

Reductionism versus Holism – Contrasting Approaches?

In the afternoon of 7 May 1959, Dr. Charles Percy Snow entered the prestigious rostrum of the Senate House at the University of Cambridge to deliver the annual Rede lecture. His address on ‘The two Cultures and the Scientific Revolution’ unleashed – much to his own surprise – one of the fiercest discussions among natural scientists and humanists in the 20th century. What provoked the most was Snow’s contention that a gulf of misinterpretations existed between the two ruling knowledge-producing cultures of modern science – the literary intellectuals and the natural scientists. C.P. Snow – by training a scientist, by vocation a writer – held that the two cultures had a curious distorted image of each other based in profound mutual suspicion and incomprehension, and that their attitudes were so different that, even at the emotional level, they could not find much common ground. In his opinion, the literary intellectuals regarded the scientists as being unaware of Man’s condition, whereas the latter assumed the former to be totally lacking in foresight and “anxious to restrict both art and thought to the existential moment” (C.P. Snow, 1959, p. 5). These imageries made the feelings of the one culture, the anti-feeling of the other, and produced hostility rather than fellowship between them. What was worse: The prospects of this hostility-gap ever being bridged seemed bleak indeed, and history, in Snow’s mind, provided no source of inspiration or comfort. In the late 1920s, the two cultures managed a kind of frozen smile across the gulf. In 1959 the politeness had gone and they just made faces (C.P. Snow, 1959).

C.P. Snow regarded this situation to be all destructive – a sheer loss to the creativity of science. To close the gap between the two cultures was, in his mind, a necessity in the most abstract intellectual sense, as well as in the most practical. He was convinced that since the two senses had grown apart, no society was going to be able to think with wisdom.

Multiplicity of cultures

Snow’s intervention is still a matter of academic debate. Although there is a growing awareness in many research circles that there is a greater need than ever to address holistic processes and problems, researchers are still ‘making faces across the gulf’. One inescapable fact straining the topicality of the matter, is that the number of scientific cultures has multiplied since the time of Snow. The two main cultures have grown into four, as the social and technological sciences have taken on their own distinct cultures, deviating to a certain extent from those of the humanities and the natural sciences. More importantly, the four mother cultures have

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split into numerous specialized branches as disciplines and sub-disciplines have multiplied many times over in recent decades. These specialties form their own sub-cultures which may press against the overall culture of the discipline of which they form part, and may pose a threat to its unity. A modern discipline is thus composed of clusters of specialties that form individual micro-environments where most research and professional communications take place. Is this to say that reductionism has got out of hand and made holism a distant and even unrealistic dream?

Reductionism and holism

In reductionism, the reference is to the classical Newtonian assumption that the dynamics of any complex system can be understood from studying *the properties of its parts*. Complex systems are therefore broken down into their components and each piece is studied individually by way of disciplinary and sub-disciplinary approaches. The challenge is to find the entry points from where to address the particulars of the system. Once one knows the parts, the dynamics of the whole can be derived. In general, scientists have been so successful in applying this method that instead of reverting back to see how their discoveries fit in with totality, they have continued to dig deeper into their specialties, continuously narrowing the focus of their research.

The concept of holism has many connotations, applications and uses – even non-scientific ones. The reference in this article is to the *methodological version* in which the relationship between the parts and the whole is believed to be more symmetric than in reductionism. The assumption underpinning this approach is that the properties of the parts contribute to our understanding of the whole, but the properties can only be fully understood through the dynamics of the whole. The research focus in holism is on *the relationships between the components*, i.e. on their interconnectiveness, interdependencies and interactions. In holism, *the whole is more than or different from the sum of its parts*. Consequently, breaking complex systems down into their individual components by the method of reductionism is only a first approximation of the truth, and while it may afford many useful insights, it behoves scientists to put the pieces together again by way of holism. The call is for interdisciplinarity and for bringing the multiple specialties contained in disciplines together in what can be labelled *intra-disciplinarity*.

It stems from the differences in focus that there are no automatic or necessary contradictions between the two ‘isms’. The one focuses on the *properties of parts*, the other on the *relationship between them*. Put together, they stand out as supplementary rather than conflicting, as inclusive rather than exclusive.

This notwithstanding, interdisciplinarity has never taken firm root in the disciplinary organization of academia. The organizational scheme of universities is still based in disciplinary departments, leaving the holistic approach to university centres perceived by many to be *at* the universities *not of* them. This difference has made disciplinary work the highway to academic acclaim, whereas interdisciplinarity has been the back road to, at best, congregational praise.

Disciplinary, intradisciplinarity and interdisciplinarity

As stated by Julia Thompson Klein, to picture the relationship between disciplinary and interdisciplinarity as a double impasse, and as a fixed choice between one or the other, is to oversimplify the creative interplay that has produced changes in the nature of both (J.T. Klein 90, p. 103). This acknowledgement has given rise to the concept of *disciplined interdisciplinarity* that moves outward from mastery of disciplinary tools. Interdisciplinary work depends totally on highly specialized learning, not so much on universal knowledge. This is why disciplinary specialties have been labelled “the first principle of science (B.R. Clark, p. 342)”. Here disciplinary is the foundation on which synthesis is constructed. By moving across the vertical plane of depth and the horizontal plane of breadth, the latter connotes the comprehensive approach based in multiple variables and perspectives, whereas the former connotes competence in pertinent disciplinary, professional and interdisciplinary approaches. Thus, synthesis connotes creation of interdisciplinary outcome through a series of integrated actions (J.T.Klein, 96, p.212). In integrative processes, the two approaches are intertwined, and inseparable as the two sides of a coin. What then is the scope and extent of integration?

There are scientists convinced that the holistic approach will ultimately result in a grand theory of everything (Wilson, 99), and there are those launching compelling arguments against, stressing the viability of mid-range integrative theories (Wilbur, 00). Whatever the outcome of this disagreement in the future, both parties agree that holism offers an integral vision that provides “..considerably more wholeness than the slice-and-dice alternatives. We can be more whole or less whole, more fragmented or less fragmented; more alienated, or less alienated – (but) an integrated vision invites us to be a little more whole, a little less fragmented in our work (Wilber, p.xii).”

The mutual inclusiveness between reductionism and holism is not to deny that the two approaches have differences in agendas and that the disciplinary pull can be a serious barrier to fostering interdisciplinarity in practice. Among the many hurdles to be overcome are the multiplicities of sub-disciplinary terminologies that, in extreme cases, may seem impenetrable to specialists coming from the outside. This being said, the only prescription to succeed, is to get even with the ‘Tower of Babel’, theoretically, methodologically and conceptually. Indeed, this is time consuming. Therefore, confusion, frustration and incomprehension are frequent feelings among members of boundary-straddling teams, not least at the commencement of projects. The temptation is to revert back to the comfort and safe haven of one’s own domestic territory and leave foreign territories to those who are motivated to make sense of them.

Summing up

The important thing in our context is not to deal with the plentiful hurdles to be overcome in inter- and intradisciplinarity, but to demonstrate that there are no philosophical, ideological or practical contradictions between reductionism and holism in scientific synthesis. What is required to bridge Snow’s ‘gulf of misinterpretation’ is the *curiosity* to explore what is on the other side of the ‘fence’, the *courage* to jump over it, and the *willingness* to make deliberate and patient investments in terms of time and effort after

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touch down. This sequence of curiosity, courage and willingness will produce wholeness of some mid-range sort, if not in terms of a grand all-inclusive theory.

The richly varied thematic contributions to this book are interdisciplinary in three respects: First, because most of them are specialist products, representing the first and fundamental step in synthetic integration, i.e. in disciplinarity/sub-disciplinarity. Second, because they all have been the object of multi-specialist attention and discussion. Third, because some of them are in fact intra- and/or interdisciplinary in approach and expression.

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