Economic growth and progress: A paradigmatic conflation

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Abstract

This article uses a paradigmatic lens to conceptually explore the global sustainability crisis. To anchor what would otherwise be an abstract thought experiment, the discussion focuses on GDP, economic growth and progress measurement. By reviewing the extensive debate around GDP through a paradigmatic lens, the article explores why the prevailing growth-centric paradigm is "in crisis". More importantly, it suggests that the crisis is unlikely be resolved by human agency, unless the requisite convincing forces for a paradigm shift are present. Or, failing this, that aggravating sociological and/or ecological conditions over time could impel the shift to some new, hitherto-unimagined paradigm.

1. Introduction

"Sustainable development" is entrenched as the overarching goal of modern society, at least according to the discourse in recent decades among the major supranational entities responsible for global decision-making. From a sustainable development perspective, it is acknowledged that the sort of "progress" mankind should be aiming for in the 21st century is multifaceted and complex ... *as* multifaceted and complex as the profound challenges that must be overcome.

According to this discourse, "economic growth" is a *component* of progress, not synonymous with it. In reality, though, the conflation[1] between the two concepts is pervasive, and there is no better demonstration of this conflation than the continued predominance and widespread use of gross domestic product (GDP)[2] as an indicator of how well or how poorly society is doing.

GDP has been the subject of academic scrutiny for as long as it has existed, largely owing to the temptation to conflate GDP growth with success, and GDP shrinkage with failure. From the start, one of the architects of the GDP methodology, Nobel Laureate Simon Kuznets, cautioned against stretching the interpretation of GDP beyond production factors. Since then, many successive experts – among them Nobel Laureates Joseph Stiglitz and Amartya Sen, and Nominee Herman Daly – have echoed Kuznets' warning: that GDP was not intended to be an all-encompassing progress measure and that its methodology is not suitable for this purpose. These arguments have proliferated at the highest levels of society today, with the United Nations (UN), Organisation for Economic Cooperation and Development (OECD) and World Economic Forum (WEF) largely agreeing that the concept of progress is far more ambiguous and epistemologically complex than that which the linear logic of GDP is designed to capture. Some academics and experts argue vehemently for the dismantling of GDP, suggesting that its interpretation as an indicator of progress is an institutionalised "mirage" (Stiglitz, Sen & Fitoussi, 2009:9) and a "structural information failure" (Van den Bergh, 2009:124).

Yet, GDP remains the most widely used economic statistic in the world, featuring regularly in almost every discussion forum there is: multilateral negotiations, national politics, business, news media, online networks and, indeed, the dinner table. Any mention of GDP invariably carries the same semiotic understanding: the bigger, the better. International laws, national policies, institutional investments and individual life choices are impacted positively or negatively by news of changes in GDP. An overall increase is read as an indication that progress has been made at the societal level, and an increase per capita implies that the standard of living has progressed at individual level.

To explore this apparent paradox at the conceptual level, this article draws from the physical sciences, in the form of Thomas Kuhn's *The Structure of Scientific Revolutions* (1962) and, specifically, the description therein of paradigm shifts. In writing about the progress of scientific knowledge, Kuhn developed a lens for understanding how and why major changes in thinking take place – and why sometimes they do not. He suggested that no empirical practice exists in isolation from the inherited set of beliefs and values of the prevailing paradigm and, by extension, that a change in empirical practice is inextricable from a change in beliefs and values (Kuhn, 1962). If we accept that the prevailing paradigm elevates economic growth in all facets of life – from policy-making to individual consumption choices – it is not difficult to see why such a society treats the empirical measurement of GDP as its sole health barometer. However, this practice is being challenged by the growing consciousness of sustainable environmental and human development imperatives. These imperatives – blind-spots in the GDP calculation – have risen to the fore of global planning for the future (the most obvious example of which is the UN's Sustainable Development Goals). Humanity may respond with a paradigmatic shift away from economic growth-centricity toward a more holistic definition of progress, or it may not.

Thus, the aim of this article is not to offer yet another interrogation of the methodological robustness of GDP as a progress measure, though this will be outlined briefly to establish

context. Rather, the shortcomings of GDP are treated largely as given, and a more abstract question is asked, specifically of the advocates for change: Why has the widespread critique of one-dimensional (economic) progress measurement failed to inaugurate a new paradigm in which economic growth is *not* automatically equated with rightness?

The article will proceed according to the following structure: As background, Section 2 outlines the historical origins of GDP, before touching on some of the perverse outcomes of using GDP as a catch-all for societal progress. The section concludes with a brief snapshot of the alternative measures that have been proposed over time, and why they have been largely unsuccessful in challenging GDP primacy. Section 3 introduces the main features of Kuhn's ideas of scientific paradigm shifts and situates these within the context of societal change. As a broad framework for the discussion, the three fundamental conditions required for a shift to occur, as described by Kuhn, will be explored. Shortcomings in each of these conditions, which will be described in detail, constitute a possible explanation for the paradoxical pre-eminence of GDP in the face of so much opposition. Section 4 investigates the limitations of the discussion, which primarily relate to its necessarily high levels of abstraction. Section 5 attempts to pull the discussion back from the brink of a bleak and hopeless conclusion, by appealing especially to educators to understand that, in order for students to make paradigm-shifting decisions in future, the structure, content and ethics of their education today *cannot* be business-as-usual.

2. Relevant literature: perspectives on GDP

21. The origins of GDP

The historical path of GDP begins with the most significant event of the twentieth century: the Second World War. While work on methods for calculating national income had been undertaken by scholars since the 17th century (England, 1998; Lawn, 2003; Van den Bergh, 2009), the statistical framework of GDP was developed by leading economists before and during the war and became an indispensable tool to the Allied governments eager to account for the impact of military expenditure on their economies (Fogel, 2001; Marks, 2010). Maximising production of armaments and supplies was critically important to strategic planning and GDP captured precisely those factors in a single statistic. Similarly, production growth, as reflected in GDP in the post-war recovery period, was a clear indicator that nations were rebuilding, thereby improving the material welfare of society (Marks, 2010). The purpose of the GDP measure was therefore narrow but legitimate, borne out of a specific and urgent need for a reliable measurement of production (Philipsen, 2015). In 1953, the UN institutionalised GDP in the System of National Accounts to promote international comparability among national accounting systems (United Nations, 1953). A number of writers argue that this legislated foregrounding of a production-based measure of progress effectively shut the door on potential alternative indicators (Philipsen, 2015; Van den Bergh, 2009; Hartwig, 2005).

2.2 Criticisms of GDP as a progress measure

GDP as an economic measure is not of interest here. Indeed, were GDP figures interpreted *en masse* as the summative production statistics they were designed to be – nothing more, nothing less – there would be little cause for controversy. But that is not the case. GDP plays a prominent role as a catch-all measure for society's collective well-being, which has several perverse outcomes that a number of writers have described in detail (for example Stiglitz *et al.* 2009; Talberth, Cobb & Slattery, 2007; Stiglitz & Fitoussi, 2011; Kubiszewski, Costanza, Franco, Lawn, Talberth, Jackson & Aylmer, 2013; Fioramonti, 2010; Philipsen, 2015). The common threads among these views are GDP's failure to discriminate between welfare-enhancing and welfare-degrading expenditures, as well as its embedded blind-spots, namely, environmental and social "externalities", and "informal" economic activity. To paraphrase a few trenchant examples:

- Pollution is computed as a double benefit to the economy – for example, GDP is boosted by the production of toxic chemicals and again when they have to be cleaned up and remediated. Furthermore, GDP is increased by crime, a socially destructive behaviour, insofar as the related costs of repairing damaged property and security features are included (Talberth *et al.*, 2007).
- Activities that enhance welfare but do not involve a monetary transaction are left out, such as picking vegetables from one's garden, whereas buying them frozen from a store are included because money is exchanged (Kubiszweski *et al.*, 2013).
- Traffic jams result in increased fuel expenditure, which is a boost to GDP – yet traffic jams are a miserable daily experience for most working adults (Stiglitz *et al.*, 2009).
- The exponentially scalable capacity of digital technology in the modern age has a profoundly deflationary impact on the value of individual things and the majority of what is bartered among people today is non-monetary and intangible: knowledge, networks and ideas (Libert & Beck, 2016).

What these writers and many others are pointing to is the gap between what GDP actually indicates versus what it is perceived to indicate, and the subtle conflation of economic growth with progress that underpins this gap. Probably the most high-profile study of this kind to date is the 2009 report by Stiglitz, Sen and Fitoussi, *Mismeasuring our Lives: Why GDP Doesn't Add Up* for the Commission on the Measurement of Economic Performance and Social Progress (CMEPSP). Describing the common use of GDP, they write, "Those attempting to guide the economy and our societies are like pilots trying to steer a course without a reliable compass" (Stiglitz *et al.*, 2009:9). Indeed, Stiglitz *et al.* (2009) identify political leaders and policy-makers as their targeted readership, as these groups generally attach extreme significance to GDP in their decision-making. They make the example of certain autocratic regimes whose leaders, when observing the slower GDP growth of developed, democratic nations, are emboldened to suggest that political freedom impedes growth and should therefore be postponed (Stiglitz *et al.*, 2009). The writers suggest that the global financial crisis, which started with the implosion of the ostensibly robust economy of the United States, is incontrovertible proof that GDP information is not just misleading, but far-reaching (Stiglitz *et al.*, 2009).

It is worth probing further into the notion that GDP is far-reaching, largely because this discussion will soon turn to a macro-level, paradigmatic view of these dynamics. Consider the convoluted path that GDP information makes through society, which environmental economist Van den Bergh describes as a "structural information failure" (2009:124). Firstly, economic growth statistics are reported on by statisticians on a periodic basis and diffused in the mainstream media. Positive real growth results tend to engender an optimistic response, which is most easily observed in upside trading patterns in financial markets and accelerated retail activity. The opposite scenario is equally true, and the ensuing instability and pro-cyclic effect create volatility – a hair-raising reality for the majority of working adults with retirement savings. Secondly, central banks formulate their interest policy on growth expectations in GDP terms, as do credit ratings agencies when determining sovereign solvency. Thirdly, politicians know that a negative GDP forecast may hurt them at the voting polls and therefore subordinate decisions that risk this outcome, even if the investment will have long-term pay-offs, including those relevant to climate change.[3] Van den Bergh (2009) emphasises this last point as being particularly relevant for future planning: by omitting the depreciation of natural capital associated with climate change, as well as the depletion of extractive resources through industrial activity, GDP falsely implies that we are richer than we really are, and that we will continue to be rich into the future (Van den Bergh, 2009).

A final point, which is conceptual in nature, is made by a number of writers (for example Alexander, 2015; Philipsen, 2015; Jackson, 2009): because the fundamental logic of GDP is based on growth, it can only be an appropriate indicator in a boundary-less context, which is a characteristic the earth does not have. Since the publication of *Limits to Growth* in 1972 (Meadows *et al.*), experts in the earth sciences have been debating the nearness and nature of biophysical limits, but have generally agreed that these limits are absolute (Daly, 1992; Swilling & Annecke, 2012; Robinson, 2004; Alexander, 2015; Cabeza Gutés, 1996; Jackson, 2009). Thus growth, as an end in itself, is an inappropriate goal for life on this planet.

2.3 Some alternatives proposed

It is worthwhile to briefly touch on some of the challengers to GDP that various individuals and groups have come up with over the years. At the risk of grossly simplifying a highly complex and multifaceted historical period, it is fair to characterise the last few decades as having witnessed a gradually increasing awareness of a sustainability crisis. This awareness has magnified the scepticism that was already surrounding GDP and its exclusively economic parameters. The Brundtland Report in 1987 for the UN World Commission on Environment and Development projected the environmental debate onto the world stage, stating categorically that the issues of environmental degradation and human under-development were at crisis level (Robinson, 2004; Swilling & Annecke, 2012). Three years later, the UN introduced the Human Development Index (HDI). HDI is probably the national social wellness indicator most widely used, and is intended to complement, not replace, GDP, by centring human beings as the locus

of measurement, though it excludes environmental indicators or any computation of human happiness.

Ecological economists Daly and Cobb produced one of the first comprehensive attempts at a truly holistic indicator in 1989 in the form of the Index of Sustainable Economic Welfare (ISEW) and its later version, the Genuine Progress Indicator (GPI). Intended as a substitute for GDP, the ISEW/GPI begins with personal consumption expenditure at the top line and adjusts for a wide array of different factors, including income distribution, environmental reparation and crime (Daly & Cobb, 1989). It is not without its shortcomings, either: what is generally acknowledged is that ISEW under-accounts for non-market household labour (which the creators admit in a later edition) and misrepresents human capital because, as critics point out, education is excluded as is a measure of happiness (Daly & Cobb, 1994; England, 1998).

The Happy Planet Index (HPI), developed in 2006 by the New Economic Foundation, calculates an efficiency indicator of how societies use environmental resources to promote lives that are happy, healthy and long[4] (Marks, 2010). Only a decade old and lacking the institutional backing of an entity such as the UN, the value of the HPI is currently more of a thought experiment to demonstrate the skewness of national ranking based on national income; indeed, it finds that Costa Rica (75th in GDP terms) is the most efficient country at creating happy adults with minimal environmental damage and the United States (first in GDP terms) is 114th in HPI terms (Marks, 2010; Statistics Times Online, 2016).

While there are a number of other indices that have been proposed by various bodies over time, the contentions surrounding the HDI, ISEW/GPI and HPI capture the major challenges that arise in trying to develop a truly holistic measurement, simply because the concept of progress is profoundly complex. For every new index proposed, dozens of methodological oppositions arise in response. Specific difficulties aside, there is the overarching challenge of widespread acceptance and diffusion, without which the impact of a new measurement will remain limited. While the example of Bhutan and its Gross National Happiness (GNH) indicator has received much publicity, it remains an isolated case.

2.4 The persistent primacy of GDP

The calculation of a single statistic to capture a multifaceted reality is useful for decision-making. Human beings have been committing vast amounts of energy to measuring things since the early Enlightenment period. Clark, Crutzen and Schellnhuber (2005) and later Swilling and Annecke (2012) suggest that the so-called Copernican revolution of the 16th century introduced objective reasoning as a tool to unlock the immutable laws of the universe by communicating their reducibility in mathematical formulae. This curiosity-driven conviction in the empirical quantifiability of all observable phenomena led to some of the major scientific discoveries of the modern age. Indeed, a reductionist approach at the theoretical level is, arguably, necessary. The alternative would require trying to account for all the contingencies, uncertainties and informational incompleteness of

real life, rendering decision-making a virtually impossible task. To paraphrase Swilling and Annecke (2012), the allure of reductionism can be explained thus: by reducing a complex reality into a few basic elements which are judged to hold primary explanatory weight within the system, society is able to apply analytical logic to the present and, indeed, forecast the future. The (apparently) objective ordering of reality brings a degree of certainty and comfort.

Where does this leave the GDP discussion? Those writers who take a historical view posit that a conviction in empiricism in the early 20th century provided the ideological underpinnings for the institutionalisation of a national accounting system, with GDP as the essential figure (Fioramonti, 2010; Fleurbaey & Blanchet, 2013). Kuznets is credited as having transformed economics into an empirical science (Abramovitz, 1986; Fogel, 2001); and yet, it was he who said the following when delivering his framework of national accounts at the US Senate in Washington D.C. in 1934:

> The valuable capacity of the human mind to simplify a complex situation in a compact characterization becomes dangerous when not controlled in terms of definitely stated criteria. With quantitative measurements especially, the definiteness of the result suggests, often misleadingly, a precision and simplicity in the outlines of the object measured. Measurements of national income are subject to this type of illusion and resulting abuse, especially since they deal with matters that are the centre of conflict of opposing social groups where the effectiveness of an argument is often contingent upon oversimplification.

Kuznets is suggesting that, while the reducibility of a complex reality is useful, it can lead to an "illusion" of simplicity, which effectively blinds the decision-maker to factors that fall outside of the delineated measure. In the case of GDP, these would include the ecological, social and non-market indicators which can also be measured, though not necessarily in monetary terms. Reductionism in quantitative sciences has a conceptual sibling in behavioural psychology: bounded rationality. Van den Bergh (2009) suggests that, because human beings are limited in their ability to comfortably entertain a large and diverse number of informational inputs at the same time, we are predisposed to focus on only one or two in the way we construct the world. This bounded selection process is informed by personal preference of what is convenient or quick or familiar or, ideally, all three. The GDP calculation and mainstream interpretation thereof fulfils these criteria, making it the obvious choice of progress measure (Van den Bergh, 2009).

This brief, and by no means exhaustive, look into the history and contextual use of GDP yields certain observations that can be summarised thus: though GDP was not intended to be an over-arching measure of progress and has been criticised as such for as long as it has existed, it continues to be used widely owing to its simplicity and embeddedness. Because alternatives have largely failed to beat GDP "at its own game" – namely, as a catch-all for progress – GDP continues to be the default. This impasse is far deeper than an ordinary debate among experts: until "progress" is understood to be multidimensional, a stalemate is likely to remain.

A statement, attributed to Albert Einstein (as quoted in Philipsen, 2015:1), is instructive at this point: "We cannot solve our problems with the same thinking we used when we created them." Thus, the remainder of this article will explore some of the complex dynamics surrounding GDP and economic growth through a paradigmatic lens.

3. A paradigmatic conflation

3.1 A summary of paradigm thinking

The following summary is not intended to be a definitive précis of Thomas Kuhn's work on paradigm shifts. Though he was writing about the history of science, Kuhn's ideas have been adapted and featured in a swathe of different disciplines, including economics, political science, sociology and theology (see for example Urry, 1973; Barnes, 1982; Kung & Tracy, 1989; Fuller, 1992; King, 2002; Longino, 2002). The word 'paradigm' is employed in the way that Kuhn did, at a fairly high level of abstraction, as an inherited set of preconceptions that informs how we perceive the world.

In *The Structure of Scientific Revolutions* (1962), physicist Thomas Kuhn challenged one of the fundamental tenets of the sciences: the conviction that successive discoveries are events in a cumulative process of uncovering the objective truths of the universe. Kuhn argued instead that what constitutes "normal science" – in other words, the generally accepted laws for explaining scientific phenomena – is constructed among its human proponents, and therefore subject to the fallibilities of social behaviour. Empirical evidence is not a sufficient "convincing force" to adopt new thinking; it is human agents – a "community of adherents" – who must accept the evidence and then drive its diffusion. Once this evidence has been accepted as normal science, and all the old rules have been discredited in favour of the new evidence, a paradigm shift has taken place.

Far from being connected steps in a cumulative process of uncovering an objective truth, the different paradigms are fundamentally incompatible or, to use Kuhn's term, incommensurable. Because of the radical or revolutionary nature of the change between paradigms, normal science is highly resilient in the face of novelties, which potentially question its fundamental elements. These novelties are suppressed as merely "anomalies" by demonstrating that they can be explained by normal science: this is how the discipline grows and expands through new discovery. When the number of anomalies has grown to the point that normal science cannot explain them, the existing paradigm is said to be in "crisis" and the revolution to an alternative can take place. *Can* – not necessarily *will.*

Without a sufficiently promising alternative supported by a community of adherents, the discipline will remain in crisis. In such a case, the convincing force of the paradigm shift may end up being time itself and the toll it takes on human beings. Kuhn, quoting German theoretical physicist and Nobel Laureate Max Planck, wrote in the 1970 edition of *Structure*:

> A new scientific truth does not triumph by convincing its opponents and making them see the light, but rather because its opponents eventually die, and a new generation grows up that is familiar with it. (p. 150)

To simplify these concepts further, it is helpful to break down the convincing forces that bring about a paradigm shift: logical evidence with the strength to discredit the existing paradigm, a community of adherents promoting an alternate paradigm and sufficient promise of the alternative itself. It must be pointed out, however, that this simplification is the authors' interpretation of *Structure* and does not reflect Kuhn's conceptualisation, which is far more nuanced and, ultimately, less accessible. The interpreted structure of a paradigm shift for use in this article is illustrated in Figure 1.

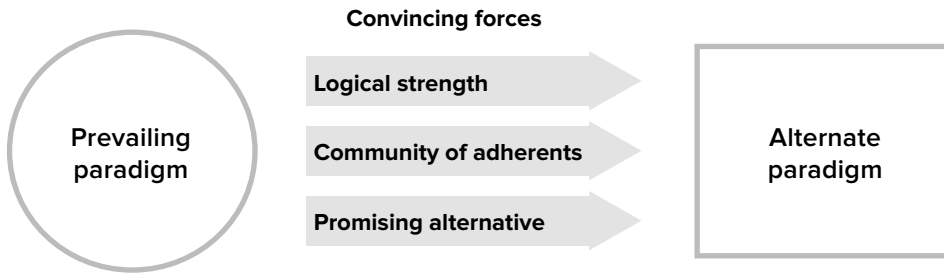

Figure 1: Interpreted structure of the convincing forces necessary for a paradigm shift

The circle and the square in the figure above are a deliberate metaphor of the incommensurability of different paradigms and a nod to the famous mathematical problem of "squaring the circle", so ancient that it was used by Aristophanes in an anecdote of a man who was trying to attempt the impossible, described as a "circle-squarer" (as told in Robinson, 2004). To put it plainly: a true paradigm shift is nothing short of a revolution. Kuhn, and subsequent iterators of paradigm thinking, stress the power of linguistic determinism in constructing and fortifying the normal science of the prevailing paradigm *against* revolution. Language prescribes how we "see" the world; indeed, proponents of different paradigms will look at the same phenomenon and "see" different things (Pajares, 2000; Gotkurk, 2011; Lock & Strong, 2010). As the framework suggests, all three convincing forces are required to bring about a paradigm shift (also referred to as a Gestalt switch).

Applying this framework to the discussion: the persistent primacy of GDP is akin to the power of normal science in harnessing hegemonic accepted truths to suppress novelty. In this case, the "novelty" is the proposed alternative progress measures and their ideological underpinnings, while the "accepted truth" is that growth, measured in GDP terms, is always good. The community of adherents of this view has largely been mainstream economics, politics, the media and, critically, the billions of consumers who conflate wealth and material accumulation with success. The growing counter voice has long been from academia and, more recently, from supranational entities. Depending on the discourse foregrounded, the descriptive term for the shift required could be "short-termism to long-termism" (Swilling, 2013; Klauer *et al.*, 2013); "anthropocentric to biocentric" (Robinson, 2004; Alexander, 2012); "overconsumption to sufficiency" (Swilling & Annecke, 2012; Alexander, 2012); "wealth to well-being" (Easterlin, 1974, 2016; Layard, 2005; Fioramonti, 2010); "Newtonian science to heuristic science" (Klauer *et al.*, 2013); or

"development to sustainability" (Robinson, 2004). If we agree with Kuhn's emphasis on the need for a promising alternative paradigm to discredit the prevailing paradigm, then it is clear that the multidimensional nature of the counter-views is an inherent stalling factor, particularly in the face of the monolithic growth paradigm. Indeed, to paraphrase Daly (1992), it is not enough to be a critic of the status quo – the critic must also be able to coherently and convincingly answer the question "What would you put in its place?"

Perhaps where society's fixation on growth is most similar to Kuhn's description of scientific paradigms is that it is virtually invisible. The strength of a paradigm is in its unacknowledged ubiquity (Kuhn, 1962). Because it provides the fundamental explanation for the world, it allows scientists to experiment with the details and make new discoveries within the bounds of its truth. Similarly, the assumption that growth is good and worth striving for is, to use Van den Bergh's (2009) analogy, like the water that a fish swims in without knowing of the existence of water. Part of the process of discrediting the prevailing paradigm is to make explicit its invisible assumptions in order to question them (Pajares, 2000). A number of writers, most notably Clark *et al.* (2005), suggest that this is currently happening and, furthermore, that a second Copernican revolution has already taken place. Citing the fact that the fallibility of empirical science and humanity's dependence on the earth have been acknowledged, this view holds that the long-term growth-focused cycle has come to an end (Swilling & Annecke, 2012; Fioramonti, 2010; Alexander, 2015; Clark *et al.*, 2005). However, when using paradigm thinking as the tool of analysis, this seems unlikely: while the recent discourse around growth and GDP at the highest levels of society is consistent with a paradigm in crisis, revolution is not yet in the picture.

The remaining paragraphs in this section will attempt to demonstrate that shortcomings in all three convincing forces have contributed to the resilience of GDP and the prevailing growth paradigm in which it retains primacy. Furthermore, it will be argued that the logic of sustainable development – informing the decoupling, ecosystem services and Green Economy efforts – remains rooted in a growth worldview. Indeed, very few contributors offer truly revolutionary ideas that constitute an alternate paradigm, and fewer still venture to describe what this could actually look like. For as long as this is the case, it is likely that time will ultimately be the convincing force, and, to paraphrase Planck (quoted in Kuhn, 1970:150), it will be for a new generation to enact a society whose definition of progress is predicated on something other than economic growth.

3.2 Logical strength

Kuhn uses the example of chemists in the 18th century who were convinced that homogenous solutions were chemical compounds and, by extension, that chemical reactions did not occur in fixed proportions. However, John Dalton's work on atomic combinations, which take place in simple, whole-number ratios, rendered the previous theory in compounds invalid. The undeniable evidence brought about a paradigm shift (Kuhn, 1962).

Thus, the normal science of the prevailing paradigm comes under threat when successive discoveries discredit its fundamental truths (Pajares, 2000; Gotkurk, 2011; Agamben, 2002). In the case of economics, a number of theories have been posited to describe the normative trajectory of a growth model. To summarise the diverse but epistemologically similar theories (including Adam Smith's stationary-state economy and Simon Kuznets' growth curve and its environmental impacts version), the intrinsic forces of supply and demand will ultimately result in a state of market equilibrium where resources are maintained at sufficient levels for their long-term use by human beings (as described by Van den Bergh, 2009). However, the critical insights of the Brundtland Report, and the sustainability research it catalysed, imply the opposite. The single-minded pursuit of economic growth has had disastrous impacts on both the environment and humanity, to the extent that the long-term future of both is threatened. With this kind of anomaly threatening its fundamental assumptions, the prevailing paradigm can be said to be in crisis, with the potential for revolution.

However, by adopting a "sustainable development" discourse, the normal science can be said to have expanded to embrace these challenges without altering from a growth course. While the sustainable development movement should be lauded for calling for significant change, it manages to avoid the more intractable problems described by ecologists and sociologists as a "crisis", which require a *fundamental* change in the way individuals and societies operate. In other words, the negative impact of unqualified growth is acknowledged, but the solution proposed thereto is not revolution, but a more responsible version of growth: *sustainable* or *inclusive* growth. Notions of decoupling, ecosystem services, and the Green Economy, which feature prominently in the UNEP's future planning (UNEP, 2011), are all children of the sustainable development discourse in that they suggest that economic growth can be "decoupled" from environmental and social damage, that the environment can be accounted for in monetary terms and that the resources of the earth exist for human use. At the individual level, the message is: if you want to be part of the change for good, you ought to buy an electric car and buy a solar geyser and *not* buy products with palm oil. In other words, your ambit of influence is your buying power and you should strive to be a responsible economic agent, but otherwise carry on.

Technology is regularly hailed as the flagship of sustainable development because of the improvements it can bring, particularly for resource use. While this is undeniable, it must be acknowledged that we do not fully understand the impact of technology on society, and it would be disingenuous to hail its capabilities in isolation from the human beings who use it. It remains to be seen whether the union of man and computer will have a happy ending – but that debate is beyond the scope of this article. In the literature, the view that technology will bring about the realisation of sustainable development ideals has been challenged by a number of writers who maintain that, as long as material and wealth accumulation are the signifiers of success, resource depletion and inequality will not be averted by technological intervention (Fioramonti, 2010; Alexander, 2012; Jackson, 2009). The economies of scale afforded by digital production will just make us more

efficient at producing the *stuff* – homes, overseas trips, running shoes and smartphones – we desire. Robinson (2004:379) states that the discourse of sustainable development "misses the point" posed by the ecological and social crisis, and that the change required is of a much more fundamental nature.

Therefore, while the logical strength of the evidence to discredit the prevailing paradigm is acknowledged, the normal science of growth has successfully expanded to include it. The mainstream discourse, of sustainable development and technology, is the prevailing paradigm's answer to the sustainability crisis, leaving the fundamental paradigmatic characteristics of society unchallenged (Jackson, 2009; Swilling & Annecke, 2012; Alexander, 2012, 2015, 2016). The multi-dimensional nature of the problem and the diverse voices from different disciplines and constituencies act as further stalling factors, as shall be demonstrated below.

3.3 Community of adherents

Continuing with Kuhn's example of 18th-century chemistry, John Dalton's work on atomic theory received significant interest because of its direct opposition to the generally held view of compounds. Even prior to publishing, Dalton had a formidable reputation and had lectured at the Royal Institute in London, the pinnacle of the academic world at that time. A growing community of adherents (within a not very large academic community) accepted the evidence and, with the weight of Dalton's reputation, drove its diffusion among their colleagues. The more evidence emerged with successive experiments, the stronger the belief in its scientific integrity (Kuhn, 1962).

In the case of the GDP discussion, the community calling for its amendment or replacement has grown substantially in recent decades and, since the global financial crisis, with greater vehemence (Fioramonti, 2010; Stiglitz *et al.*, 2009; Fitoussi & Stiglitz, 2011; Philipsen, 2015). However, far from presenting a coherent alternative, this community is characterised by fragmented efforts in multiple directions and few sharing the same interpretation of critical concepts (Robinson, 2004). In other words, while there is general consensus that there is a problem, different views on its exact nature, timing and, more importantly, solution, abound. Swilling and Annecke (2012) point out that ecologists have a limited understanding of institutional power and social change, while social scientists lack an appreciation of the ecological context of social ills. Perhaps this absence of a clear counter-community has provided adherents of the growth paradigm with the opportunity to absorb sustainability challenges without altering fundamentally.

It would be remiss not to mention the largest and arguably most powerful community of adherents to the growth paradigm: the general populace. It is when discussing the established buying and investing patterns of ordinary people that critics of the growth paradigm and GDP become most despondent (Alexander, 2012, 2015, 2016; Swilling & Annecke, 2012; Van den Bergh, 2009). For example:

> Societies that reward overconsumption and thrive on social inequalities will not be rescued by a new numerical device, no matter how useful and long-overdue its invention might be. (Fioramonti, 2010:2)

Ordinary people are the final recipients of the interconnected institutional channels that reinforce a growth-centric worldview and foreground GDP (Van den Bergh, 2009). The invisible conflation of success and wealth has a powerful influence on virtually all spheres of life, including employment choices, voting patterns and interpersonal relationships (Elgin, 1981; Alexander, 2015). Linguistic determinism comes into play here as terms such as "wealthy", "rich" and "successful" would arguably have different definitions in an alternate paradigm. Research into human happiness has added empirical weight to the notion that consumption for consumption's sake brings with it a certain malaise (Van den Bergh, 2009; Alexander, 2016; Easterlin, 2016; Layard, 2005). The voluntary simplicity movement, comprehensively described for the first time in 1981 by Duane Elgin, is one example of individuals opting out of a consumption lifestyle in favour of a pursuit for "meaning" in terms of relationships, work and spirituality (Elgin, 1981:30). The growing online community that calls itself minimalism reflects similar ideals of decluttering one's material life in order to find psychological clarity (for example, theminimalists.com). Whether these kinds of alternative lifestyles will spread to the extent that they convert a large portion of the general populace away from a growth-centric worldview remains to be seen. Even then, the challenge would likely remain, as it is those who have benefited most from the growth paradigm who have the power and status to draft new policies to change it. Robinson (2004:378) stresses the importance, and unlikeliness, of such a change:

> Without a political constituency for change, a market for different products and consumption patterns, and social acceptance of both the public policy and private sector actions needed to accomplish these goals, no fundamental changes in behaviour or practice are possible.

Therefore, while the movement for a new progress measure to shift the focus away from economic growth has gained significant momentum, it lacks the necessary coherence to convince the mainstream that change is necessary, worthwhile and achievable. It may be that the deeply complex nature of the crisis itself renders the articulation of a coherent solution impracticable. Indeed, it is this last point – the practicability of change – that presents the major sticking point of the discussion. This shall be explored briefly below.

3.4 Promising alternatives

To close Kuhn's chemistry example: John Dalton's discoveries of the behaviour of atomic particles provided an elegant solution to many of the unsolved phenomena of the previously held theory of compounds. The promise of atomic theory was in its simplicity (not in the sense that it was easy, but rather in the sense that it offered one integrated explanation for a number of puzzling elements of the previous science). The future of a discipline which incorporated atomic theory could be clearly imagined, and so it was adopted (Kuhn, 1962).

The same cannot be said for the proposed alternatives to GDP and the growth paradigm in which it has proven so resilient. The unsolved phenomena associated with unqualified economic growth – chiefly, environmental degradation, resource depletion and poverty

– remain unsolved. The scale, depth and multi-dimensional nature of the sustainability crisis has meant, to some, that efforts to develop a new progress indicator that reflects this complexity is a "chimera that will not be achieved" (England, 1998:102). That it will take more than a new statistical measure to bring about societal change is widely mentioned; yet, the commentary does not go much further than general ideas of a "new ethic" (Robinson, 2004:376), a "philosophical re-thinking" (Fioramonti, 2010:2) or a "new contract between science and society" (Clark *et al.*, 2005:7). What do these phrases really mean for the daily lived experience of human beings? The question is largely not answered. Samuel Alexander, of the Melbourne Sustainable Society Institute, is one of very few writers who have attempted to describe a fundamentally different economy, what he calls the "sufficiency economy". Alexander describes futuristic versions of the basic facets of ordinary life – drinking water, food, clothing, housing, energy usage, transport, work and financial markets (Alexander, 2012:10-26). He is, however, sceptical about the propensity of society to bring about such a radical change: to paraphrase his concluding statements, the Earth is likely to make the decision for society, not the other way around.

In general, positive projections of a sustainable future are, at best, guarded (Clark *et al.*, 2005), while prognoses for the environment (particularly from climate change experts) are, frequently, pessimistic (see especially Lovelock's [2006] *The Revenge of Gaia*). Thus, as far as a promising alternative as a convincing force for change is concerned, the sustainability crisis is without one. The resilience of GDP, then, can possibly be attributed to a simple idiom: Rather the devil you know, than the devil you don't. As Alexander (2012:2) points out in the opening paragraphs of his sufficiency economy description:

> If people cannot picture the alternative society, it is very difficult to desire it; and if we do not desire it, no social or political movement will arise to bring it into existence.

In summary, the shift to an alternate paradigm has not taken place, owing to a pervasive conflation of economic growth with progress. The normal science has successfully re-clothed the fundamental challenges posed by the sustainability crisis as sustainable development, a more responsible and inclusive version of growth. Furthermore, the disarray of the adherents for change weakens their collective cause, especially in the face of institutionalised growth-centric values that are embedded in the very language used to frame the debate. Lastly, because a desirable alternate future is virtually impossible to imagine beyond the dystopian vision of the more pessimistic environmentalists – flooded coastlines, metastasising desserts, mass starvation – the case for change lacks convincing force. The application of Thomas Kuhn's paradigm thinking has therefore suggested that a revolution has failed to take place at a number of levels, and that the paradigm that exclusively conflates economic growth with progress has prevailed as a result.

4. Limitations

Because of the broad paradigmatic lens applied to this discussion, scope for detail is limited. The subject matter is handled at a high level of abstraction, which obstructs

inquiry into the subtlety of the concepts introduced, none of which is straightforward, uncontested or treated synonymously in the literature. Secondly, an epochal perspective such as paradigm thinking is useful for identifying the *necessary* conditions for change, but not the *sufficient* conditions; in other words, the question "How 'much' of each convincing driver would lead to a paradigm shift?" is not answered. Thirdly, while economic frameworks are mentioned, the vast literature on the mechanics of growth from various schools of thought over the past two centuries is glossed over in favour of a more philosophical approach. Lastly, a high-level discussion of this nature fails to discriminate between different geographies and cultures, which risks implying that the trends described therein are universal. Indeed, the nascent concept of inclusive growth, which is a critical subject in many departments of development economics in some developing countries, is not investigated. Nevertheless, the application of Kuhn's paradigm lens offers a useful insight into the failed revolution, so to speak, of economic primacy.

5. Implications

This discussion has reiterated the abiding theme of the literature calling for a radical change: for as long as economic growth is the hegemonic truth of society, proposed alternatives to defining progress will implicitly reflect a growth-centric worldview. This is in spite of over forty years' worth of evidence of the unsustainability of such a trajectory within the finite bounds of planet Earth. While it is tempting to rebut this discourse with a question along the lines of "But how do we invest in a better, more sustainable future if the economy isn't growing?", this is a misunderstanding of that which is fundamentally at stake. It is the *nature* of the activity that is causing the growth, shrinkage or equilibrium of an economy that will determine whether sustainability is built into the fabric of society, or something for which we have to keep extracting resources (human and environmental) in order to afford sometime in the future.

So, what is to be done? Kuhn's suggestion that the "ultimate" convincing force – time – need not be the death sentence it at first appears to be, if we take to heart its implications for cross-generational knowledge sharing. Let us again return to the words of Max Planck which made such an impression on Kuhn (1970):

> A new scientific truth does not triumph by convincing its opponents and making them see the light, but rather because its opponents eventually die, and *a new generation grows up that is familiar with it.* (Authors' emphasis)

If it is only the next generation of decision-makers who will have the knowledge, networks and coherent future plans to bring about a different paradigm, then it is up to today's adults responsible for their education to ensure they are "familiar" with what is at stake. In other words, the most powerful community to advocate for change today is, surely, those educators who recognise the paradoxes of modern life and decide to do something about it. They can make an ethical commitment to empower their students with the tools and values which they can then use to disrupt the stalemate when it is the students' turn to make the important decisions.

This article thus concludes with something of a plea to educators of future leaders – particularly in the schools of economics, business and politics – to understand the current failings in the three necessary convincing forces, and actively address them in the way they impart information and model ethics to their students. Firstly, resist the urge to be assuaged by technologically-driven "solutions" under the sustainable development banner; secondly, reach across disciplinary boundaries to amass a more unified and coherent counter-community; and, thirdly, utilise transdisciplinary networks and harness courageous creativity to imagine and promote a different way of living. No young person who completes formal schooling this side of the release of the Sustainable Development Goals should be without a clear understanding of the nuances of society and the interconnected vulnerabilities of mankind, peace and planet.

If future decision-makers can be conscientised to appreciate the complexity of the concept of progress to the extent that they reject the notion that any single indicator could capture it, the advocates of this generation will have succeeded. It will be no small achievement – nothing short of revolutionary – and it is not an exaggeration to say that the future depends on it.

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Endnotes

1. Modern usage of "conflate" has shifted its meaning slightly, according to Daly (2012) in an article available online. Once a fairly neutral term describing the merging of two things, "conflate" is increasingly imbued with negative connotations, to the point that it is largely interpreted as confusing two things by merging them. While a synonymous relationship has not been officially recognised by the Oxford English Dictionary, Merriam-Webster lists "confuse" and "confound" as synonyms of "conflate". This article uses the word in this modern sense.
2. The term GDP (originally referred to as gross national product) is used to encompass a similar indicator of almost equal prominence, gross national income (GNI). GNI measures goods and services produced specifically by domestically-owned factors of production (Lawn, 2003). GDP does not differentiate source of ownership in its calculation, but this distinction is not material at this level of abstraction and the terms are generally used interchangeably in the literature.
3. For example, the magnitude of the initial costs associated with curbing carbon emissions was one reason provided by the Bush administration for refusing to ratify the Kyoto Protocol (Van den Bergh, 2009:121).
4. As Marks (2010) puts it: "It [HPI] recognises that a satisfying life is not ideal if it is very short, but also that a long life is not ideal if it is miserable."