

## Forms & Causes

### *What's the Difference?*

In identifying things in Reality, we first notice their **Forms!**

Forms are frequently recurring patterns, which appear in all phenomena, and seemed to be the crucial indicators of the nature of these happenings and their involved entities. All our earliest characterisations of things were unavoidably on the basis of their Form, and things with closely similar Forms would initially always be inevitably grouped together as “closely related”.

But, this didn't usually hold up, as many members of such “groups” later turned out to be hardly related at all: they merely had the same Form.

So Forms are not particular and fundamental, but universal: the same forms appear in many different, and certainly not causally-related, situations.

So, though common patterns **do** recur, and hence need explaining, they are quite different to the more **physical** causes: they can be common to many unrelated, and differently-caused things.

Now, in addressing why this is, and how Form is characterised by it, we have first to address the other, indeed the **primary**, consideration, which is what actually **physically causes** the identified phenomenon!

It is clear that quite different causes, in widely separated areas can display the very same Form, but that this is almost **never** because they all have exactly the same actual **cause**.

Yet, this being true, why are the Forms themselves so recurrent?

They must reflect similar patterns, weights and conjunctions of contributions. (Notice that the conjunctions themselves are not directly involved. It is the MIX that determines Form. Forms must be the natural shapes of recurring types of mixes, even if the physical causes of the involved contributions are unrelated. This feature of Form can make it extremely valuable in predicting what is likely to happen next.

But, we must also notice that to “follow the Form” in this way does NOT mean that we understand the producing causes, but only the **shape**, or pattern, of what follows.

Now, these questions are very important because, when asking those who address them what they think, a large fraction of them insist that the Form is primary, indeed they tend to consider each Form as a kind of immaterial Essence, the **makes** things the way that they are. Consequences are considered to be **driven** by Form!

Now, this is important because the physical causes can be missed in the worship of assumed Essential Form, and actual causes are not then directly sought for: they become unnecessary if the essential driving forces in Reality are just the Forms. Why do we need more?

Now, Mankind has developed a powerful set of techniques for dealing with Form, and perhaps the most significant stage in its progress has been their distillation into Formulae – into general equations which are abstract mathematical representations of measurables within given Forms.

Instead of mere Shape, Form was regularly extended to finally include **all** formal relations between the involved, measurable quantities, and with the invention of symbols to represent such things, the crucial results became algebraic equations.

Now these, perhaps surprisingly, have many properties of their own, and are investigatable by solely considering the Forms themselves, and not necessarily any part of involved physical causes. Thus they can be manipulated and “realised” to reveal various aspects of a given single Form – not least the ubiquitous **Graph**. So the study of Pure Form **alone** arose surprisingly quickly.

It was in fact the first area of detailed study by Mankind, and ultimately significant advances were made in this area.

The **equation** is a distillation of the relation between *whole sets* of measurable quantities: it is a general statement of a Form covering all parts of a defined range.

The simplest Forms relate just two of these, and deliver the decidedly powerful advantage of **Prediction**, wherever the equation is valid.

Once concentrated into an equation, this can be used to predict what the consequences will be for one variable “produced” by changes in the other. Particular values can be substituted into the equation, which can then be manipulated to directly produce the corresponding value of the other.

This is termed *solving* the equation!

This was the first real magic of Science.

**Prediction** was *the* confirmation that the “essence” of a particular phenomenon had been cracked. For from that equation reliable predictions could be extracted. But what had been understood was the Shape or Form of the given phenomenon, and NOT yet the reasons why that Form appeared in this particular case: none of the *causes* had not yet been even been touched upon.

And the very **universality** of these formulae – that a single one could be correct in many different situations, undermined their believed “essential” contribution.

Other thinkers, and indeed experimenters, were coming up with what they called **explanations**, and these could involve NO equations at all, and yet seemed to offer reasons **why** phenomena acted as they did.

This alternative means of study involved identifying the **Parts** involved, and establishing their various properties. Their type of explanation was then constructed in terms of the interacting properties of the various component Parts. It was often possible to explain the features of the phenomenon entirely in terms of these interacting Parts. They were then termed the *causes* of the phenomenon!

The conceptions involved in this alternative approach soon meshed with the recognition of Forms, and the derivation of equations, and these not only produced a powerful amalgam of the two, but they also allowed thinkers to *carry over* explanations of one phenomenon to give guidance on the explanations of other phenomena with identical equations (i.e. the exact same forms).

They would not have the *same causes*, but they would be *analogous* cases, and mapping from one to another could throw light on the new occurrence of the Form in a different area.

But, the amalgam of Equation and Explanation was never a perfect fit however, but that was to be expected. Each of these was in fact a different **abstraction** from Reality.

One abstracted a universal Shape, while the other abstracted a particular kind of Cause.

They were not very easily extracted from Reality, and it wasn't until Mankind was in a position to extensively Control situations that the tasks became much easier, and these twin approaches could BOTH deliver the required results, and allow a great increase in the pace of tackling an ever wider range of phenomena.

And this change also had other significant consequences.

A philosophy of **Plurality** took a very firm hold.

Everything was considered to be composed of extractable Parts, and each of these, in turn, was itself clearly built out of lesser Parts. Such a process seemed to go on forever, but philosophers such as Democritus had seen the difficulties involved in such infinite regression and had suggested a termination to this descent, at what he considered were the most basic immutable entities. He called these Atoms, and proposed that everything was constructed out of these fundamental units. They were the minimal units of everything!

A general picture was thus emerging – Atoms with properties could come together to produce higher forms, each with their own consequent properties produced by those of their constituent atoms. The process could be

repeated many, many times with different proportions of a selection of possible component Parts to deliver quite different Wholes.

The “scientists” could deliver measurements to the “mathematicians”, who in turn would *match* them to appropriate formulae for predictive purposes. Thereafter, the “scientists” would go on to consider exactly why the phenomenon was actually produced by its component Parts and their known properties.

At this early stage the “scientist” and the “mathematician” were probably the **same person**, but it did not remain that way. Implicit in the mathematical approach was an assumed **Primacy of Form**, whereas the scientific approach considered that it was the *material properties* of the Parts that were **Primary**.

One approach had abstract Essence as the driver of Reality, while the other had material properties as determining all phenomena.

The former were obviously **idealists**, while the latter were philosophically **materialists**.

But, of course, both depended on Plurality as their initial means of dividing Reality into analysable chunks, and this inevitably also led to an almost infinite regression from level to level, to finally identify the “first causes”, or fundamental entities and laws.

Beyond each causal explanation was another underlying one, and even many others all requiring further explanations.

## **Forms & Causes: *Paper II*** *What's the Difference?*

And for those relying exclusively on equations, the situation was even worse!

Each equation was an eternal and universal Form that was increasingly seen as some sort of absolute Essence. Considering hierarchies was all well and good, but, at each and every level, similarly eternal and essential formal relations were unearthed.

Now, this was an approach with complete **universality**, and yet NO *continuity*.

The fact that eternal Forms popped out at every level in a connected sequence, did NOT explain anything, except confirmation of the belief that Form was essence and would naturally appear everywhere. Indeed, it was very early on clear that in most of the derived laws (with their essential equations), the possibility of a derivation of that law from the underlying situation was clearly impossible by **direct** means.

Most actually involved rich complexes of separate contributions, that were too many, and too various to individually sum to result in the given overall law. Yet, and this is very important, the overall result did conform to a Law (usually with a statistical ground). Indeed, a quick and effective short-cut involved the method of assuming most of the contributions were contending, and therefore would either cancel out, or result in some qualities ending up being the same in all directions.

The transition from Contributions to Effect was thus only conceptual, and it was at this point that a second member of a contributing duo came into play!

That considered at quantities which were meaningless at the level of individual contributions, but eminently measurable for the situation *as a Whole*. Thus, particular versions of Temperature, Pressure and the like were taken as parameters at the **combined level**, and turned into relations along with other measurables.

Now, in the alternative approach of tracing “qualitatively” the causes at one level, for the phenomena at the next level up, the implication was that the very properties used to explain a given phenomenon were themselves caused by properties of the Parts involved in their production.

Here, indeed, was a **continuity**, but, it was NOT *quantitative*.

This line of investigation did not produce a single equation, or even *use* equations to generate new situations. It dealt exclusively in properties, or *qualities* as they should be called. This seemingly continuous sequence of connected explanations was the bedrock of both approaches, and was termed **Reductionism**.

Now, scientists and mathematicians often surmised that they “almost had it cracked”, and that the full completion of their endeavours was just round the corner.

But, almost immediately, their dreams were shattered, as their “certain” edifices (in both areas) proved to be built on sand.

After Hilbert’s statement that just a handful of things was still needed to complete his area of mathematics, a string of powerfully reasoned ideas torpedoed his position. Russell & Whitehead, early on in the century, had been forced to admit failure in their attempt to generate the whole of Mathematics from the Logic of Sets alone. They failed, and they admitted it!

Later Gödel delivered the next nail in the coffin, and, perhaps most importantly, by the 1930s Turing had also supplied what was the final debunking of Hilbert’s position. His **few outstanding items** were *all* proved to be, not only NOT delivered, but also impossible – they were incorrect!

It was clear that Mathematics could **neither** be *Complete*, *Consistent* nor *Calculable*!

It was merely a series of Forms and techniques!  
It was NOT the Essence of Reality – far from it!

But, that didn’t help the scientists either.

In the early years of the 20<sup>th</sup> century, a series of discoveries and explanatory theories totally undermined the assumptions of Reductionism too.

Particularly in the sub-atomic realm the results from experiments, no matter how carefully they were set up, and powerfully they controlled the conditions, the extractions still proved to be contradictory: no single explanation seemed possible.

An eclectic and pragmatic regime of “horses for courses” was built up with many theories that could NOT be reconciled, but which worked – *each in its own area*.

The contradictions were indeed profound!

Some entities sometimes behaved as Particles, while at others seemed to display the properties of Waves. And some experiments could not be explained by either conception, but if *waves of probability* were used instead, correct predictions (over time) were quite possible.

In this area the whole ground of explanation was totally undermined, and the consensus moved to mere pragmatic and eclectic use of equations *alone*.

Statements such as, “*Causality is a myth!*”, and “*The only truth is the given equation in the given circumstances*”, became the basis for Science in these areas.

While all this was happening in the so-called Hard Sciences, a positive revolution had occurred in the Soft Sciences.

From Geology and into Biology concepts of immutables were so evidently nonsense that the idea of Evolution was established, and took over as the most significant ground for these increasingly important Sciences.

Qualitative Change could no longer be avoided: It was indeed endemic! And though there were periods of quiescence and relative stability, it was equally certain that they always seemed to be terminated by world wide catastrophes of colossal significance, which reached their peak in tumultuous revolutionary events, and came to be called Emergences. These Events were regularly transforming Reality throughout its history.

**The essential changes were not the pin-head steps, but the innovatory leaps!**

Now this paper, perhaps rather long-windedly, has had the purpose of clarifying what **Forms** and **Causes** really are, and debunking the current assumed positions, which have clearly redirected Science into a series of classic cul de sacs.

The problems that have caused this impasse were real enough, but the solutions decided upon were a kind of lazy pragmatism, and did not even attempt to seek the causes for the situation.

The real task was surely to attend to the assumptions which had resulted in this crisis, and to redirect thinking to find answers to the confounding evidence that had been unearthed, particularly in sub-atomic Physics.

The task turned out to be not only gigantic, but basically philosophical. Our methods and assumptions which had served us well in the past, were clearly increasingly inadequate to the new problems that were now on the agenda, and could be shelved no longer.. What emerged from this investigation was a radical criticism of our basic and grounding ideas.

Plurality and the confusion of Forms and Causes were behind the increasing number of contradictions and dead ends that were regularly being encountered. And even our growing number of pragmatic frigs and “numerical methods” only augmented the difficulties, for they delayed the necessary redirection with short-term, one-off pragmatic solutions.

And a thorough-going study of all these assumptions and methods began to reveal that they were only appropriate within very simplified and rigorously controlled situations. Everyone was well aware of these methods but believed that they *revealed* the actual components of Reality as is. They didn't!

It was clearly true that as long as the required control that was used in the extraction of relations, was also carried over into the *use* of the acquired results, all was well.

But Science was more and more pressed into addressing situations that could NOT be so constrained. It had to confront questions in unfettered, completely holistic situations in Reality, which proved to be impossible to tackle by the old totally pluralist methods.

The long-followed choices wherein the more difficult areas were left for someone else to tackle, and the readily controlled areas concentrated upon instead, was no longer possible, The revolutions of the 19<sup>th</sup> century in Philosophy, Geology and Biology had forced scientists to adopt a very different approach, where Qualitative Change **had** to be dealt with, and in addition, had to cope with wholly new kinds of laws, as epitomised by Darwin's Origin of Species in Biology, Orogenies (mountain building) in Geology, and even Social Revolutions in society. Thinkers were forced to consider major revolutionary overturns, such as that produced by the actual Origin of Life itself. A wholly new kind of Event was becoming harder and harder to ignore. These remarkable overturns were termed Emergences, and seemed to have occurred throughout the history of the Universe. They changed things because the old ideas of incremental changes “adding up” to more far reaching changes was turning out to be far from the truth when the significant, world-changing revolutions had to be addressed. These took place in (geologically) short interludes, which involved a great deal of destruction as well as a phoenix-like rising from the ashes into wholly new possibilities.

To get anywhere with these significant Events, scientists had to **concentrate** on the inner trajectories of Qualitative Change in all developing systems. They had to switch attention from the pedestrian changes that had been their only area of study, to confront the real overturns that were the nature of episodic Emergences.

It will be a very new Science.

The assumption of Plurality will be seen NOT as the nature of Reality, but as only a useful pragmatic technique, and the promotion of the consequences of that methodology into an inherently flawed philosophical standpoint, would have to be rejected, and replaced by a holistic alternative.

Perhaps the most shocking aspect of the consequences of such a change is that our universally agreed methodology in scientific experiments would have to be totally changed, and all our simplifications and rigorous controls seen for what they are, and NOT as revealers of Essence.

What confronts us is the greatest revolution in Science since its break from religion, and it will not be an easy task.

Nonetheless, it is now imperative!

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