underlying theory for systems thinking

ÇG -March 2006

Soft systems thinking (SST) was developed mainly owing to the work of Churchman, Ackoff and Checkland, although not following the same path, nor as a common and unified methodology. The purest soft approach is probably Checkland's "soft systems methodology-(SSM)". Checkland says that he developed SSM through practice, that is without recourse to any underlying theory. Although SSM has probably evolved through hundreds of real world applications, it was also inspired by previous work, such as that of Sir Geoffrey Vickers, a British civil servant who, in the several books he wrote argued that *"the goal-seeking paradigm, while adequate to explain the behaviour of rats in mazes, is totally inadequate to explain what goes on in the (*government*), in board rooms, in trade unions, on committees, and in our everyday life"* [1].

Other types of SST have similarly evolved through applications. Even though the various variants were developed separately and often without well defined theoretical underpinnings, it would probably be easier to understand SST in the context of a theoretical framework even if the frame may not directly relate to systems thinking. Such a framework is provided by ***critical philosophy*** originated by Immanuel Kant (1724-1804), and more definitively by ***critical theory***, initiated by a group of neo-Marxist thinkers known as ***the Frankfurt School*** that was finally developed to its present form by Jürgen Habermas, the surviving member of that school.[2] Habermas has had key influence on the development and the justification of SST and of soft OR. In these notes we try to sketch this critical framework.

Enlightenment, modernity and Kant

18th century Enlightenment and the rise of empirical sciences established the supremacy of reason as the only effective path to attain true knowledge. The Enlightenment was a European intellectual movement committed to reason and science, as the means for building a better world, clearing away myths and prejudices of the past. Putting into practice the idea that humanity's problems can be solved by the exercise of reason, has been called the ***project of***

[1] quoted in Peter Checkland (1981) "Systems thinking, systems practice" Wiley.

[2] "Das Institut für Sozialforschung" or "The Frankfurt Institute" as it is commonly known, was formed as part of Frankfurt University in 1923 by a number of academics who came to be known as "The Frankfurt School". The Institute exiled itself to NewYork when Hitler came to power in 1933, but returned to Germany in 1953. Their original agenda was to update and reconstruct Marxist analysis of western society using methods of historical materialism, dialectics and empirical analysis in general. Members of the group included Max Horkheimer (1895-1973), Theodor Adorno (1903-1969), Herbert Marcuse (1889-1979) and Walter Benjamin (1892-1940) among others. Jürgen Habermas (1929-) was Adorno's assistant; he retired from the Institute as director in 1993 to take up positions elsewhere.

modernism. This project would create the ***modern society*** by consolidating and building upon the achievements of the Enlightenment. Such a society would be ruled by reason and rationality; developing rational forms of social organisation; ensuring liberation from the irrationalities of myth, religion, superstition; and promising release from the arbitrary use of power and the "unpleasant" side of human nature.

kant

The idea of the Enlightenment was most completely explicated in the work of Immanuel Kant. Kant wrote three fundamental books; ***Critique of Pure Reason***, ***Critique of Practical Reason*** and ***Critique of Judgement*** respectively (i) on science, (ii) on ethics and (iii) on aesthetics; spelling out how human reason could be called on to deal with issues in these three areas that collectively cover all human practice. The success of science and the scientific method was assured without any doubt in the first area; indeed modernity is now, rightly or wrongly, identified with the advanced technological society that science has created since then. Enlightenment thinkers, including Kant, were confident that human reason would also prevail in the area of practice, ensuring an ethical life, and also in the area of aesthetics, ensuring the liberation of the individual from domination.

We start with science and try to explain Kant's contribution. Before Kant, the path to knowledge was assumed to follow either of two long standing traditions: ***rationalism*** or ***empiricism*** both of which dated back to ancient times. Briefly put, rationalism says that all knowledge is acquired using ***deductive inference***, or ***logic***. This type of knowledge is ***a priori***. Experience itself is not necessary, it can only awaken innate knowledge. Empiricism on the other hand, takes the opposite view saying that all knowledge is based on experience and is the product of ***inductive inference***. Both rationalism and empiricism run into difficulties since neither the contribution of logic nor of experience can be denied in knowing. Kant is credited with a resolution of this conflict.

According to rationalism, all ***cognitive propositions*** had to be ***analytic*** whereas according to empiricism they all had to be ***empirical***.[3] An analytic proposition is something like: "*all husbands are married*"; whereas an empirical proposition would be "*all swans are white*" or "*all husbands are faithful*". Analytic statements are of the form: "A is B" where B belongs to A; and hence they are a priori ***tautologies*** that cannot really add anything new to

[3] Cognition is defined in The New Oxford Dictionary as: *"mental action or process of acquiring knowledge and understanding through thought, experience, and the senses"*; therefore a cognitive proposition is one that conveys knowledge acquired in this way.

existing knowledge. Empirical propositions however, in which B does not necessarily belong to A, are said to have "empirical content" and can add to knowledge. But the difficulty with empirical propositions is that the inductive method cannot be concluded to a generalisation since the possibility of contrary evidence will never be ruled out. Discovering black swans in Australia for example, instantly killed the proposition about white swans no matter the proposition had withstood all tests before the arrival of Europeans at Australia. This difficulty was named the ***problem of induction*** by the British empiricist David Hume (1711-1776) who preceded and influenced Kant.The fact is, Hume's problem of induction has removed the possibility of proof in science for good.

Kant believed, with the empiricists, that to have knowledge meant to have knowledge with empirical content. His contribution to the debate was to reclassify cognitive propositions as either ***analytic*** or ***synthetic*****,** and at the same time as either ***a priori*** or ***a posteriori***.[4] All analytic propositions are necessarily a priori, that is they are all ***analytic a priori*****;** and therefore analytic a posteriori propositions are impossible. Also clearly, most synthetic propositions must be ***synthetic a posteriori***, meaning that they cannot be validated a priori to experience. According to Kant analytic a priori and synthetic a posteriori propositions were uninteresting standard cases but the last possible class of ***synthetic a priori*** propositions was essential for cognition. Synthetic a priori propositions consisted of ***categories*** with which to organise thought. The legitimacy of this class of propositions is the central theme of Kant's *Critique of Pure Reason*. A category in philosophy is the most fundamental division of some subject matter and for Kant these are concepts in terms of which the human mind has to view reality if it is to make sense of it. Kant's list of categories included such concepts as unity, plurality, existence, necessity, causation etc. with which Kant believes, we are born[5]. The list is less important than the idea that without these we cannot make sense of our experiences. According to Kant, concepts cannot arise from impressions: *"..impressions have to be formed in accordance with our innate intuitions of space and time in order to be experienced at all"*. It must be our faculty of perception itself which produces order out of the incoherent multiplicity of impressions. In short, objects of experience are constituted by us in the sense that reality appears to us through certain a priori categories embedded in the human mind.

[4] This classification has been disputed and modified by many, but is still fundamental.
[5] Kant thought arithmetic propositions such as 1+1=2 are synthetic a priori and therefore cannot be proved. Bertrand Russel (1872-1970), who was closer to positivism, tried to show that proof was possible; with A. Whitehead he wrote the three volume "Principia Mathematica" for that purpose but had to fail in the end.

russel campaigning for disarmament

An example of Kant's synthetic a priori propositions is: "*all effects have causes*". The validation of such a proposition using either deduction or induction is clearly not possible. This means that all empirical knowledge ***presupposes*** a priori judgements that cannot be validated either logically (ie. analytically) or empirically. How can such propositions be justified or validated then? As it came to be known, Kant's "transcendental question" was: "*What are the conditions of the possibility of objective experience or knowledge and what can reason achieve when all experience is removed?"* We can hardly go into the details of Kant's argument here; instead we pass on to how Habermas developed and expanded it into a new theory. Let us however reiterate: Kant is telling us that knowledge without synthetic a priori presuppositions will not be possible and that we have to remember that we are making those presuppositions. This is how we can live with the problem of induction. Failing to remember our synthetic a priori judgements on the other hand, will lead to an ***illusion of objectivity***.

the critical theory of Habermas

Kant's transcendental question is rephrased by Habermas as:

- *What are the conditions that constitute meaningful experience?* (This question is the ***a priori of experience***, it requires a ***constitution theory of experience*** that defines what experience is).
- *What are the conditions that justify validity claims of propositions?* (This question is the ***a priori of argumentation***, which requires a ***consensus theory of truth*** that defines the criteria of validation).

Habermas has developed a complex answer to these two questions which is directly relevant to systems thinking. The answer to the first question is provided in his ***theory of cognitive interests***, and the answer to the second question is provided in his ***theory of communicative action***. We start with the first one.

- **Habermas' theory of cognitive interests**

Habermas starts with the premise that human activity is guided by a search for knowledge. Accordingly, with regard to the a priori of experience, he proposes his theory of knowledge constitutive interests or ***cognitive interests***. It is a theory of contexts of experience and action, on which the meaning of experience and objectivity depends.[6] The cognitive interests proposed by Habermas are of three types, corresponding to three types of knowledge. In turn these three types of knowledge inform and guide the three types of human action. The three cognitive interests defined by Habermas are:

- technical interest
- practical interest
- emancipatory interest

habermas when he was young

Technical interest and practical interest are fundamental and they derive from sociocultural human life which is dependent on "work" and "interaction." M.C. Jackson[7] explains this as follows:

*"*Work *enables human beings to achieve goals and to bring about material well-being. Its success depends upon achieving technical mastery over the environment of action. The importance of work for the human species directs knowledge towards a technical interest in the prediction and control of natural and social systems.* Interaction *requires human beings to secure and expand the possibilities for intersubjective understanding among those involved in social systems. Disagreement between different individuals and groups can be just as much a threat to the reproduction of the sociocultural form of life as a failure to predict and control natural and social processes. The importance of interaction leads the human species to have a practical interest in the progress of mutual understanding. While work and interaction have, for Habermas, pre-eminent anthropological status, the analysis of power and the way it is exercised are equally important, he argues, if we are*

[6] Habermas, unlike Kant, does not provide any categories that are constitutive of our experiences within such contexts.
[7] Jackson, Michael C. (2000) Systems Approaches to Management, Kluwer Academic Publishers.

to understand past and present social arrangements. The exercise of power in the social process can prevent the open and free discussion necessary for the success of work and interaction. Human beings have, therefore, a third cognitive interest: an emancipatory interest in freeing themselves from constraints imposed by power relations and in learning, through a process of genuine participatory democracy, to control their own destinies. (…)

Corresponding to the three cognitive interests are three types of knowledge. The first type is instrumental knowledge, or as Habermas puts it, ***instrumental reason.*** It is produced by the empirical analytic sciences that enable technical control by making predictions about future events given initial conditions. The second type is ***practical reason***, which is interpretive knowledge that seeks meaning and understanding of the intersubjective relations between individuals and aims to maintain and improve mutual understanding among people. Finally the last is ***critical reason***, which is knowledge that recognises the limitations of the other two types and "*enables people to reflect on their situation and liberate themselves from domination by forces that they are involved in creating but that they cannot understand or control*."[8]

Linked to his theory of cognitive interests, Habermas makes a distinction between what he calls the ***system*** and the ***life-world*** [9] within which human life takes place. The "system" is the differentiated social structure, based on division of labour for example, that enhances the capacity for material production[10]. The life-world on the other hand, is the unproblematic and pre-scientific background convictions about life, culture, society and enabling human action, that we have built up and inherited from the past. Work, leisure and arts are all dimensions of the life-world. If the "system" is the domain of instrumental reason, the life-world is the domain of all reason; instrumental, practical and critical. Now, instrumental reason guides ***instrumental action*** oriented towards material production but it also guides ***strategic action*** which is oriented towards the development of ***steering capacities*** of capitalist society that constitute structures of power and money. The evolution of these capacities is what in fact creates the "system". It is Habermas' conviction that under advanced capitalism where the state undertakes the steering of the economy in order to prevent economic and financial crises, instrumental reason has come to dominate practical reason. The "systemic" media of money and power has displaced communicative socialisation in all dimensions of the life-world resulting in the colonisation of the life-world by the "system". This results, for example, in the commodification of work, leisure and arts. Problems of practice are misrepresented as problems of fact and then these

[8] ibid

[9] "lebensweldt" in German; a concept invented by Edmund Husserl (1859-1938).

[10] Be careful not to confuse the "system" Habermas refers to, with the general concept of "system" in systems thinking. Habermas' use of the term is restricted to "the system of production, finance and political power" that is imposed on society by late capitalism.

are handled by “experts” using the methods of science. The result is that practical problems about what ought to be done are defined as administrative problems, beyond the realm of public discussion, and tackled by experts from science. Politics is now defined as the task of ensuring that the social system runs smoothly. Habermas believes that the threshold beyond which the system of money and power generates pathologies in the life-world has been passed under advanced capitalism, and that capitalism and democracy are no longer compatible. Having said this, it is important to note that the pathologies of advanced capitalism do not spring from systemic differentiation of the society as such, but from the invasion of the domain of politics, justice and ethics by “expert cultures” which have lost contact with the understanding processes of society.

- **Habermas’ theory of communicative action**

With regard to the a priori of argumentation that constitutes the second part of Kant’s transcendental question, Habermas proposes a model for ***rational discourse***. This is his ***theory of communicative action***, which is highly complicated and cannot be summarised here. We can point out only that Habermas provides :

- a consensus theory of truth dealing with ***theoretical (ie. technical) discourse***, and
- a consensus theory of rightness dealing with ***practical discourse***.

This means briefly that disputed validity claims such as truth or rightness can only be settled discursively by some sort of consensus. Settling such claims effectively will be possible through ***communicative reason*** which reproduces, that is enables the preservation across space and time of the validity of the life-world. Habermas develops an intricate set of conditions under which this

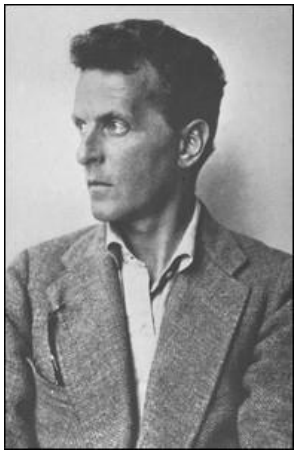
habermas now

can be possible. Briefly, while satisfying several semantic, syntactic or logical requirements, these conditions would also guarantee communication to be free from constraints of domination produced by strategic action or ideology or an unequal chance of expression. Even though these conditions may be hard to satisfy in practice, they would represent an idealised measure, “an ideal speech situation” as Habermas calls it, that can be used as a benchmark to reveal systematically

distorted communication in situations where uneqal chances to participate in discourse or unequal distribution of power create a false consensus.

critical theory and positivism

We could say that the traditional method of science can be described as ***positivism*** which as we know, accepts the Newtonian paradigm. The claims of positivism can be summarised as: (i) the only true knowledge is scientific knowledge; (ii) such knowledge is free of values and any normative committments; and (iii) the domain of values and norms falls outside of the demarcation line separating science from non-science.[11]



wittgenstein

Habermas developed his critical philosophy starting with a critique of positivism. He questioned whether scientific knowledge could be free of normative commitments on the part of the scientist and asserted that scientific theories could not be separated from the underlying technical interest. According to Habermas therefore, positivism fails to "reflect" on the technical interest and to differentiate it from the practical and emancipatory interest of humanity. Questions of practice concerning intersubjective social and cultural life for example, are declared by positivism to be out of the domain of rational discussion, when in fact practical concerns can never be separated from technical concerns. In short, positivism suffers deeply from objectivist illusions.

post modernism

Since the end of World War II new currents of thought have been challenging the ideal of the Enlightenment and the project of modernity. The umbrella term of ***postmodernism*** is used to define this diverse new thinking. Postmodernity is important and may influence systems thinking and OR much more in the future than it does today, so we provide an extensive quotation from Jackson[12] that puts it into perspective, even though we do not discuss postmodern systems thinking at this stage.

[11] Positivism was developed into its final form known as "logical positivism" by a group of scientist-philosophers known as the Vienna Circle, who met regularly at the University of Vienna from 1922 until Hitler came to power. They were influenced, among others, by Bertrand Russel and his pupil, Ludwig Wittgenstein (1889-1951). Although criticised and rejected by several thinkers since then, the positivist outlook still survives to a degree especially in the conduct of natural sciences.

[12] ibid

"Habermas (..) has his concerns about how instrumental reason came to dominate the Enlightenment project, but he remains committed to the aims of the Enlightenment. Critical theorists want to see the full potentialities of the Enlightenment realized rather than abandoned.[13] *There is, however, another group of theorists whose work we must now consider, who regard the whole Enlightenment rationale as flawed and want to abandon the entire project. These theorists are often labeled "**postmodernist**" in contrast to the "**modernists**" who are* (deeply affected by) *the ideals of the Enlightenment. **Postmodernism** is frequently linked to supposed changes in culture and in society more generally, as well as to a new theoretical position. Thus postmodernist culture is variously associated with postindustrial society, consumer society, media society, knowledge- and information-based society, the dominance of multinational companies, a post-Fordist decentralisation of enterprises, and a new stage in the development of late capitalism in which everything becomes a commodity. (..)*

Modernism (..) upholds reason and believes that rationality is the most important vehicle for helping human beings perfect themselves and their societies. The world is seen as logical and orderly so that it can be probed by science to produce objective truth. Language is "transparent" so that it is capable of conveying truth and acting as a suitable means for arriving at consensus. History is seen as having a meaning based upon human purpose or, if not that, upon the rationalization of social systems. (..) Modernism essentially believes in the order of things and searches for unity, identity and consensus. It offers security through rational explanations of what is happening, centering on the human subject or the increasing complexity of society.

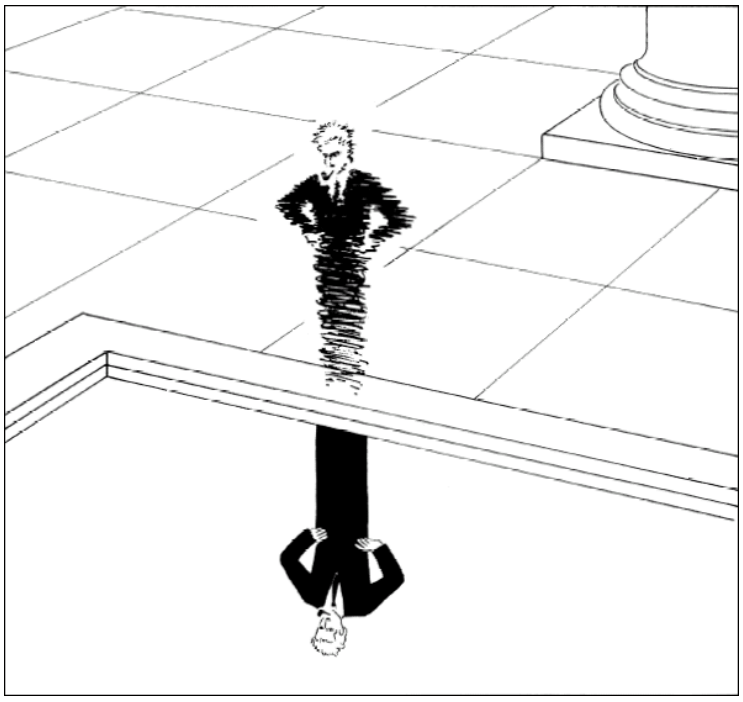
foucault

Postmodernism seeks to puncture the certainties of modernism, particularly the belief in rationality, truth and progress. It denies that science has access to objective truth, and rejects the notion of history as the progressive realization and emancipation of the human subject or as an increase in the complexity and steering capacity of societies. Language is not transparent, and it certainly does not offer the possibility of universal consensus. There are many different "language games", obeying different rules, in which speakers take part in order to defeat

[13] Habermas in this respect is more conservative and hopeful about modernity than his teachers such as Adorno, who were deeply pessimistic about its prospects.

opponents or for the sheer pleasure of playing. We have, therefore, to be tolerant of differences and of multiple interpretations of the world, and we must learn to live with the incommensurable since there is no meta-theory that can reconcile or decide between different positions. Postmodernism offers little security. Rather, it thrives on instability, disruption,disorder, contingency, paradox, and indeterminacy. "The image is more significant than reality"[14], and so postmodernism emphasizes superficiality and play instead of seriousness and depth."

Postmodern thinkers who have influenced systems thinking include Michel Foucault (1926-1984) and Jacques Derrida (1930-2004).[15]



derrida dies

relevance of critical theory to systems thinking

I shall make a few remarks here pointing out the correspondence between constructs of critical philosophy and systems thinking which must be already clear by now.

The first cognitive interest defined by Habermas is the technical interest, which produces instrumental knowledge, enabling instrumental and also strategic action. Instrumental action is directed towards production of material goods and is clearly visible in a problem situation. The ***functionalist systems approach*** is based on instrumental reason of this type; the words "functional" and "instrumental" clearly have similar connotations. Strategic action, which also results from technical interest, is directed on the other hand towards the preservation of power relations in favour of the present structure and may be masked or at least is less visible in problem situations[16]. The functionalist approach assumes this possibility away and therefore is in danger of

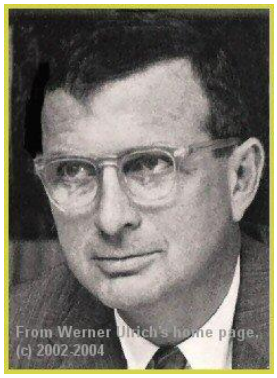
[14] The illustration above appeared in NewYork Times when Derrida died in 2004.
[15] Habermas remains unconvinced by postmoderist claims and believes that they are not a recipe for human emancipation. He has had extended debates with Foucault on these issues.
[16] Note that the word "strategic" is being used here in a context-specific, restricted sense.

misguidance, of turning the enquirer into an "expert" as Habermas says, even though it may still be useful if all stakeholders are unified behind a unitary purpose.[17]

The second cognitive interest is practical. "Practical" derives from "human practice" which incorporates production activities that create patterns of intersubjective relationships among individuals and groups. So in general, the application of instrumental reason will produce practical consequences impacting human practice in general and social life in particular. This is why "theory and practice cannot be separated", as we sometimes say. Put in other words, problems of practice are in the first place, problems of ethics. The ***interpretive systems approach*** is clearly based on practical reason and addresses situations in which a unitary purpose is not possible. It aims implicitly to reveal and prevent the detrimental effects of technical interest on the life-world.

The third cognitive interest is emancipatory. It is directly concerned with asymmetries of power and the steering mechanisms of the technical world, the "system" as called by Habermas, as well as the damages and distortions this creates in the life-world. The ***emancipatory systems approach*** seeks to address such problem situations.[18]

churchman in 1968



Finally we note that synthetic a priori propositions, Weltanscauungen, and boundary judgements -- resulting from setting the boundaries of systems relevant to enquiry -- are all based on the common notion of hidden presuppositions about reality. That these presuppositions need to be unearthed and revealed is the same as saying that we should not fall victim to environmental fallacies and objectivist illusions. SST in general and the interpretive and emancipatory systems approaches in particular, generally depend on the principles of communicative reason defined by Habermas in order to achieve this. Churchman in his 1970 article[19] for example, describes a dialectical procedure in which he tells us to counterpose all our presuppositions against their "deadly enemies", even though he was writing before Habermas had developed his ideas.

[17] We should note that instrumental knowledge in everyday language is more often called "theory" or "theoretical knowledge".
[18] It should be clear that these three perspectives on human life were each a subject of the three volumes of *Critique* Kant wrote.
[19] Churchman C.W. (1970) *OR as a profession*, Management Science Vol. 17, no:2

a postscript

Let us conclude with a few short quotations from Adorno. Adorno, teacher to Habermas, was for many the most endearing member of the Frankfurt School. He was deeply pessimistic about the future of modernity. The following quotations are from his book, "*Minima moralia*"[20] or "*reflections from damaged life*" written during World War II. The book, although very sad, is no doubt a masterpiece and is addressed to the general reader. The quotations also point to us where Habermas got his inspiration from.

> *"Because thought has by now been perverted into the solving of assigned problems, even what is not assigned is processed like a problem".*
>
> *"Dialectic thought is an attempt to break through the coercion of logic by its own means".*

> *"What has become alien to men is the human component of culture, its closest part, which upholds them against the world. They make common cause with the world against themselves, and the most alienated condition of all, the omnipresence of commodities, their own conversion into appendages of machinery, is for them a mirage of closeness".*
>
> *"When all actions are mathematically calculated, they also take on a stupid quality".*
>
> *"The task of art today is to bring chaos into order".*
>
> *"Art is magic delivered from the lie of being truth".*
>
> *"Once the last trace of emotion has been eradicated, nothing remains of thought but absolute tautology".*

[20] Available in Turkish, Metis Yayınları 1997