

A Feminized Science : From Theory to Practice

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There are many feminisms but a feminist science should question all forms of domination (Fee, 1986, 54). This paper argues that only through a deeper conceptual and practical understanding of the 'feminine principle' (a path for renewal Harding, 1971, 240) will we achieve a feminized science (Femsci) viable because it is a humanized non-dominant science.

Historically there has been a 'feminism' which is holistic, humanistic and ecological. 'Feminism' as a 'movement' has fragmented in recent years and deferences have often been used to further the interests of cliques or women at the expense of men, rather than care for humanity and the planet. This paper uses 'feminism' as a coherent value system as above.

There is certainly no shortage of insight into the failures of patriarchal or masculine science (Msci) but despite a decade of feminist critiques, "no feminist science has evolved" (Rosser, 1986, p 168). This failure is not confined to feminist perspective. More generally, alternative visions of science and society show high degree of commonality (Emery M. 1982, 78—88; see the SHE Future, (Robertson, 1978), Eco-Philosophy (Skolimowski, 1978), Convivial Equiry (Henry & Thompson, 1980) and there is an unresolved question as to whether a feminist science differs significantly from a humanized science. But none have made significant dents on the major institutions, particularly organized science. 'Science' is, therefore, almost by the definition of invulnerability, one of the most entrenched manifestations of the constellation of ideas and values incorporated into the world view of mechanism (Pepper, 1966).

As theoretical alternatives are in place, all that is lacking is the reality. To become a vital force for change in science and, therefore, society, the gap between vision and reality must be bridged ; the feminist principle must be translated into an alternative way which performs the functions of science but holistically, with respect for life in all her forms. At least four inter-related elements appear to be necessary and of these, methods to transform dreams into action are critical and available.

The Search Conference "Can we build a feminist science?"

WISENET, the women in science enquiry network, was established in 1984 with a broad set of objectives to change access to and the nature of science. A small group of members of both sexes in Canberra at the Australian National University had been meeting periodically, exploring various ways of coming to grips with the notion of a feminist science and as one of these ways, a Search Conference was organized and advertised. Canberra is rich in educational and research resources and a broad sample of scientific people turned up on the 6-7 February, 1987.

A Search Conference is a carefully designed method for participative planning (discussed in more detail below) and this one followed a fairly classical pattern (Emery M. 1982). It began with a briefing on the method, a history of the project, personal introductions and expectations. Utilizing direct perception and validating personal experience, the conference compiled a database of significant changes taking place in our shared 'extended social field'. Over 160 recent changes were quickly recorded in all areas of our lives. Small groups then synthesized this data into desirable and probable futures at the global level and reported. Through ensuing discussion and negotiation, the following statements were agreed to be those of the conference as a whole, (The one significant conflict is discussed below.)

A DESIRABLE FUTURE

(i) Women can define independent positive identities and express them

Women are visible everywhere doing a wide range of jobs including those involving strength, intellectual ability and nurturing. Mothers would be honoured, have excellent resources and there would be freedom (not licence) to explore and seek pleasure in all ways. Children would be valued as people, not being moulded into stereotypes.

(ii) Greater identification with the natural world

Small groups of people have land to be self-sufficient; as *caretakers*, not owners. Spaces in cities and backyards grow food on recycling principles, replacing large monocultures. Large tracts of wilderness are protected (no rights to mine) and Aboriginal land rights are extended with whites learning from Aborigines how to live with the land. Australia is 'greened' with protection for and vast replanting of trees. High-rise accommodation is replaced and everyone has access to open space.

(iii) Knowledge and learning is holistic and interactive, not based on desire for control and destruction

More choices are available in healthcare, homebirthing etc. and all people have access to education facilities throughout life, eg. libraries, universities, trade workshops. Networking and community based learning

centres replace institutionalized education with their goals developed within the community.

(iv) More equal distribution of wealth and resources among people with an awareness of the need to limit exploitation of resources

Production relates to community need rather than monopoly profits and large-scale production exists only where this is the most economic or practical use of resources. The unit of production is the small self-managing group. We have alternative power (solar, wind etc. no nuclear) and new biodegradable packaging. Waste is out! Mining, forestry and all natural resource use is planned and controlled nationally on the basis of community need. New technology is also subject to community decision and control. There is a question about the future of farming.

(v) People are able to express their own spirituality

People are spiritually aware within small community-based rather than large institutionalised religions. Creativity expands.

(vi) Life within communities

Social structures consist of self-managing groups without hierarchies based on race, sex, occupation, sexuality or lifestyle. Participatory democracy operates without abdication of power or responsibility to representatives and there are no armies, police, courts or law system as we know them. Ideas for change proliferate.

(vii) Men accept their interdependence with others and with nature

They are learning not to obstruct women defining themselves as people and share equally the responsibilities and joys of being a parent.

(viii) *Communications* (this point was *not* unanimously agreed). There is more emphasis on face-to-face communication with sharing between and within communities with increased use of post, telephone and radio rather than centralised computer systems.

(i) *There is a collapse of economies* based on expansion because of the crises in the monetary system and capitalism.

(ii) *Increasing rich/poor polarisation* with privatisation of education and a public education crisis. Polarisation is both national and international.

(iii) *Increasing distance* between authorities and counter-culture with a growth of resistance, eg. 'greenies' and increasing media control over public opinion.

(iv) *Increasing degradation* of the natural environment with consequent illnesses (eg. cancer, respiratory diseases) pollution (lack of pure water, food, air) and depletion of natural resources (forests, fossil fuels).

(v) *Increasing degradation* of the social environment and violence between nations, governments and people with both repression and resultant self-abuse (addictions, suicide etc.) and social stress and mental illness.

(vi) *Growth* in the use of *computers* and technology application with resulting changes in work practices and perceptions of what is valid knowledge (eg. research that is represented by computers). Bureaucratic control and automation in production are increased and world views are changing.

Groups then worked towards a 'desirable science' and its contribution to narrowing the gap between desirable and probable futures.

(i) *Humble Science* which recognises its own limits, values and other forms of knowing. It is non-elitist (cf. Bleier, 1986, p 16).

(ii) *Which is in the hands of all people*. There is open debate of ethics, politics and awareness of social responsibility/accountability. The community is involved in control and funding.

(iii) *With a shift in emphasis towards human welfare and ecology*. All socially responsible enquiry is valid.

(iv) *Adopting an interdisciplinary approach* with a proliferation of specialisations but with increased collaboration between them.

(v) *With collaborative, cooperative methodology and non-hierarchical, non-sexist, power structures*. Divergent and holistic approaches are encouraged.

(vi) *Which communicate and educate* to demystify through honest, realistic reporting of interrelationships (dynamic) as well as facts (static) in order to realize full human potential and fun.

A DESIRABLE SCIENCE WILL CONTRIBUTE BY

(i) *Meeting Community Needs*—It will :

Develop smaller community-based (alternative) technology directed to community needs (not profits) and empower community networks : Use Nobel dollars more usefully, break the military connection or turn the University into a home for the homeless .

(ii) Democratizing

Scientific workplaces, breaking down dominance, the patronage system and degree structure. Use interdisciplinary work teams, empower individuals, support people within institutions who have these views and goals, network amongst women working in science and fund non-traditional areas such as women's centres. Decrease the elitism in schools by changing the balance of teaching to learning and thereby demystifying scientific knowledge and production. Value all levels of education, rewarding equally. Perhaps make community teaching part of the work of all research scientists.

(iii) For Oneness, Wholeness

Science must spring from the values of a desirable future for all, an ecological stance which expands spirituality and science as a way of life (not life in an institution). It must make possible a more holistic view of people, destroying the myth of rationality and objectivity. Science is intrinsically interesting and debate about it must widen to include educational, social issues and ethics.

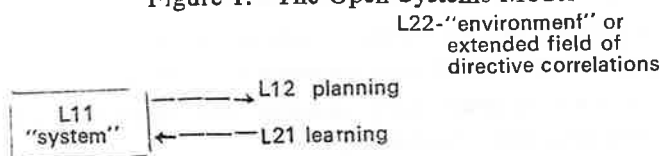
It had become obvious that implicit conflicts were running through the Search which needed to be rationalized. Common ground eventually emerged as : "Science is discursively and culturally produced and at any given time it is what is recognized as 'science'" (cf. Bleier, 1986, 2). It is not absolute and it does use intuition and revelation but at the moment, 'science' is not done by house-wives at home. The Search then embarked on its final stages which were plans for action. Of seventeen possible project to operationalize Femsci, three were selected for preliminary work. Plans for 'street theatre' at an upcoming science conference using music, dance and mythos to illustrate the return to 'learning by indirection', synchronizing participative learning (Hall, 1976 ; Havelock, 1963, 1978). Science shops address contributions (i) to (iii) while childhood science learning will hopefully and respectfully build upon children's world views and creativity. Work continues on these fronts and the Science Shop will be fully fledged by the beginning of 1988.

This Search Conference illustrates the other elements necessary for the development of a Femsci.

1. A New Paradigm : Open Systems Thinking (OST)

Feminism finds its reasoning at odds with the linear logic of Msci (Rose, 1986, p. 58) and is critical of Msci's fragmentation of reality which, of course, is much too diverse and complex to be analysed by scientists (Namenwirth, 1986, 31). The world's complex problems demand a methodology for thinking that transforms a singular view into an integrated, collective process of thought and action with continuous communication and adaptive change at all levels (Stulman, 1967, 25). Working with the 'behaviour of whole systems unpredicted by the separately observed behaviours of any of .. the parts' (Buckminster Fuller, 1970, 64) is now known as Open Systems Thinking (Emery F, 1981).

Figure 1. The Open Systems Model



The basic set of four relations between a system and its environment are lawful (L), governed by dynamics which are able to be known. Both system and environment are dynamic entities (L 11) and L 22) which transact through the function of perceiving and learning (L 21) and planning (L 12). Directively correlated (Sommerhoff, 1969) means mutually determined. At the simplest level, system and environment act together to produce a new outcome (Ackoff and Emery, 1972).

Open systems thinking is an *ecological* rather than disciplinary paradigm, opposed to linear causal thinking (Emery F, 1981, I, 10). It is a-disciplinary, concerned with *wholes* as is feminism (Namenwirth, 1986, 32). It addresses social concerns or problems which require collaboration between specializations, comprehensiveness, a future orientation and heuristic strategy (Emery & Trist, 1972, 91-92).

Because it concerns wholes, OST includes human values and ideals as they are as much basic data as are economics or material properties (Emery M, 1982, 139; Harding S, in Fee, 1986, 50). This is sufficient to cast it as heresy in the eyes of those who mind the ruling disciplinary 'objective consciousness myth' (Roszak, 1968).

2. The New (Old) Set of Ideals.

The ideals below are derived from the OST framework (Emery F, 1977) but are the essence of the historical "feminine" (Neumann, 1954, 1955) and, therefore, very old. Msci has adhered to a set of ideals and practices with relatively recent origins in early Greek culture. Ideals and epistemology are inextricably interrelated (Table 1 and see below).

Table 1. Ideals and Operational Modes for Msci and Femsci

MSCI		FEMSCI	
<i>Ideals</i>	<i>Operation</i>	<i>Ideals</i>	<i>Operation</i>
The Good	Literacy	Homonomy	Conversation
Truth	Teaching abstractions	Nurturance	Learning through
Plenty	Materialism	Humanity	perception
Order	Hierarchical	Beauty	Spirituality
	domination		Participative
	(patriarchal bureaucracy)		Democracy

(Adapted from Emery M, 1982, 194, with original sources)

Homonomy (Angyal, 1941)—interdependence with others. relating parts to each other and the whole for mutual benefit ; the opposite of selfishness.

Nurturance—cultivating those means which contribute to the growth of the whole and its parts ; the opposite of exploitation.

Humanity—putting the well-being (spiritual as well as physical) of people above the needs of institutions ; opposed to inhumanity.

Beauty—that which is aesthetically ordered and intrinsically attractive in all spheres ; the antithesis of ugliness.

In the ancient matriarchal cultures (Reed, 1954 ; Gould Davis, 1971 ; Herbert, 1975 ; Shaw, 1981) the supreme deity was The Great Goddess or *The Great Mother* (Neumann, 1955) ; the unity of Life and Earth. Her ideals derived from the functions of physical woman (Bachofen, 1967) such as gestation and lactation. The objectification and damaging of people and environment by a dehumanized Msci (Arditti, 1980, 364) and bureaucracies (Pietila, 1987) alienates many women as "world-loathing is woman loathing" (Lederer, 1968, 168). Nurturance, the ideal most visibly and traditionally associated with motherhood, is now a key to women's efforts to create a more sane future for all (Pietila, 1987). The peace and environmental movements are essentially concerned with preserving and nurturing the earth and all her creatures.

Within the complex Great Mother, feminine wisdom is personified by Sophia who is most active in times of change or spiritual transformation, providing cultural therapy (Neumann, 1955, xiii). Her wisdom "is no *abstract disinterested knowledge* but a wisdom of loving participation" and "desires whole men knowing life in all its breadth" (Neumann, 1955, 331). Learning to act wisely is the process of pursuing the feminine ideals through participation in the creation of reality (Emery M, 1986).

3. A New Epistemology : Naive Realism or Ecological learning

Science and our educational system are the consequences of an epistemology and the tragedy of their success was inherent in its basic premises (Schwartz, 1971, 10). These are a further product of the world hypothesis of mechanism (Pepper, 1966) which springs in part, at least, from Euclid's fifth proposition that parallel lines do not meet, thus guaranteeing a mechanical and stable universe (Emery F in Emery M, 1982, 18-19). Phenomena which could not be explained within a geometric, Euclidian and later 'Newtonian' universe came to be outside the realm of rational enquiry. In the same era, literacy was invented, transforming our appreciation of life through a shift from oral-aural and musical to visual; a rebalancing of the senses. While the origins of the relationship between a mechanical universe and literacy remain murky, there was a coincident reinforcement (Ong, 1967). A postulate which contradicted perceived reality opened the way for a form of knowledge which could not be learnt from experience. It led to an intellectual elite, the literate, who specialized in *abstract* knowledge. Ordinary experience was devalued as the abstractions could be conveyed only by reading and teaching. What is 'scientific' is incorporated into the academic culture of the ruling classes (Gorz, 1980, 268).

We are now a "rampantly visualist culture" (Ong, 1967, 10) as observation and literacy gained dominance in science. The universe became curiously silent (Ong, 1967, 63) but, of course, it is neither static nor silent. The implications of our failure to know holistic patterns were exposed as the *Silent Spring* (Carson, 1962). As only spoken language features vitality and change a predominantly literate culture becomes a victim of its own logic, its characteristic inertia. We all suffer from the "pathology of normalcy" (Fromm, 1963, 3) which is difficult to escape. Even idealistic radicals fall into closed system thinking (Goldsmith, 1981) and some academic feminists (eg. Ferguson, 1984) escape neither their discipline nor their national culture (Emery M, in press).

However, this epistemology may now be put to rest as an alternative exists which does not dismiss or trivialize experiential knowledge (Rose, 1986, p 70) but which emphasizes learning from direct perceptual experience through creative group work. Known as 'ecological learning' its concepts and practices are spreading rapidly. Once again the scientific basis of our beliefs has been shown to be less than 'scientific'. Not only have Bolyai and Lobachevski irrefutably established that a proof of Euclid's fifth postulate is

impossible (Pirsig, 1974, 260), Heider and Gibson have also shown that the environment is recognised as having an informational structure which is embodied in the invariances that exist in the relation between energy flows, despite fluctuations in the individual flows and regardless of whether they impinge on the sensors of an organism. The perceptual systems of living species have evolved so as to detect and extract this information from their environments despite a great deal of 'noise' at the sensory level (Emery F, 1981).

Every human is equipped at birth with a unified perceptual system uniquely adapted to directly extract meaning from the environment (Gibson, 1966; 1979; Starkey et al, 1983 ; Haith, 1980). We were never 'tabula rasas' or empty, mechanical people (Emery F, 1981). Theories of 'learning' based on these assumptions have had the disastrous consequence of dissociating us from our environment.

This applies equally to social affairs as human meaning and levels of conversation are as directly known and made conscious as is the physical environment (Bion, 1952; 1959 ; Emery M. 1982, 1986). The powers of spoken language are the preserve of the Muses (Sophia's sisters) whose role was to produce celebration and pleasure in the pursuit of knowledge, in the days before research became 'work'. Learning in oral cultures was to *know* reality not to 'see the truth' (Caudwell, 1937). Conversation is "phatic communion" (Malinowski in Farb, 1973, 24), verbal togetherness or social cement", preparation for concerted group action (de Laguna, 1927, xi) and the old cultures spent "an amazing amount of time simply talking" (Farb, 1977, 104).

Feminism is well aware of the need to change from command to conversation (Fee, 1986, p 47) changing the narrative field "by telling another version of a crucial myth" to reconstruct new meanings (Bleier, 1986, 14) but appears not to have grasped that 'the medium is the message' (McLuhan, 1964). Contrary to Bleier, I argue that changing from asymmetric to symmetric relations (commands to conversation) is not a different process from changing paradigm but a part of it. Neighbourhood learning centres are returning to the *mythos*—the oral culture term for the story which instructs (Havelock, 1978, 46) as the way to change practice, consciousness, and paradigm (Slattery, 1979, Gloster, 1981).

A change to valuing direct perception, conversation and symmetric relations will inevitably cause problems for some feminist scientists and academics who, having fought for their status in the system, will be as loath as their colleagues to change it. But "the task of our generation and the task of all education is metaphysical reconstruction...to understand the present world, the world in which we live and make our choices". "More education can help us only if it produces more wisdom" (Schumacher, 1973, 83 & 66). To reverse our flight into the sterile world of Msci there is an urgent need to practice ways in which new learning and transformation may take place with as little pain as possible.

4. New Methods

So if we are to put a Femsci into practice we must introduce it through methods which demonstrate the new learnings required. These must be in all senses 'rituals' of the holistic new way, generating the energy which accompanies excitement and joy (Emery M, 1986) in order to reverse the effects of Msci (Namenwirth, 1986, 25) and fuel continuing action. Rituals serve learning through participation in meaningful expressive action (Sennett, 1974, 266). These rituals must :

- (a) elicit visions of basic human spirituality and ideals
- (b) involve participatory democratic face-to-face modes such that
 - (i) conversation replaces the broadcast (lecture) and written language;
 - (ii) the impotence of oppression (Pietila, 1987) is replaced by a contribution
- (c) focus upon important practical tasks within the sphere of control of participants using experience of reality not abstraction
- (d) lead to celebration of responsibility, accomplishment and effort.

Groups engaging upon such new learning towards a Femsci should evolve into networks of wider involvement. Two well-tested methods (rituals) may serve its introduction. The design and management of the Search Conference (Emery M, 1982; Crombie, 1985) and Participative Design Workshops (Emery & Emery, 1974, Crombie, 1978; Williams, 1982) flow explicitly from OST, feminine ideals and ecological learning.

Search Conferences are designed on the basis of each of the elements of OST. The first phase (which desirably also contextualises a Participative Design (Workshop) specifically examines the environment (L22) of the existing or potential system and then elicits ideals through a shared desirable future. This phase is also explicitly governed by the ground-rule that 'all perceptions are valid'. Later phases explore the system itself (L11), its unique character, and the system-environment function of planning (L12). The method itself is a learningful one (L21) on many levels, not least because people have to talk and argue in leaderless groups to arrive at a collective plan.

Feminism recognizes power not as domination of others but as internal strength and shared control over direction, ensuring personal growth and political efficacy (Pateman, 1970; Pietila, 1987). Participative Design Workshops are specifically designed to fill this yawning gap between our ideals and the inability of our dominant hierarchies (bureaucracies) to support them, or meet the everyday needs of healthy people pursuing their purposes. They provide the concepts, practical tools and experiences that people need to participatively redesign their organizations as democracies. Even very large organizations can operate as *non-dominant* hierarchies (Emery F, 1976). Any group using a Search to plan its future should at some stage consider a Participative Design Workshop as ultimately it will have to face the question of 'how do we organize ourselves to achieve this?' Unless the intuition of the group is very strong, it will be revert to an election of decision makers, or in

other words, a bureaucratic structure justified by 'representative democracy' (Pietila, 1987, 46).

There are greater rewards for women than men in democratic structures where they can begin to realize their potential. Responsibility, multi-skilling and their effects on growth are often strongly transferred to the family, for example, where housemate and children discover that they are now living with a different person (Emero M, 1982, 105-6). Democratizing organizations shows that women do not need special education divorced from their normal life activities. Much of the learning which damages girls and women arises from the hidden curriculum, the structure of the school or university. Changing the ostensible curriculum leaves the dominant hierarchy untouched to continue to destroy confidence and motivation to learn in its students. Bureaucracies by their very nature reinforce the myth of the inferior female. Until the organizational infrastructure of our culture is democratized improvement in the status of women will represent a marginal gain.

These two flexible methods can link feminist critiques of Msci to an emergent powerful Femsci.

DISCUSSION

The Femsci fulfilled its basic aims of generating action plans and the energy to see them through. Creative work is contagious. All four human ideals were explicated as is usual and flowed through to final plans. Convergences often come as a surprise to participants. This is simply because their 'normal' environments do not provide the conditions for their emergence through 'learningful' communication (Asch, 1952; Emery M, 1982). Methods and the environments they create are therefore critical in transforming theory into practice.

Recognition of the need for a new paradigm, epistemology and democratic power structures are present throughout the Femsci literature without seeming awareness of their interrelations. Hopefully, this Search conveyed something of this through its experience but there will need to be explicit learning of both the concepts and managerial practices. Participative Design Workshops are more easily grasped as the structural concepts for changing from bureaucratic to democratic are self-contained. To introduce a comparable briefing at the beginning of a Search, however, would detract from one of its main purposes which is to provide an experience without the group assumption of dependency (Bion, 1952, 1959); that which dominates in teaching.

As a holistic oral ritual the ways in which decisions are reached during a Search Conference are always fascinating and this experience illustrated two important points. Firstly, most decisions were not 'taken' but appeared in the Aboriginal way (Emery M, 1982, 94 from many sources) albeit, more quickly. (Those which cannot be reached within the time constraints of a Search are best left as 'time and talking will tell'). Second, there was a conflict, distinct from the non-appearance of a decision, about the use of

nigh tech. This disturbed some participants with the intensity of its expression. We now have to face one of the most difficult consequences of the mechanical, literate world view; our cultural flight into dissociation (Emery F, 1977). This has totally reversed oral culture's appreciation of violence summed up by 'sticks and stones can break my bones, but names will never hurt me'. In these cultures verbal hostility was accepted as a function of interdependence and ritualized as a way of keeping the peace (Ong, 1967 ; Farb, 1977; Gardner & Heider, 1974). People in democratically structured organizations inevitably notice a shift from apathetic communications to deeply felt and intense ones. *Involvement creates meaning*. 'The family that yells together gets together' (?). Only further experience with non-dominant structures will overcome today's fears.

For the embryonic Femsci to become a force for change it must also consider carefully its long-term strategy. In a case such as this where heavy resistance can be expected, the appropriate strategy is that of 'the indirect approach' (Sun Tzu; Liddel-Hart, 1943, 1946). Based on Wei-ch'i, it works to diminish the ratio of resistance to innovation, putting effort into areas of heavy resistance. It is a jigsaw puzzle strategy requiring great adaptability, non-linear and discontinuous logic. Victory and defeat are relative phenomena over protracted periods (Boorman, 1971). It is a highly demanding strategy to Western eyes which expect to see quick results, but anything less cannot be expected to effect fundamental and enduring change.

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