepreneurs (formal and informal) may also operate at different levels, in constant tension yet overall unity with the organisation as a whole.

Whatever the difficulties of consistent applicability and empirical referents of this itself rather fundamentalist schema, it does appear to resonate with broader experience and research on organisations and (with more difficulty) political cultures [10]. A further criticism, however, is that the basic metaphysics of this theory are a version of "naïve pluralism"; that although the cultural emphasis usefully reintegrates cognitive dimensions of social behaviour, there is no talk of power, even though the schema pretends to encompass political affairs.

A valuable linkage has been provided, however, by Thompson's suggestion [11] that the diagonal between Hierarchist and Entrepreneur (Bureaucrat and Innovator) can be regarded as a joint axis of power (and complacency) as conventionally treated in social science. In 3-D space, with power as a third dimension, this axis could be regarded as a ridge connecting the Entrepreneurial quadrant with the Hierarchist. Although tensions exist along it, there are many coalitions and elite formations in society which constitute this ridge system. The Ineffectuals can be regarded as a pretty flat landscape, and the Sectists, for our purposes radical grass-roots labour union sections, environmental or other activist campaigning groups, a slightly less lowly and, as we shall see, more turbulent landscape. This diagonal axis might be called the axis of instability and powerlessness.

Although this rough schema gives us the opportunity of testing ideas about changing social patterns through the whole system, I am interested here in exploring only one part, namely what makes people and groups move from being passive, alienated and disoriented "ineffectuals", to become active, even zealous, intervenors in the process of technological decision and development. How does this apparently unpredictable sudden process come about? This has become a question of great practical importance whether to government agencies wishing to anticipate and contain such movements within their planning horizons, or to activists wondering why they are not being joined by mass uprisings in their cause. Dissatisfied by the simplistic (though no doubt partly true) NIMBY explanation [12], I have tried to dig deeper into the labyrinth of psychic tunnels by which ineffectuals, rather than try to scale the ridge separating them from activism, instead burrow through like moles to the other side.

III. THE AXIS OF INSTABILITY

Although the Ineffectuals category is probably the most complex of all those advanced by the grid-group schema, this complexity renders it perhaps the most interesting. By definition, many of the attitudes and beliefs of this category are inarticulate, partial and latent. This is, after all, the central arena of the perennial "false consciousness" question [13]. All the other groups use this passive if differentiated majority in their own schemes, involving different versions of "the public interest" and different theories of *why* the majority is so silent, corresponding with their own cultural bias. This sector could perhaps be regarded as a heterogeneous aqueous solution, invisibly super-saturated in parts, where local seeding gives sudden crystallisation and an entirely new constellation of phases and interactions. These new phases are our analogy for activist groups with egalitarian sectist properties.

From beaming its ideology one way towards the passive, alienated majority, the axis of power now sudenly has to face the opposite direction too. To maintain power and authority towards this sector with its different rationality may require very different ideological contents, perhaps even ones contradictory to those effective for keeping the ineffectuals quiescent. This is suggested conceptually in Figure 1, and is borne out in empirical experience.

For example, when controversial policy decisions about complex technological developments are made by institutions like public hearings, legal processes, etc., they are usually described in the public language as expert discovery problems.

This description only inflames the (often well-informed) relevant activist groups, because their disaffection is strongly rooted in antagonism towards expertise and technocracy. They demand more explicit recognition of moral and political choices--a (low grid) language of prescription rather than objective structure. What is good legitimating language for keeping the quiescent majority quiescent is exactly the opposite for these "sectist" activists. I have elsewhere described in detail this tension in the case of the 1977 Windscale Inquiry and its framing legal rationality [14]. Conversely, describing the issue in the language of inevitable expert uncertainty, thus ("difficult, so you may lose") political and values choices, even if the specific decision had gone against them, would have mitigated the impact on many activists because this language caters to their cultural style of moral prescription; but, by the same token, it would have invited some quiescents to join the fray and take issue.

Seeing this relationship as a fragile balance-in-tension of contradictory ideological tendencies and relationships offers us an analytical framework within which the relatively sudden shifts which are frequently seen in attitudes and levels of conflict--political surprise--can be conceivable. Regular symbolic action [15] beamed in one direction and apparently successful at keeping consensus-by-quiescence may conceal from the view of the power elite the growth of activists as it were popping up threateningly behind it. The cultural filters of the elite may allow the activists to develop into significant features of the political landscape with solid connection (e.g. via the skilful use of the media) with the popular culture called "ineffectuals", before they begin to take them seriously.

Once taken seriously, however, some interesting dynamics may emerge. Sectist groups are highly egalitarian, grass-roots in style. They are antagonistic towards leaders, spokespersons and experts, which is why the leadership rituals of such groups are often more agonising and bloody than those where at least the notion of leader is accepted [16]. Despite this, however, being taken seriously demands that leaders and spokespersons be deputed. In regular necessary interaction with the institutions of power such a role demands increasingly expert, technical language of argument. Typically, such leaders move, in language attitudes and style, towards the axis of power and the elites they begin by rejecting. They find themselves torn between, on the one hand, loyalty to their fundamentalist, uncompromising grass roots with its bosom-like security but politically "outsider" status; and, on the other hand, incorporation into the respectable margins of the policy elite, where status and recognition are traded for the willingness to emasculate original arguments into the narrow technical dicourse controlled by the establishment. They gravitate towards top-right, Figure 1, towards cooption.

This kind of metastable state can exist for years, with activist groups in a continual state of crisis and upheaval over their leadership, proper strategies and styles of argument. If their leaders reduce this tension by becoming too coopted*, too drawn towards the hierarchical sector, such groups may simply and quite rapidly dissolve back into anonymity and the majority

*This cooption process, its successes, ebbs and flows, depends also upon the structure and flexibility of the establishment, which is at least partly relative to the specific issue. Cooption may be more likely with confident establishments (e.g. UK) and less with insecure, thus intransigent, ones.

resume their membership of the ineffectuals; the process of high-group boundary-maintenance and the fervent articulation of common identity and purpose fall apart. It may be, of course, that coption of leaders and the emergence of new leaders from the grass roots is an endless process, maintaining the active if turbulent existence of vigorous "sectist" groups. If such groups do disappear from view, their members may still make up a latent nucleus--to use the earlier metaphor, a super-saturated area of solution--for later reactivation, perhaps on an adjacent but not identical issue.

This kind of analysis corresponds strongly with the approach to attitudes and behaviour which rejects the rational economic individual calculator model, of values, goals and interests as clear, stable and concrete [17]. It supports the view of people and their attitudes as more tentative, experimental, incomplete and perhaps internally inconsistent; humans as flexible managers of the conflicting, complex grounds of their own being. They may be more ambivalent, "unstable" and open to suggestion of their goals and values by dominant cultural stimuli than more individualistic, rationalistic approaches and methods claim. It is culture, not individuals, which gives these values what consistency and force they may have.

Since technology provides potent experiences and images which shape meanings, perceptions and behaviour, it may be regarded as a key substrate of culture. To the extent that modern technology provides uniform mass experience, it may be a form of common culture cross-cutting and underlying or destroying the differentiations which the grid-group approach posits [18]. I shall advance the perspective: that such differentiations are under-acknowledged and are far stronger than generally assumed; that the experiences, relationships and their guiding rationalities which people invest

in technology are more varied, contradictory and important than received models of "technology" can accomodate; and that their systematic analysis and recognition is of practical importance to technology policy. It is worth attempting to examine the expression of attitudes and self-images in technological experiences, and then to explore the psychological and sociological undercurrents of these. Technology can be regarded as culture in the sense that it is a potent framework relating dimensions of belief and meaning to social relations and processes; and it is *political* culture in that the social relations of power embodied by the technology are more or less successfully legitimated by the cognitive structures which are naturalised in the culture, and which thus conceal those underlying structures of power from critical examination and possible change.

IV. TECHNOLOGICAL ANIMISM

In his classic account of the social and psychic devastation caused by the 1972 Buffalo Creek dam failure in the Appalachian mountains [19], Kai Erickson observes that the reaction of the economically and politically marginal people who were victims of that "point-disaster" was profoundly conditioned by their internalisation of the state of "chronic disaster" represented in their long term neglect and alienation from employers and public authorities. The psychic withdrawal characteristic of extreme traumatic shock was already consolidated on the community scale in the alienation and self-dependence of the community, trusting none of the agencies on whom they nevertheless depended and thus tolerated for economic survival. Erickson argues that what was most significant about the social aftermath of the disaster was not the personal trauma--"psychic numbing"--which everyone experienced, but the collective trauma, the inability of the old social networks to reestablish themselves

as the framework of personal psychic convalescence and development. The people felt betrayed by the coal company which neglected the dam whose burst caused the disaster, not because they had previously thought it a conscientious company, but because structurally, in their position, they had to trust it, despite realistic appreciation of its selfish motives, past neglects, etc.

In Erickson's perspective [20] the powerless always tend to defend and rationalise, thus *consolidate*, their own impotence and apathy because to do otherwise is to expose themselves to the greater human damage of *explicit* neglect and powerlessness. They withdraw, and justify and defend that withdrawal as consistent with cosmic principles; it becomes their culture, integrating their beliefs about cause and effect in the experiences they encounter, with their established social relationships. Erickson saw the classic symptoms of trauma in the ordinary human reactions to "the age we are entering", namely "a sense of cultural disorientation, a feeling of powerlessness, a dulled apathy, and a generalised fear about the state of the universe" [21]. These correspond with the features of the "ineffectuals" of the high Grid-low Group cultural category. They are the symptoms of social experiences and roles which are highly prescribed by others, yet where the structure of such prescriptions--of their own marginality and manipulation--is obscure. The "effective causes" of their powerlessness are socially invisible. What Erickson also saw being enacted in social reality was the tentative, fragile nature of movements out of apathy and disorientation. What community developments there had been in that direction were swept away by the flood, which was analogous to the condensation onto a single, extreme dramatic event, of years of non-affirmation (identity-stripping) by the outside world.

I have made this excursion into Erickson's interpretation of a man-made disaster in order not only to help uncover the complexities of attitudes and some continuities between historical events and historical processes: I also want to explore how technology--here a dam central to the community's existence (it was part of the local coal mine system which employed most of the people)--is externalised in images which shape cultural attitudes which implicitly reflect back people's social relations as alien objects, beyond their control or responsibility to alter. In the Buffalo Creek case, the survivors seemed to have a clear sense of who was responsible for the technology's havoc, but an equal sense of hopelessness that anything might be done about it. *The effective cause of their disaster was at least seen as human agents*, even if these were believed to be beyond control. This, however, might be taken as an extreme example of a concretely visible technology with clear lines of control and responsibility. Many other technologies typical of the modern age--nuclear power, genetic engineering, and perhaps most especially computers--lie at the opposite end. Their controlling human agents are invisible, diffuse and socially remote. It is impossible for ordinary people to identify the effective causes of their confusing and often troubling experience of these technologies, even if they do not produce dramatic interventions in their lives. Yet the importance of these experiences requires that people construct some working explanations so as to rationalise them one way or the other.

One example of the way such effective causes in technology have been mystified, and images cultivated, is given in Figure 2 [22]. The technology--here a nuclear power station of the most "advanced" sort (the Dounreay fast reactor)--is deified to the extent not only of hovering, disembodied above the mere earth, but with a halo to denote its moral purity and magical power.

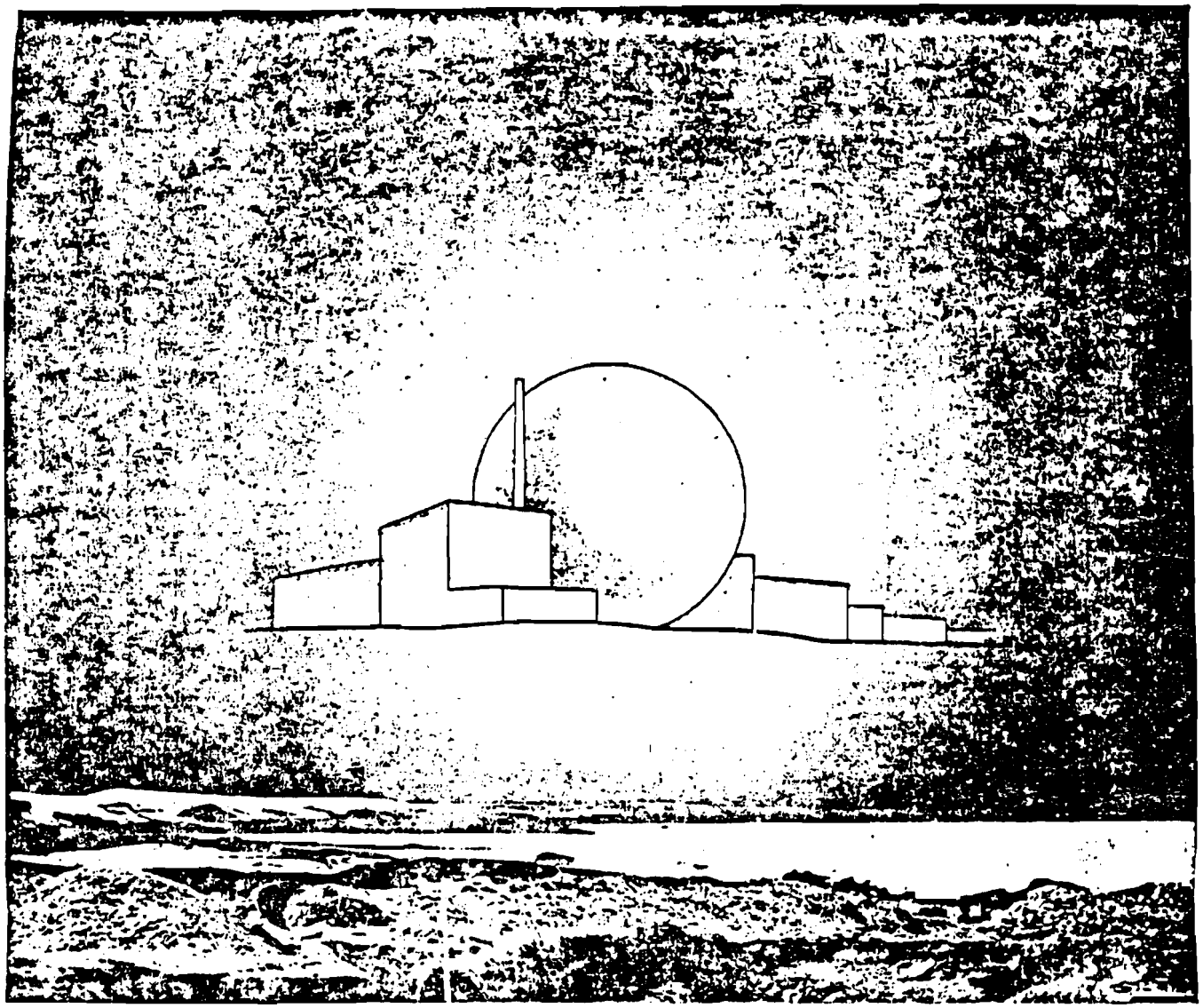

Figure 2. **DOUNREAY—**

to mankind will be the reward . . .

Millions of people, with only a glimmering of what the Atomic Age can mean to mankind, stand amazed at the fantastic prospect of heat, light and power issuing from a source that cannot even be seen. These people of the world, for whom the atom will be harnessed for service, gather their news of this great new power, day by day, from newspapers, radio and television.

These men and women can feel a sense of pride in the achievement of harnessing this power for peace.

The caption invites people to awe-struck worship, dazzling them from any perception, let alone questioning of the agencies, interests, uncertainties and human frailties behind the image. This is symbolic action *in extremis*.

An important consequence of this socially constructed invisibility of effective causes in technology is indicated in a small part of the caption of Figure 2. Part of the imagery of magic power is the fact that the "fantastic prospect" will emanate mysteriously, from a superior force that cannot be seen, heard or felt. These properties of ionizing radiation, then used to intensify the positive power of the technology, are the very ones which are now regarded as intensifying exaggerated hostility and fear. In other words, legitimation was created by cultivating the idea of awesome, other-worldly power, beyond the bounds of ordinary nature and culture, but this disorienting relationship's corollary is a double-edged instability which can easily and suddenly flip over from *benign* externality to *malign* externality.

The point is that with effective causes and structures of responsibility so obscured, the only responses possible are *total* acceptance (tinged with an ambivalent potential for anxiety in the face of such supernormal power) or *total* rejection (tinged with fascination at the sheer technical mastery such technology may entail). There is no possibility for measured criticism and conditional, qualified responses--all possible currencies of discrimination have been historically obliterated, leaving behind inflexible absolutes. This is tantamount to primitive thought, where the symbol is collapsed into the word,

and no creative tensions exist any longer between the metaphorical skeletons of ideas and literal versions of the metaphor. People behave as if the technology were literally an alien being from space.

Psychoanalysts have examined clinical cases involving similar condensed images of technology which have become central surrogates for explanation of more complex experiences and potential responsibilities which people cannot handle. These images, or *specters*, are not only psychic simplifiers but also fraeworks of social relationships: and they are built around technological images, perhaps increasingly so, given the increasingly central role of such experience in daily life.

Daly defines a specter as a kind of potent, artificially created but invisible behavioural force [23]:

> "A sense of the operation of such forces arises when men find they cannot account for emotionally significant events by ascribing them to the conventional sources of power and efficacy (e.g. human, natural, divine) which are believed to make things happen in the world. When such inexplicable events persist and are experienced by numbers of people, agencies are created to account for these events. These agencies are given names, made into realities, and adapted to as powerful things....
>
> The spectral view of technology arises from a sense of domination by mysterious forces or agencies which are, or were, linked to technological enterprises but which are now apprehended as being beyond the control of any particular man or collection of men....
>
> [People] behave as if the spirit of meeting specifications in many discreet, limited and finite human ventures had taken flight from the hands of responsible agents and become an independent reality-- a reality which has come to overhang the modern world and to enter into the dynamic processes of personality-- as a spectral object."

There is, in other words, a ritual defence mechanism--a transference of responsibility for complex and inexplicable experiences which are too emotionally important to be ignored. Daly describes how several patients created such specters of their own biological systems, investing them with powers to decide and cut a clean swathe through otherwise overpowering ambiguities. Thus they would obsessively refer to a simple measure such as their pulse rate as a guide to decision making--it was made into a source of "objective decision rules" supposedly reflecting a greater, more powerful but impenetrable biological mechanism. Such agents may become absorbed into part of one's very identity; or more accurately perhaps, one's identity may be shaped by, then absorbed into the image, one becomes "a cog in a machine", or, with Bettelheim's "Joey: a mechanical boy", an electrical appliance who "plugs himself in" and "switches himself on" before he can speak, and who causes others to behave in parallel fashion in order to relate to him [24].

It is a central point of Daly's analysis of these conditions that they are no longer, if they ever were, restricted to clinically psychotic individuals. They are now in his view mass neuroses, transmitted in normal processes of cultural dissemination. Given the kinds of symbolic action depicted in Figure 2, this is hardly surprising. Indeed the historical use of images of scientific, technical power as if from outside the realm of human interests and values has ironically cultivated an escalating search for objective decision rules from science, akin to a collective scale version of consulting pulse-rates, such as the eternal effort to avoid the ambiguity of *negotiating*

acceptability from situation to situation, by instead creating objective scales of "acceptable risk". The artificiality of these entities and the impossibility of their ever providing what they promise may never be apparent to the majority of ineffectuals since they are embedded in a whole labyrinth of dense managerial political language and institutional barriers. But their constant usage in keeping the ineffectuals at bay is just what disaffects and activates the sectists even more [26].

V. TECHNOLOGICAL ANIMISM AND SOCIAL ACTIVATION

In many cases the creation of such technological spectres may ironically be an essentially rational reaction to irrational situations. Most people are fragments of technological systems which entail many connected parts whose coordination is essential, but complex and chronically problematic. However, they never experience the whole system [27]: their experience is fragmentary and bounded by their local organisational and cultural context, within which they have to make out. Finding it impossible to penetrate the boundaries of their local experience and to understand the rationalities, interests and interactions of those whose doings structure that situation, they create shorthand images to "explain" those external agencies and their frequent unpredictability and apparent malevolance.

A graphic example of this was given by McDermott, who described a specter created by American GI's in Vietnam [28]. They were operating in the jungle, constantly sniped or attacked by Vietcong guerillas who could never be identified and pinned down; regularly shelled and rocketed, but never sure it wasn't

their own side; and received orders but never explanations from their superiors. Their experience was frightening, confusing, contradictory and utterly obscure as to its effective causes. They couldn't find an enemy and they couldn't identify their own side. Yet they received orders and were attacked in equally arbitrary fashion. As part of their rationalisation of this (very high-grid) predicament the GI's had condensed the potent, but diffuse and invisible effective causes onto a single agent, a "huge-fucking" gun which lived in a hollowed-out mountain, and which emerged at whim to unload death and destruction onto them. It was an agent beyond control, imbued with a kind of autonomous malevolent intelligence. In one major sense it was no comfort at all, but in another sense it was, because at least it offered *explanation*. It was a kind of metaphor representing their social relationships with those elites (and here also enemies) who remotely and invisibly controlled their fate.

Langdon Winner has also discussed this process as technological animism [29]. He takes the story of Rudy in Vonnegut's *Player Piano*. Rudy was a mechanic whose job had been replaced by automation--his skills and experience had been reduced to an algorithm and entirely handed over to a computer. Deeply upset and mystified by this shattering of his very identity, Rudy enacts a scene in a cafe with a doctor friend, where he goes into a frenzy over what he sees as the creepy, superhuman intelligence controlling the keyboard movements on a simple slot machine (Player) piano. Perhaps indicating that as a more educated being he sees through this conversion of concrete if hidden human goals and interests into extra-human, therefore untouchable intelligences, the doctor friend has to get up and

walk out on this pathetic scene. In Winner's words [30], this scene gives:

> "a glimpse of the crucial statement and ultimate conclusion of the writings on technological animism. If one asks, Where did this strange life in the apparatus come from? What is its real origin? the answer is clear: it is human life transferred into artifice. Men export their own vital powers--the ability to move, to experience, to work and to think--into the devices of their making. They then experience this life as something alien and removed, something that comes back at them from another direction. In this way the experience of life becomes entirely vicarious....
>
> Man now lives *in* and *through* technical creations. The peculiar properties we may notice in these creations are not the result of some spontaneous generation. What we see is human life separated from the directing, controlling positive agency of human minds and souls."

Winner's important insights here must, however, be qualified, or perhaps clarified, by one important point. Although men do "export their own vital powers" into the technologies they have created, and reflect them back as aliens beyond control, this falsely implies a lack of any social stratification or cultural differentiation in this process. Elites are also immersed in their myths and fantasies about technological power, and non-elites do make technological creations. But it is also important to see that those ineffectuals are circumscribed by mystifications created through domination by decision making elites, a domination whose arbitrary human structure is increasingly socially complex, remote and thus "invisible". They therefore transfer responsibility from this frustratingly intangible and impenetrable human complex, onto extra-human spectres. This is transfer and

condensation not so much of their own (anyway small) responsibility and power, but of the power of elites in the social structure around them. The myths and fantasies of the axis of complacency (see Figure 1) actively promote this mystification and concretisation of their own power, even if not always deliberately.

Not only does this cognitive process artificially consolidate the axis of power by placing it apparently beyond human access, but it encourages a lack of human tolerance for ambiguity, thus a structural brittleness in the system. When responsibility is so condensed onto such technological spectres whose inner workings are inaccessible, experience has to be interpreted, and life conducted, by either total identification with or total repudiation of such spectres. Thus public "debate" and interaction becomes rigid and prone to sudden discontinuities: government itself may become less viable. As Crozier has put it, there is no authority without negotiation [31], and since such fantasies and spectres preempt the possibility of negotiation by replacing and "black-boxing" more discriminating perceptions of relationships and causes, they tend to destroy even the *possibility* of legitimate authority.

A good example of the absolute contradiction in different social perceptions of technology, and the linkages between these and power structures, arose during the 1977 Windscale Inquiry [32]. This was a public inquiry into a plan to build a new plant to reprocess spent nuclear fuel from the new generation of reactors, using oxide fuels. This would extract plutonium which could be used in fast breeder reactors or weapons, uranium which could be recycled in further thermal reactors, and radioactive wastes which would ultimately need some safe final disposal.

The plant was part and parcel of a longer term historical vision of nuclear development reaching out of colossal past commitments and into future ones. Its go-ahead naturally made all of those future envisaged commitments more likely, via institutional momentum and technical-economic logic.

The proponents and the High Court judge in charge defined the issue as the examination of the direct impact only of the reprocessing plant itself, and excluded any question of the implications of future fuel cycle developments which might be entailed by it. These, he argued, would be subject to future separate decisions, and any attempt to cover more comprehensive nuclear futures was "emotive nonsense". Yet many objectors took for granted that the reprocessing plant, being only a part of a historical process, had to be examined as such. Fast reactors, plutonium trading, waste disposal, and reprocessing plants, and so on, all had to be considered.

This issue was only "resolved" by the *fiat* of the judge. He found it impossible to negotiate with this alternative definition of the problem, perhaps because it was rooted in *objectively* different social experience, which he defined as "merely" emotive. To the decision making elite it was logical to say that future plants could be separated as decision issues, because they could identify with the whole process in which those future decisions, as well as the present ones, would be made. They could conceive of decision choice and access to those future steps, which were thus separable from the present issue.

To the powerless however, no such identification could be made, because from their objective social position, consolidated in empirical historical experience, the processes by

which the present step might or might not be converted into future elaborations were socially and intellectually impenetrable. From their social position it was therefore entirely logical to reject the equally logical, but contradictory definition of the issue by the elite, and to condense all future possibilities into the one present question. It was an undiscriminating, all-or-nothing stance, occasioned by their relationship to the axis of power.

VI. CONCLUSIONS

My own suggested definition of technology is, of course, also political in that it highlights very different questions, and suggests different structures of naturalness and unnaturalness, from other definitions, such as technology as "tool", "craft", "package", or "historical dynamo". Although granting that technology does have intrinsic force and that this may well encompass and freeze, in its own way, the whole field of possibility for some societies or groups receiving a technology, the cultural process model does not commit the often-ensuing slide into technological determinism as a model of history. Nor does it encourage us to use such terms as "technology" in an undifferentiated way, wothout attempting to understand people's different perceptions of control and responsibility in relation to it. Just as "nature" acts as a mirror reflecting back our social and moral preoccupations, so too does "technology".

I have tried to sketch a view of technology as a cultural process, attempting to link previous analysis of technology as social organisation with ideas about how we structure experience of technology and its imbedded social relations. By exploring

the cognitive dimensions of these relations we may approach an understanding of the depth and complexity of the organisational dislocations which frequently beset modern technology. To see these as sociocultural allows us to conceive of them as rooted in cosmological commitments which the language of "management" of "organisational" difficulties may oversimplify. The pattern of possible cosmologies, their associated rationalities, metaphysics and individual identities and styles of interaction, are suggested by the grid-group cultural hypothesis.

The technological specters, such as those I have discussed, act as a framework of interaction within these cultures, and between them. They also define these cultures by becoming central parts of their very identity. Sherry Turkle has discussed the fact that various technologies invoke strong personal feelings and intense relationships [34]. "People develop intense and complex relationships with cars, motorbikes, pinball machines, stereos and ham radios." Computers appear to have particularly strong properties in this direction. Turkle also recognized that such feelings can reflect external social and political concerns. However, what we are discussing here is more than relationships to, but *identification with* the technology, by fusion of personal or group identity with technological imagery. As we have seen, the purely mechanical technological metaphor can be reanimated by further metaphorical extension into images of intelligent controlling beings, but these are often alien, threatening and unpredictable, a metaphor for real social relationships.

This cultural process may occur on a microsocial scale in comparison to the overall organisational scale of the technology.

Thus nuclear power station laggers are a small if crucial part of the overall system of nuclear power development and use. They install insulation at critical parts of the cooling circuit of reactors, so as to avert catastrophic thermal gradients and stresses which would crack the pipes and release radioactive gases. Their work is arduous and uncomfortable, working with protective clothing in a maze of boiler and pipework. Interviews with laggers at the Heysham nuclear station in Lancashire, England [35] revealed that, well away from regular supervision as they are, they frequently remove gloves and dust masks to ease working conditions, even though the gloves are supposed to avoid possible corrosion from (acid) perspiration on the stainless steel pipes. When they need to urinate, instead of crawling laboriously back to an exit, thence to the site W.C., they find a convenient corner on the job in the pipework system, releasing onto it a potentially corrosive liquid. When they lose a piece of equipment, they are supposed to report it at the end of the shift, and go back down with a supervisor to find it and "sign it off". Instead of subjecting themselves to an open-ended search in their own time, they quietly ignore and cover up the loss, thus leaving the equipment possibly to disrupt the highly sensitive, precision flow dynamics of the cooling system when the reactor is started up.

Laggers are a culture unto themselves. They see the thing they are building as just a theatre for doing their work and drawing their pay. The identification they have with the technology is as a white elephant--when asked to justify what looks like their potentially dangerous and irresponsible behaviour from the the view of the nuclear technology as a whole, they do not see it

as a piece of nuclear technology. They point in very well-informed fashion to management incompetence on a par at least with their own "irresponsibility", and conclude that the technology will never come into being. Thus, seeing their behaviour as irresponsible in the overall technology context is, in their view, irrelevant. Arbitrary forces outside their control completely neutralize the implications of their own behaviour.

I would suggest that such cultures as fragments of overall technology systems are commonplace. As the technological division of labour becomes more elaborate and institutionalised, such groups become all the more segmented and isolated. In creating their own cosmologies out of this experience, they create a certain independence from the technology on which they depend. This "independence" is, of course, not total, but gridded by the boundaries of related parts of the overall system. The growth of a quasi-independent cultural identity out of the corresponding social practices may stabilize the boundaries of activism of such groups by "naturalising" the surrounding social "landscape", to within limits that retain that dependence. However, this deeply ambivalent dependence may be misinterpreted as loyalty from the social distance of the axis of complacency, and the underlying alienation and cultural autonomy of such units never become apparent, except indirectly as technological (and maybe government) systems that do not work.

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13. And the similar issue of political communication. See, for example, the discussions of "communicative competence", in P. Connerton (ed.), *Critical Sociology*, Harmondsworth, Penguin Books, 1978.

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