

## **METAMORPHOSIS IN POLITICAL ECONOMY: A NEW COMBINATION OF THREE DISPARATE IDEAS**

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**ABSTRACT.** Innovation in theory building usually follows the prescription of “normal science” as described by Thomas Kuhn in his account on the history of theoretical physics – see Kuhn (1962). What already had been postulated by Descartes (compare Descartes, 1637) as a signum of science, namely the systematic advance towards smaller, more specialized, partial problems that are easier to solve, this procedure still prevails in the social sciences till today. Contrary to this piecemeal engineering approach, Joseph Schumpeter made the character mask of the revolutionary entrepreneur to his hero of progress – at least as far as innovation in the production of commodities is concerned (Schumpeter, 1911). Of course, history shows that both forms of innovation are alternating: If the slow advance and broadening of a prevailing mainstream gets stuck and the contradictions it produces start to accumulate quickly, then it is time for a revolution – in the material world (compare Hanappi & Wäckerle, 2016) as well as in its scientific correlate. It is time for a *metamorphosis*. In which direction a theoretical innovation in times of metamorphosis shall point clearly has to remain an unanswered question. The best characterization of its general methodological form still seems to be Schumpeter’s dictum. It is a new combination of (existing) elements. The existing elements typically should concern burning problems of the troubled mainstream (compare Hanappi, 2016), and the adjective “new” means that they so far are not connected to each other in the stagnating mainstream approach. The global political economy as well as its theoretical reflection in mainstream theory undoubtedly currently is in a state that calls for a revolutionary metamorphosis. This paper therefore sets out to develop a new combination of *three seemingly unconnected ideas*, which each address a fundamental contradiction. The first idea concerns the *contradiction between the rich and the poor parts of the global economy*, the second idea concerns the *driving force of progress of the human species and its impediments*, and the third idea concerns the *contradiction between syntax and semantics of the formal representation of the first two contradictions*. Contrary to papers in “normal science,” which in a

conclusion propose a solution for their research question, this paper avoids to pretend a finite horizon of its arguments. As is appropriate for a proposed theoretical innovation it just offers a new open-ended contribution to the rapidly evolving discourse in the middle of metamorphosis.

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## Introduction

The contemporary global political economy is characterized by an accelerating increase of tensions in the majority of the dimensions of political economy. These increases quite generally are the result of growing inequalities of life circumstances as they are observed by an ever-larger part of the world's population. To some limited extent, the dramatic increase of observed inequalities stems from the increase in technical possibilities of observation, i.e. from the spread of the internet and its users. But apart from that, there also are numerous socio-economic and physical processes, which drive the elements of political economy into contradictory directions. In the first section of this paper the status quo of the current situation will be sketched by a list of the most essential inequalities; as they are experienced as well as they are physically present. The concept of inequality implicitly includes the notion of measurability and as an immediate consequence the concept of equality (compare Hegel, 1831, book 1, part 3). Both states, inequality and equality, are only useful concepts in the context of some assumed dynamic forces, which either could stabilize disturbed equilibrium, or could amplify disequilibrium. Since both types of forces are usually present, it is the net impact that counts. In Hanappi and Scholz-Wäckerle (2017) we have provided a framework that allows to consider the history of political economy as a sequence of more stable regimes (where the net impact points to equilibrium) interrupted by revolutions (where the net impact of amplifying disequilibria necessitates a fundamental structural change). The crux, of course, is to understand how these stages are linked, how relative stability breeds revolutions and how the chaos of revolution then condensates into a new era of relative stability.

The second section therefore sets out to identify the drivers in these two transitory processes. For upcoming revolutions, the most lucid analysis goes back to Karl Marx and his class analysis. Despite the evident fact that almost 200 years of new experiences have been added since his attempt to describe

class dynamics, it still seems to make sense to think in terms of classes – probably newly defined global classes – as the central elements of dynamic analysis. The alternative, namely to start with human individuals and their minds,<sup>1</sup> is less and less adequate as these minds are more and more streamlined – not just by local cultural constraints but also by the globally stratified electronic media sphere.

To find out how the condensation process in the course of a revolution works is even more challenging, and much less investigated. Nevertheless, as has been studied in other areas of evolutionary theory, there are new methods emerging that can help to do so. In particular, simulation techniques and network theory are promising tools to study the emergence of sets of new combinations. Given a relatively small finite number of feasible solutions might allow steering in the dark with a somewhat improved map of scenarios.

The shift in methods to be applied then is the focus of section three. Looking back at the contradictions expounded in section one and the countervailing forces at work explained in section two reveals that any formal representation of this type of inconsistencies, exploding structures, of vanishing old and emerging new entities, that these typical elements can best be adequately mirrored by methods that also include a contradictory feature. Using the jargon of linguistics, this contradiction can be expressed as the opposition between a static syntax and the dynamics of semantics. Any textual formalization, from everyday language to mathematics and algorithmic languages, has to have a static rule set for its application, which is needed by all entities sharing this language to enable communication. If this works, then the communicators can be considered as a larger social entity. This rule set is the syntax of the language. On the other hand, there is a world outside the world of languages, and languages are just a particular set of tools of entities living in this other world. Contrary to their static constancy encapsulated in their syntax, the semantic dimension of languages is permanently challenged to adapt to this outside world. Therefore, a language simultaneously carries a static potential, i.e. its syntactic consistency, and its opposite, i.e. its preliminary character pointing to continuing change and reoccurring inconsistencies.

Note that these twofold, contradictory potentials are also present in the description of energy provided by theoretical physics: energy of a position in space and kinetic energy. The full implications of the contradictory character of this description have only become visible with the discoveries of quantum theory – see Susskind and Friedman (2014). They lead to a (in applications highly successful) formalism, which misses almost all semantics, even appears to be counterintuitive. The concluding section of the paper provides some rough and ready new combinations of the three bundles of ideas in the previous sections, and on this basis sheds some light on the set of possible future shapes that a political economy after its metamorphosis might take on.

## 1. Disequilibrium

The concept of disequilibrium presupposes that there does exist a quantitatively measurable property, a quality ascribed to the two objects that are compared, which is the same quality in the different objects though the quantitative extent is different. For any static evaluation of disequilibrium in a system of political economy it thus first is necessary to determine adequate qualities, i.e. properties that are thought to be essential for the respective society.

Traditionally, one property characterizing the human species globally is the number of human individuals. In that respect this species is just another group of mammals, the property addresses only a primitive biological aspect: the higher the number of individuals the better.<sup>2</sup> Since humans differ from other mammals primarily with respect to their capability to build sophisticatedly enhanced internal models in their individual brains, it is necessary to incorporate this special trait by appropriate additional properties to be considered. With their mental apparatus humans can store past experiences and can form expectations about the future, and they can develop and maintain internal mental models which connect experiences with expectations. What is even more important is that human individuals can share these cognitive ingredients with the help of communication using languages. Knowledge does not die if a single individual dies, and newborn individuals do not have to start at zero with their experiences. An immediate property that would mirror this human trait thus would be the global state of knowledge, the quantitative amount of available science.<sup>3</sup> Progress itself often is identified with the growth of human knowledge.

The self-amplifying force of human knowledge already is something that has to be described with the language of political economy – indeed it constitutes the core of this science. To escape from the necessities of the animal kingdom the human species *exploits* growth processes of plants and animals. Since the agricultural revolution some 100,000 years ago human society takes away some output of nature as harvest and stirs up its future growth process systematically. To be able to do so it has to use its technical knowledge, which in turn can be enhanced if successful application of new techniques frees some specialists from doing stupid agricultural work. The upward spiral of this process becomes visible. But another implicit element has to be considered too: The more complicated process of agricultural exploitation needs a more systematic organization of the human tribe, of the individuals engaged in labor time spent specifically at certain times of the year and at certain places. Societies with small groups of “masters of organization” thrive, and these elites usually use their knowledge power<sup>4</sup> to extend the exploitation process from the “exploitation of nature by man to the exploitation of man by man” (Marx). So very early on progress of society had an additional twist, namely

the property that internal exploitation of mankind coincided with overall progress of the species. But as a matter of fact growth trajectories of progress of (technical) knowledge and exploitation did not run in parallel. Ruling classes typically lost their ability to contribute to progress in overall knowledge – organizationally and technologically – and compensated their growing incompetence by exaggerating exploitation of man by man. History became a history of class struggles. It is important to note that the degenerating process of ruling classes is not just some kind of moral deficiency of a saturated elite. First of all, it is the very success of their dominant advances, which changes the environment in which they act. And then, since their success makes them insist on their hegemony, their behavior becomes inadequate to the changed landscape they produced.

It is difficult to measure the tide of class struggle. The starting point could be a look at time budgets. All progress in the end should materialize in less time spent for the primary metabolism of the species. The average individual should experience less working time per day. Note that the averaging of time periods worked expresses the primate of the species over the experiences of the individual member. The averaging processes has its own problems, in particular it hides the assumption that labor is unspecified and the time it needs is directly comparable.<sup>5</sup> To compute the average labor time that is necessary to produce a unit of a certain commodity or service, a full-fledged algorithmic model of the respective production process would be needed. With evermore complicated and interwoven global production it cannot be expected that such a model will be available soon, so approximations using direct and indirect labor time inputs so far are the best guess available. They lead to the concept of labor (time) embodied in a unit of output. This consideration then is the starting point of the labor value theory formulated by classical political economists from Adam Smith to Karl Marx. It links a physically observable variable, time spent, to a subject, a commodity or service.<sup>6</sup>

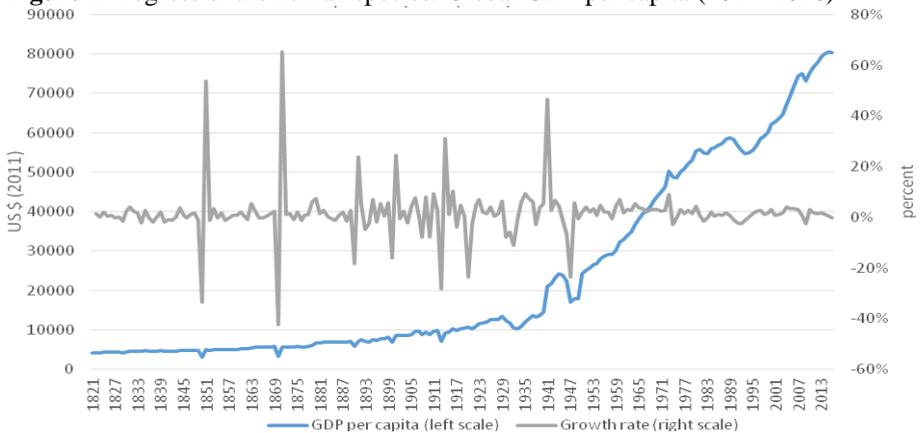
To link the final physical product – existing either as service time or as a physical object – to the consumption process of a social entity (individuals, production units, political institutions, etc.) is also a theoretically demanding task. First of all, the structure of social entities has to be clarified. Only the largest social entity is amenable to a clear-cut definition, it is the species itself. With respect to the smallest entity the question already is, if this concerns the (non-reproducible) human individual, or the smallest reproducible group (the family or household), or the smallest reproducible community in a historical context (e.g. the tribe). In between the largest and the smallest forms of social entities rich and overlapping, partly hierarchical structures exist, and in each node of this network consumption processes occur. Consumption is a vector of physical inputs of the social entity, usually a bundle of objects

and service times. A minimum level of consumption, defined for each element of this vector, is needed to maintain the social entities primary metabolism, i.e. to keep it alive.

At this point of the argument the particular feature of the human species, namely its use of an information sphere, comes into play. The physical consumption vector consists of heterogeneous elements that only can be assigned to a single index of a consumption level if each of them is denominated in the same measure, in a sign system usually called money. More elements or higher amounts of an element are equivalent to a higher number of money units.<sup>7</sup>

To understand how the above mentioned pulsating advance of progress works it is necessary to take a closer look at the relative stability with which a given stage of development manages to maintain its social entities. In other words, how – with the help of money forms – labor time is allocated to production processes and their outputs are allocated as inputs to social units. Thus a rough image of overall progress might be approximated by comparing the total amount of global real GDP with the respective population that produced it, see GDP per capita (deflated) in figure 1. Progress, the success of capitalism in the past 200 years, is tremendous.<sup>8</sup>

**Figure 1** Progress of the human species: Global GDP per capita (1821–2016)



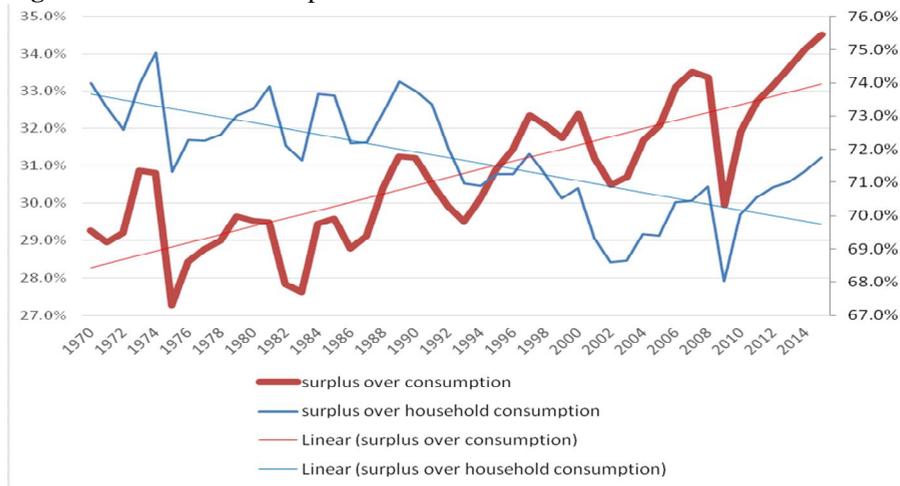
Source: Maddison Project Database, version 2018. Bolt et al. (2018).

But a picture of overall progress is insufficient to understand the proposed stepwise political form this progress was based on. For this investigation an index of exploitation, of the tide of class struggle, of the state of disequilibrium is needed. A first idea of global exploitation can be gained from taking a look at the development of the surplus of total global GDP and total consumption

expenditure, see figure 2. It is clear that the approximations used in these figures suffer from numerous shortcomings.

As it can easily be seen even in this approximate indicator (the thick red line, left-hand vertical scale), this surplus is increasing in stepwise pushes since 1975. The consolidation of the global capitalist class after World War 2 (and the reconstruction phase immediately following it until 1975) gave way to almost half a century of rising exploitation. It is also remarkable that the periodically intervening drawbacks of this general rise seem to become deeper. The need to continue the upward trend seems to provoke ever more severe resistance. What is even more interesting is that this surplus does not include government consumption – it assumes that public goods and services are part of the input that is needed by the workers for their reproduction. If one adds these publicly provided inputs to the surplus one gets a decreasing trend (the thin blue line, right-hand vertical scale). This supports the above mentioned interpretation that the generally ever more difficult production of surplus (the thin blue line), the increasingly obsolete capitalist engine, has still been thriving (the thick red line) – but only due to changes in the state apparatus: a move from compromise-allowing expenditure policy to cheaper exertion of direct coercive power.

**Figure 2** Global rates of surplus



Source: United Nations National Accounts Database.

If the two trends continue, then a bundle of bursts, of sudden breakpoints of the global system appears on the horizon.

One often mentioned development is a permanent and deepening *global government debt crisis*, which is needed to support the demand with which TNCs transform their production into monetary profit. Weapons<sup>9</sup> and luxury

goods for the super-rich are insufficient for the level of mass production that is already achieved. This means that large-scale financial crisis, fiscal crack-down on taxpayers, moratorium for the debt of whole nations will accompany the next decade. Postponing exploitation and transferring its final execution to the respective national bourgeoisie, to its nation state representatives, implies that from time to time hard coercive power has to strike to be credible.<sup>10</sup>

Another breakpoint is a consequence of the technological advances in *information technologies*. Groups are organized and get political power by a shared interpretation of their living circumstances. Classical political class analysis addressed this process as the step from being a class in actual life, and the members being conscious that they are such a class. Sharing interpretations – internal models that are needed to make sense of perceptions – is a process, which is subject to technical developments. If communication is supported by a worldwide electronic net connecting owners of smartphones across all continents, then the boundaries of speakers on squares and in city halls are definitely surpassed. Communities can build up and break down very fast and with content an analogue transformation towards speed and fluidity is implied. As moreover, living circumstances are getting harder and harder to grasp, the observed fallback to religion and mystic nationalism, distributed by mind-manipulating leaders with the help of these technical devices is only a logical consequence.<sup>11</sup> Since so-called “movements” built on such sandy foundations with respect to content often tend to violence to support their case, they will run into severe conflict with each other. The situation in the Near East might be just a prelude to a global phenomenon. It has been dubbed the “age of alienation” in Hanappi (2018).

A third breakpoint is simply the systemic blindness vis-à-vis *environmental catastrophes*, from climate change to drink water scarcity. The major deficiency that leads to this blindness is rooted in the concept of individual private property,<sup>12</sup> which on the other side of the coin (in particular with respect to private firms) is just irresponsibility against everybody else. Such a system of maximizing private individual utility (of individuals, firms, nation states, etc.) ignoring the damage that might be produced outside the narrow borders of local perception typically erodes the very foundations of its property relations. Clashes between have-nots and owners become inevitable, despite the cheap talk about the advantages of the “competition between nations” etc. The wave of migration from Africa to Europe is just another example of a suddenly bursting bubble that grew over centuries of dis-equilibrating property relations.

Thus the current disequilibrium state of the world has to be characterized by a number of conflicts: Contradictions between classes, between interpretations and actual states, between unimaginable powerful global players and isolated individuals without any power. It is not always easy to construct

measurable indices for every dimension of disequilibrium, but even without such instruments a general feeling of a dis-equilibrated world is creeping into the minds of human individuals and other social entities.

## 2. Drivers of Progress

If one accepts the view that the current situation is quickly developing into a crash scenario, then the next question is: Who could be the social entities that can handle a transformation, a metamorphosis, a revolution leading into a more adequate social form of the human species?

The first thing to recognize again is a methodological difficulty. Each social entity, each living system, irrespective of its size is always in motion, i.e. its position exists only in combination with its movement. In the 17<sup>th</sup> century this most fundamental insight<sup>13</sup> led to the development of calculus by Leibnitz and Newton, which enabled technicians to understand and to use marginally occurring forces in the macroscopic world. In the last century, when quantum theory explored the microcosm, this contradiction reappeared as a strange property of the measurement process: Heisenberg proved that in the quantum world position and velocity of a particle cannot be measured simultaneously – *in principle*, and not because of imprecise contemporary measurement instruments.

The incessant movement of the small elements nevertheless can temporarily settle down at a relatively stable overall state of the system they form. In non-living systems this relative stability depends on internal and external conditions, which usually are properties of the constituent elements, e.g. of molecules, their internal organization, e.g. characterized by their kinetic energy (temperature), and some outside pressure on the system. All these conditions typically are interdependent and if they change then at some point, or better, within a small range of this change, a so-called phase transition takes place: The system transforms itself quickly into another relatively stable state of aggregation. So on earth the rotation of the planet around the sun enforces phase transitions of the surface water in lakes according to different seasons. In these non-living systems the driver of phase transitions is found outside the system and since the system has no memory, phase transitions at first approximation are highly reversible.

The human species, considered as a system of living entities resembles its non-living fore-runners as far as it also seems to progress with a sequence of relatively stable arrangements intermitted by quick phase transitions. The very essence of the adjective “living” seems to be the property that this sequence of stable states is only to a small degree a repetition and typically features something experienced as progress, as a direction of human history – this holds on the level of the species as well as on the level of the human in-

dividual. This experience can also be expressed as having consciousness and memory, which makes reversibility of history impossible.

Still a comparison between phase transitions of non-living systems and metamorphosis of social systems – classical political economy called them revolutions – is interesting.

First, the natural gas or the liquid which the physicist studies in the laboratory typically is in a container, which therefore provides the limits of its closed system. In contrast, the “container” of a tribe of human individuals is its *locality*, which is given by its geographical and communicative limitations. It is evident that the inner organization of such a human tribe crucially depends on the special local conditions – just as in the case of the non-living system. But the crucial difference of the living system is that it is changing these local conditions relatively fast and rather continuously. Small groups and early tribes of humans already have been political entities, which determined the respective typical activities of its human individuals in a very rigid way. Following the enforced sequence of the seasons of the year spoken and written memory allowed for adaption, for escaping from simple repetition and the introduction of what classical political economy called “exploitation of nature,” i.e. systematic use of plants’ and animals’ growth processes. Success of this type of adaption not only leads to longer lives of individuals but lead to general growth of the species. And growth of each tribe as well as growth of the number of tribes lead to the expansion of the respective localities. But the local “containers” had borders: transport, limits of communication, and conflicts with neighboring tribes restrict the local growth process till today – again on the individual as well as on the tribe level. What emerged was a trend towards ever larger political entities, richly structured and institutionally equipped to allow for certain temporarily stable states of aggregation. These phases of historical development were dubbed “modes of production” by classical political economy. The “container” of a phase of a relatively stable social setting consists of a set of accepted and internally policed behavioral rules that are valid in a given geographical area. The complicated, many-layered power structure implicit in these rules manifests itself in a framework of institutions as well as in the forms of internal model-building, i.e. the minds, of human individuals. The larger the political entity, the more complicated is its structure – and the more demanding is it for its members to mirror it in their minds. In short, the trend towards larger political entities necessarily breeds increasing alienation of its members.

Therefore, comparing living with non-living systems there is a contrast between expansion and contraction of the latter that simply follows some *exogenous force* within which the system is embedded (a solar system or an experimenter in a laboratory), whereas the former produce *endogenous contradictions* that send the system on a progressive trajectory of stepwise

evolution. The mentally observed and interpreted power structure and its safeguards towards the end of a mode of production are seen as an obstacle for further enhancement of living circumstances of a growing share of the population. At some point only a deep re-structuring can overcome this situation. The transition phase thus is the conscious product of a re-alignment of social relations to the *imagined* possibilities to design a better and larger political entity. So the driver of progressive motion is to be found on two frontiers of the “container”: (i) at the obstacles at the borderlines of its expansion and (ii) inside the internal social relations including mental model-building of groups of human individuals.

Second, there is clustering. With respect to theoretical physics this aspect is probably the central problem of its contemporary model, the standard model. In this model quantum theory allowed for a consolidation of three of the elementary forces, but so far the fourth force, gravitation, remains an isolated theory part outside its explanatory force. And gravitation evidently describes the clustering of matter to form planet systems. In political economy the idea of clustering entered the debate in its inverted form, namely the statement that the smallest particles, human individuals, should be kept as isolated elementary building blocks of theory. Till today this dogma of methodological individualism, initiated by the marginalists of the late 19<sup>th</sup> century, haunts economic theory. Fortunately, earlier in this century, classical political economy had developed the idea that there exist several types of glue in social systems, which lead to a stronger adhesion between some of the members of a population: Families emerge, social classes emerge, and nations with common culture including language emerge. The reasons of such clustering in living systems stem from reproduction proper, biological reproduction in families, reproduction of a tribe mediated by a system of diverse productive activities, and reproduction of a nation by a larger community of production systems held together by a nation state and a shared language. Again the trend towards larger political entities is encountered and with respect to clustering shows how smaller clusters over time are incorporated in larger clusters. For the simple family clusters that humans share with animals the glue between individuals is direct genetic prolonging of existence, i.e. while the single individual dies earlier its family survives longer by transferring genes to the children. For larger political entities the glue between its members consists to some extent of shared locality (common inhabited area, common language) but increasingly also by a shared production activity in societies with more sophisticated division of labor. In the middle ages, when the military organization of states as hierarchical exploitation systems of agricultural work was established, the classes within a state became all too visible. Class consciousness of farmers surpassed local boundaries and led to upheavals that finally revolutionized feudal class structures. A new type of

clustering within nation states emerged, which Karl Marx described as mainly consisting of a purification of the class contradiction between capitalists and workers. Though Marx's hope that the international spread of the idea of working class consciousness will lead to a global communist revolution, a metamorphosis of the human species, was destroyed in the outbreak of World War 1, he nevertheless was the first scholar who clearly pointed out that it usually is a certain cluster of individuals, a class, that acts as the driver of progress. While Darwin, with his *Origin of Species*, had destroyed the idea that a driver of last resort, a God, hides behind co-existence of many diverse species, Marx went one step further and proposed that class contradictions actually are the drivers of social progress.

Ascending class contradictions can lead to a fundamental re-shuffling of social relations, emergence and vanishing of classes and their strength, but as we know from developments in the animal kingdom the extinction of a whole species is a possibility too. On the other hand, a successful metamorphosis into a new arrangement, a new mode of production, will necessarily mean that the new set of classes can minimize class contradictions by the use more sophisticated democratic institutional design. Of course, to get to the point where such a new arrangement is on the agenda, first there will be a fierce fight between aspiring classes for the dominant role in metamorphosis.<sup>14</sup>

Today, authoritarian regimes are in fashion again, we are approaching a metamorphosis of the species on a global level. Each of the three major candidates for the role of global leadership – USA, China, and Russia – was originally a national power that now aspires to represent a continent. The idea of classes that span across nations seems to have been lost, but this impression is deceiving. It survives not only in worldwide existing intellectual circles that perceive themselves as global carriers of knowledge. As a side-effect of global alienation also less educated parts of the global population increasingly find themselves not adequately represented by traditional national parties. They opt out and often join global movements, religious movements, environmentalist movements, feminist movements. In retrospect even the European fascist movement that caused World War 2 can be understood as an early warning of the dangers involved in the rearrangement of global political class forces.<sup>15</sup>

The study of clustering in the human species, the global society, thus involves the search for drivers of social progress, for *revolutionary classes* to use the language of classical political economy. In the course of history, the ferment that helps to form revolutionary subjects has changed. It evolved from geographic locality to commonality in the production process, i.e. the working class,<sup>16</sup> and finally to the possibility *to join* all those members of society who experience the *most pressing contradictions* via *global communication facilities*, the internet. A common characteristic of evolutionary processes, going back to Hegel's concept of "Aufhebung" (in German

revocation has the two-fold meaning of deleting something and at the same time keeping it alive in a different form), implies that elements of the factory floor locality as well as national culture are still preserved and have to be considered in the most advanced forms of a global revolutionary class. The emergence of such a progressive driver of human progress therefore is not at all to be expected as the outcome of spontaneous actions, it needs guidance based on highly informed and visionary anticipations provided by knowledge carriers. Antonio Gramsci has labelled this type of labor movement grounded organizer the “organic intellectual.” In a sense his analysis has anticipated what today I call the emergence of a *global class of organic intellectuals*, GCOOI.

The task of this class is to address the most severe contradictions in today’s world, to synthesize their analysis and to provide blueprints for the avoidance of the most disastrous upcoming bottlenecks of human evolution. Contradictions, a central concept of the scientific work of organic intellectuals that rarely occurs in standard academic discourses,<sup>17</sup> therefore have to be brought into focus.

### 3. Contradictions

In a lucid introduction to the concept of contradiction Lucio Colletti distinguishes between contradictions occurring in the *world of physics* and contradictions occurring in the *world of languages* (Colletti, 1975). The first type of contradiction is just another name for a disequilibrium, which implicitly is assumed to contain forces for its elimination. The analogue to the above mentioned notions of positional energy (disequilibrium) and kinetic energy (the co-existing force to reduce disequilibrium) is only too apparent. In recent years the newly emerged science of quantum biology has proposed to trace back the emergence of living systems on earth out of non-living disequilibria that existed some 4 billion years ago at very special places under very special physical conditions. This first quantum jump in evolution from non-living to living, so the claim can only be understood by applying quantum theory to microbiology.<sup>18</sup> If this is correct, then this zero-type of contradiction – a physical disequilibrium – at very special conditions – the source of “kinetic energy” – did produce biological life.

As a consequence, so the speculative idea, the next quantum jump from biological life to the human species, has its roots in the very special conditions that provoked a disequilibrium in living conditions of the species vis-à-vis its environment to develop human language, self-consciousness and memory. The details of this metamorphosis are currently intensively investigated by transdisciplinary research. What is important for the third idea presented in this paper is that the notion of a contradiction survived this metamorphosis

and re-appeared in a new form. This new form is what Colletti had as a contradiction in the world of languages. Of course, the philosopher Colletti had built its concepts on the foundation of Hegel's central scheme of thesis-negation-synthesis (i.e. negation of negation), which for Hegel's German Idealism was the logical, God-given blueprint that was followed by all processes in the material world. Inverting Hegel's idealistic point of view – Louis Althusser called it *eversion of Idealism*<sup>19</sup> – the later appearing contradictions in the world of languages are the major tools to command and to exploit the first types of contradictions in the environment of the human species. And they are able to do so by a negating themselves: Human languages work by forming non-contradictory constants, symbols, for a continuously changing stream of incoming perceptions. The species, the tribe, then constitutes itself by sharing a common set of symbols. The shared system of relations between the symbols usually is called the *syntax* of this language. It can be well-defined, which means that for the majority of statements in a language a guardian of syntactical correctness can decide if a formulation is correct or not. A negation of a language existing for a certain time and being useful for the species during that time can be seen as its adaption to changing circumstances or new perception possibilities. Note that contrary to binary logic this doubled negation does not lead back to the starting point but simply accompanies stepwise progress.

Returning to contradictions, the difference between the two types of contradictions is significant. More precisely, the contradictions observed in the world of non-living systems *are observed* in the world of information with the help of formal languages, which ban contradictions. This, of course, is itself a contradiction. But languages do not stop at syntax, only proponents of sole research in the purification of mathematics (like G.H. Hardy, see Hardy, 2004) reduce science to the research along the lines of syntax. From an evolutionary perspective, languages – including formal languages – are *tools* of the human species. As every other tool they are transmitting human actions that were pre-formed in an internal model of the social entity into the material world of physics. The set of links between items in the world of physics and the set of representations in the world of languages traditionally is called *semantics*. Contrary to syntax, semantics is striving not for consistency and closeness but for *adequacy*. To assume that a semantic language game, remember Wittgenstein, is more adequate than its alternative must always remain a refutable proposition, whereas syntactic correctness often can be proven.<sup>20</sup> A straightforward conclusion of this perspective is that with the evolutionary process through the stages of living systems also their tool-set, e.g. their languages, mirrors this sequence of developmental steps. When perception of smaller and smaller particles became possible the language of Newtonian mechanics proved to be insufficient and quantum mechanics

replaced it – in times of a metamorphosis *syntax had to follow semantics*. But note that Newtonian mechanics survives as a very useful special case, though an approximation, for many everyday problems.

In political economy, in particular in its sub-field of economics, a similar process of metamorphosis of scientific language is on its way. Perceptions and data of what is going on, of how social entities use their internal model-building and communication capacities to determine their action, all this empirical knowledge that started to be collected in the interwar period now provides a rich database on which a revolution in the language of political economics takes place. Traditional dynamic mathematical models, mostly difference-differential equation systems, are losing ground and computer simulation models, today sometimes conceived as agent-based models,<sup>21</sup> are swarming. Still some old-style mathematics will remain a good proxy for some issues, but hegemony will be transferred to simulation. And as in the case of theoretical physics, progress will come faster at those spots where semantics of the old-style syntax is most disappointing, e.g. neo-classical economics.

Another point is worth mentioning: It is known from evolutionary theory in biology that in the advent of a great leap forward to the next stage, there often occurs a small step backward before the jump takes place.<sup>22</sup> Therefore, it is no surprise that at the current state of affairs in political economy a lot of research returns to the use of prose texts and dispenses with all formalization. In an unpaved terrain it can lead to greater adequacy to use a less consistent language, which has the advantage to inspire ideas for a future formal language. To some extent this aspect of the third idea presented in this paper even is its baseline. The search for the dynamics that are processing between syntax and dynamics are carried out by using these dynamics – it is a repair action on open sea. As such it can be understood as the tool search that was there in previous metamorphosis stages with exactly the analogue problem.<sup>23</sup>

#### **4. Research Horizons**

Research in times of scientific metamorphosis consists to a large extent in the collection and synthesizing of bits and pieces of existing theories that seem to be valuable. This is a demanding task, in particular for younger scientists for whom a dogmatic education period slumbers vividly in their sub-consciousness. In teaching professors always tend to present their material as God-given truth, and in times of metamorphosis in particular older conservative faculty under the threat to lose its personal human capital easily resorts to dogmatic stubbornness. This then is the source of a first demand of a plurality of theories.

It can be met by a more extended leap into the history of economic thought, which provides a rich diversity of perspectives. However, the uncomfortable style of older theories quickly lets them appear as inferior to modern texts. As opposed to such a diachronic approach, a synchronic approach is even more difficult. Some very blunt tools of neoclassical thought can rapidly be dismissed, but other parts (and neoclassical theory is *not* a monolith, it is a disparate heap of loosely related thoughts held together by a common conservative policy imperative, it is a mess) are worth to be kept in the reservoir of potentially inspiring elements. So “plurality” essentially has to learn what to forget and what to keep in mind. Moreover, there are lots of building blocks for a new formal language of political economy which require rather excessive learning of new knowledge. Evidently algorithmic modelling, pattern recognition methods, and the like cannot be acquired over the weekend. And then there are also many blind allies. Being a specialist in measure theory looked prosperous for mathematical economists only a few decades ago, do not ask what it can help in today’s problems of political economy. Difficulties become even more severe if one looks more closely at neighbouring sciences like biology or physics. Knowledge there did definitely explode in the last 20 years and the structure of these fields, so well-defined just half a century ago, is dissolving. Nevertheless, at least one common ground might help to discover analogies that can be useful for transdisciplinary work: Computer simulation is omnipresent. Thus “plurality” is a claim easily and rightfully made, but what hides behind the proclamation is an enormous amount of tedious work: Searching, learning, ordering, forgetting, following intuition, weeding out at first sight good-looking theory fragments, combining elements, combining a somewhat larger group of elements, and so on. And above all the sheer amount of intellectual work waiting for the aspiring organic intellectual (see above) clearly surmounts what can be achieved in solitude. Working in teams is mandatory, but at the same time is extremely time-consuming if communication is taken serious.

Note also that the plurality of elements towards the end of the metamorphosis process will be necessarily reduced. The successful new theoretical combinations will be just a handful, dominating what will be accepted as the new normal by a majority of scientists. The character of scientific work will change again; a dogma of welfare-enhancing maximal diversity that continuously has to prevail certainly runs counter the ideas presented in this paper. What should be observed is a minimum amount of scientific diversity (high enough in quiet times) as well as an upper limit of diversity, which excludes what cannot be considered as science remaining on the playground of “everything goes.” The range of diversity thus will continue to pulsate, and this is true for political economy too.

In this transformation process of theoretical work in political economy the role of scientific papers will have to change too. There will be a split into papers that just prove the versatility of the authors with respect to a certain language and its habitus. These papers, as is usual today, will remain substantial for academic carriers – they also can be considered as learning how to acquire a syntax. Another type of papers, I am tempted to call them “Schumpeterean innovation papers,” will derive their validity from being original attempts to conquer new scientific territory. Since most universities in the future will also have to maintain at least a small group of creative, non-standard researchers the academic future for these authors will not be completely doomed too. But for a larger part of those authors an active role in political life, including economic policy decisions, will probably be their fate.

As already mentioned in the beginning, a process has no conclusion – just like this paper. Entities being part of a process, e.g. of political economy, can investigate past and present in diachronic and synchronic ways to enrich their internal models. Using their model to decide on actions might then look like a conclusion drawn from the model. In the middle of a metamorphosis syntax and semantics of the internal model itself are in a profound turbulence. What remains from the longing for a conclusion therefore is just a call to enhance creative science.<sup>24</sup>

## NOTES

1. Since Jean-Jacques Rousseau (Rousseau, 1754), the dead-end of this approach is becoming only too visible. It is as futile as the search of economic principles in the brain of individuals, the favourite topic of experimental economics and its critics.

2. It is telling that fitness in a biological sense refers exactly to this property. For the human species population growth has ceased to be the dominant goal variable. It now is just another endogenous variable and, depending on the context, can increase or decrease overall welfare.

3. A recent report on the education level in the United States revealed that the current youth is the first generation in the US, which on the average is less educated than their parents. This could be interpreted as a hint that something dramatically frightening is on its way.

4. Pharaohs and early kings on top of organization proclaimed themselves as being identical with omniscience, they were “God.”

5. In neo-Marxist theory that has been called the reduction problem, i.e. how to reduce complicated labor to simple labor, both measured in time. One of the first to deal with this issue was Rudolf Hilferding (see Morris and Lewin, 1974). He proposed to use education times spent as an input to more complicated labor.

6. Compare Burns (2017) for a recent perspective on the labour theory of value, and Veneziani (2012) for a survey on Analytical Marxism.

7. The physical carrier system of the money signs at this stage of the argument is irrelevant.

8. The series shown is aggregated data from countries for which it was available and aggregation uses population weights. Due to this necessity the series has two breaks: 1920 and 1950. The country lists can be found in the appendix. WW2 has ended the Great Depression by a boost of war industries feeding GDP that collapsed when the war was over, then the steep reconstruction period started followed from 1973 onwards by the conservative rollback (compare Hanappi, 2018). With the collapse of the USSR and its satellite states an overall downturn occurred, but then, mainly due to the contributions of Asian economies, in particular China, strong growth returned. Growth in OECD countries now stays low, even if the eventually occurring simultaneous renewal of the capital stock pretends a return to strong growth.

9. The Stockholm International Peace Research Institute reports an increase in military expenditure in the USA of 25.46% from 2015 to 2016; from 2013 to 2017 US arms exports (34% of total arms exports) did rise by 25% (see [www.sipri.org](http://www.sipri.org)). But only the country providing the currency that functions as world money can explode weapon demand as public (plus private, watch the NRA) demand. It can print dollars and the implied repercussions can eventually be kept in control. For all other parts of the world this is not possible.

10. It is a depressing, but probable interpretation to understand the emergence of Fascism in the 20<sup>th</sup> century as just a first episode of a certain type of crisis management stemming from exactly this dilemma. Since it is a remedy on a national basis, only it necessarily leads to clash of nations, eventually to war.

11. See Siapera and Veikou (2018) for many details of these recent developments.

12. The understanding of the property relation has played a central role in the emergence of classical political economy (see Jones, 2016, chs. 5 and 6). More recently, its importance has been rediscovered not only by more environmentalism-oriented mainstream economists like Elinor Ostrom, but also by more progressive authors (e.g., Davis, 2015).

13. It was already present in Zenon's famous paradox in ancient Greece.

14. It is this phase of class struggle that Marx refers to when he writes about the dictatorship of the proletariat. Stalinists misused this wording to legitimate the rule of their party after their successful revolt against Russian feudalism.

15. A history of Fascism, Stalinism, European Social Democracy and other movements interpreted from this perspective would be a highly valuable contribution, it is still missing.

16. The notion of the proletariat started as a characteristic of certain workers at the factory level, then was enlarged to be used as a description of a national working class, and finally arrived at the aspiration to consider a global proletariat. Each step of enlargement of the concept has its own difficulties, mainly because the necessary communication processes for the emergence of class consciousness differ substantially.

17. At best, natural science emphasizes that the outcome of a laboratory experiment, which contradicts a prevailing theory is important because it forces the scientist to enhance the theory. In the social sciences, missing the possibility to work with laboratory experiments, this scarce usefulness is not remarked. Standard neo-

classical economics, grafting the consolidated mathematical apparatus of 19<sup>th</sup> century mechanics on invented economic atoms, typically outlaws contradictions.

18. An extremely readable book on the emergence and content of quantum biology, which also provides a survey of current research in the field, was written by Jim Al-Khalili and Johnjoe McFadden (2014). The first international workshop on quantum biology took place in 2004, and a similar emergence of quantum political economy is on its way.

19. See Althusser (2005).

20. If the syntax is just a convention, then a proper setup of it can always allow a strict classification of wrong or right. If it is a logic of order 1, then Gödel showed that there always exist some statements that necessarily must remain undecidable with respect to their correctness. It remains to be seen what quantum mechanics has in store with respect to these loopholes in closeness, which Gödel found (compare Wittgenstein, 2001/1953, and Gödel, 1931).

21. Compare Hanappi (2017).

22. A famous example is the size of the brain of apes, which diminished a bit just before the first humans with their larger brain sizes emerged.

23. Collecting knowledge to generate a new formal language that provides an adequate tool to organize political economy dynamics for the species above all is a pre-condition for synthesis of our knowledge. It certainly needs a global class engaged in this highly transdisciplinary effort. A good example of transdisciplinary is the use of diagrammatic reasoning in quantum theory (Coecke and Kissinger, 2017).

24. A preliminary version of this paper was contributed to the 29th Annual EAEPE Conference 2017 in Budapest.

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## Appendix

Data used for figure 1 comes from the University of Groningen, Groningen Growth and Development Centre.

For 1820 to 1919 the following countries are covered:

Australia, Chile, Denmark, France, United Kingdom, Indonesia, Italy, Netherlands, Peru, Poland, Portugal, Sweden, USA.

*For 1920 to 1950* (additionally to the above listed ones) the following countries are covered:

Austria, Belgium, Bolivia, Brazil, Canada, Switzerland, Colombia, Costa Rica, Cuba, Germany, Ecuador, Spain, Finland, Greece, Guatemala, Honduras, India, Japan, Sri Lanka, Mexico, Nicaragua, Norway, New Zealand, Panama, Romania, El Salvador, Uruguay, Venezuela.

*For 1951 to 2016* (additionally to the above listed ones) the following countries (all countries of the database) are used:

Afghanistan, Angola, Albania, United Arab Emirates, Argentina, Armenia, Azerbaijan, Burundi, Benin, Burkina Faso, Bangladesh, Bulgaria, Bahrain, Bosnia and Herzegovina, Belarus, Barbados, Central African Republic, Botswana, China, Côte d'Ivoire, Cameroon, D.R. of the Congo, Congo, Comoros, Cabo Verde, Czechoslovakia, Cyprus, Czech Republic, Djibouti, Dominica, Dominican Republic, Algeria, Egypt, Estonia, Ethiopia, Gabon, Georgia, Ghana, Guinea, Gambia, Guinea-Bissau, Equatorial Guinea, China, Hong Kong SAR, Croatia, Haiti, Hungary, Ireland, Iran (Islamic Republic of), Iraq, Iceland, Israel, Jordan, Kazakhstan, Kenya, Kyrgyzstan, Cambodia, Republic of Korea, Kuwait, Lao People's DR, Lebanon, Liberia, Libya, Saint Lucia, Lesotho, Lithuania, Luxembourg, Latvia, Morocco, Republic of Moldova, Madagascar, TFYR of Macedonia, Mali, Malta, Myanmar, Montenegro, Mauritania, Mauritius, Malawi, Malaysia, Namibia, Niger, Nigeria, Nepal, Oman, Pakistan, Philippines, Puerto Rico, D.P.R. of Korea, Paraguay, State of Palestine, Qatar, Russian Federation, Rwanda, Saudi Arabia, Sudan (Former), Senegal, Singapore, Sierra Leone, Serbia, Sao Tome and Principe, Former USSR, Slovakia, Slovenia, Swaziland, Seychelles, Syrian Arab Republic, Chad, Togo, Thailand, Tajikistan, Turkmenistan, Trinidad and Tobago, Tunisia, Turkey, Taiwan, Province of China, U.R. of Tanzania: Mainland, Uganda, Ukraine, Uzbekistan, Viet Nam, Yemen, Former Yugoslavia, South Africa, Zambia, Zimbabwe.