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ORIGINAL PAPER

A Limit to Our Thinking and Some Unanticipated Moral Consequences: A Science of Conceptual Systems Perspective with Some Potential Solutions

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Abstract One paradox of modern society is the widespread use of highly complex mechanisms of economic and social self-regulation which produce a large number of unintended and often undesirable side-effects. Human conceptual systems (theories, policies, and mental models which support our thinking) are good enough to keep the self-regulatory mechanisms in operation; yet they are not good enough to prevent and control the undesirable contingencies. Systems thinking, and complexity science are growing in their usefulness for understanding our social systems as well as our conceptual systems. The present paper examines and explains this paradox by combining the ideas from the burgeoning science of conceptual systems and Niklas Luhmann's social systems theory. Drawing on Luhmann's argument that social systems build up their internal complexity by disregarding the complexity of the environment, we propose to differentiate between those conceptual systems that reflect the intra-systemic complexity of simpler systems and those that reflect the intra-systemic complexity of sub-systems in combination with systems of systems to include the environmental complexity. Thus it comes about that the former conceptual systems, exemplified by physics, are much more effective and successful than the latter ones, often corresponding to social sciences. The chasm between the qualities of these systems can be overcome by using the tools of Integrative Propositional Analysis.

Keywords Self-regulation · Systemicity · Complexity · Conceptual systems · Niklas Luhmann · Integrative propositional analysis (IPA)

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Introduction

A puzzling feature of modern society is the widespread use of highly complex mechanisms of economic and social self-regulation which produce a large number of unintended and often undesirable side-effects. Human conceptual systems, such as theories, policies, and mental models, are good enough to keep the self-regulatory mechanisms in operation. Yet they are not good enough to prevent and control the undesirable contingencies. For example, we have an impressive economy, yet it is subject to unexpected crashes. This situation is obviously paradoxical. If human conceptual systems can in principle be highly effective, why do they continually fail to control the undesirable contingencies? On the contrary, if human conceptual systems are assumed to be weak in view of this failure, how does modern society manage to sustain highly complex mechanisms of socio-economic self-regulation in the first place? Why doesn't the success of complex self-regulation spill over to an effective control of its unfortunate side-effects?

To appreciate the dramatism of this paradox, recall that self-regulation presents a universal systemic isomorphism providing an explanation for organized complexity as the central problem of the general system theory (Bertalanffy 1968, p. 34). In spite of the second law of thermodynamics, "there are local enclaves whose direction seems opposed to that of the universe at large, and in which there is a limited and temporary tendency for organization to increase" (Wiener 1989, p. 12). What these enclaves exhibit is systemic self-regulation that potentially encompasses positive and negative feedbacks. It is through self-regulatory mechanisms of various types that open systems, such as living systems, can maintain "themselves in a steady state, can avoid the increase of entropy, and may even develop states of increased order and organization" (Bertalanffy 1968, p. 41). Furthermore, it is the very anti-entropic role of systemic self-regulation that "enables some of us to assert the existence of progress" in society (Wiener 1989, p. 36). In a similar vein, William Frederick (1995, p. 40), a contemporary business ethicist, saw a moral role of entrepreneurial activity in "keeping entropy at bay" and thus promoting growth and development.

The identified paradox of systemic self-regulation alerts us to the fact that the anti-entropic ideas of progress, growth, and development have long deserved a bad name in view of their lack of attention to considerations of social and ecological sustainability (Tuan and Shaw 2015). The most famous philosophical critique of systemic self-regulation originates probably from Jürgen Habermas who sought to combine a social systems-theoretic perspective with the critical standpoint of the Frankfurt School. To him, the social self-regulating systems are unlikely to be sensitive to social pathologies (Habermas 1987, p. 377); he was impressed by the Marxian debunking of "the self-steering mechanism of a self-regulating process of production" as "an objectified and anonymous process of exploitation" (ibid, p. 334). If systemic self-regulation is found to be morally wanting, then so must be a whole range of human organizations, institutions, and practices that rely on various types of self-regulatory mechanisms. If the case for the moral ambivalence of self-regulation is correct, then our whole civilization, in view of its anti-entropic nature, is morally suspect.

The self-regulation paradox leads directly to a "success trap" (March 1991) where our social systems become habituated to following paths that seem to provide orderly and predictable benefits. That trap also leads us to use mental models that are increasingly simple and mechanical. Those models guide and limit our thinking, leading to unanticipated outcomes; surprises that cause more problems down the road. One way out of that trap is to develop a better understanding of our models. By knowing our models we can know if our thinking is mechanical or complex. To use a metaphor, if the map shows one straight road, we would know that our understanding is limited; even though that road seems to lead to the desired destination. In contrast, if the map shows multiple interconnected roads, we know that we have a greater understanding of the intricacies and options inherent in the journey.

Until recently, our ability to compare maps and models has been relatively limited. Political and business leaders have argued over the "best" destination and the "best" road without objectively evaluating the underlying models. In the field of Organizational Development (Industrial/Organizational Psychology) there has been some progress through the use of "dialog" and the "ladder of inference" (cf. Senge et al. 1994). However useful, those kinds of methods are "soft" or "fuzzy." They do not provide an objective method of evaluating models. Therefore, the self-regulation paradox, made difficult by the lack of objective self-evaluation, may be at least partially resolved by the use of Integrative Propositional Analysis (IPA). As will be addressed in greater depth below, IPA may be used to objectively evaluate, compare, and improve models. Returning to the map metaphor, we can use IPA to determine if we have a map that is complex and interconnected, or if the map is straight, clear, and likely to lead to long-term problems.

The goal of the present paper is to develop a systems-theoretic explanation of the self-regulation paradox and to show the potential of IPA as a coping strategy. The systems-theoretic explanation will be based on the work of Niklas Luhmann, another prominent German social theorist and an opponent of Habermas. Luhmann located the main function of social systems in the process of complexity reduction supposed to relieve human mind of excessive cognitive burdens (cf. Terra and Passador 2015). The key contention will be that the reliance on systemic self-regulation fulfills a similar complexity-reducing function. The ideas about the tentative coping strategies will be drawn from the science of conceptual systems underpinning the IPA method (Wallis 2014b, d). After the illustration of the self-regulation paradox on the example of the market mechanism in the next section, the subsequent sections discuss a Luhmannian approach to this paradox. The Luhmannian systems-theoretic perspective will be shown to generate novel insights into the ability of IPA to make human conceptual systems more successful.

Self-regulation in the Economy and Society

The paradigmatic statement of self-regulating properties of the market mechanism is found on the first pages of Adam Smith (1981)/1776 Wealth of Nations: "It is not from the benevolence of the butcher, the brewer, or the baker, that we expect our dinner, but from their regard to their own interest. We address ourselves, not to their humanity but to their self-love, and never talk to them of our necessities but of their advantages". Since then, many economists follow Smith's belief that the self–regulation, or the "invisible hand", of the market makes egoistic acts serve the public good, and serve it much more effectively than if the public good were intended directly. Modern mainstream economics defines the public good in the utilitarian terms of "Pareto optimality – an analytical device that allows economists to separate efficient resource use from the more controversial problem of its distribution" (Swanson 1999, p. 210). Lacking considerations of distributional justice, the idea of Pareto optimality presents a very special type of utilitarianism that "does not encourage the inclusion of moral dimensions, other than self-interest, in explanations of economic choice" (ibid, p. 211) by assuming that "self-interest and the greater public good are largely accordant" (ibid).

In the economic literature, the cybernetic self-regulatory connotations of the Smithian "invisible hand" have been explicitly acknowledged by authors such as Goodwin (1951), Tustin (1957), Phillips (1954), Allen (1956) and Leijonhufvud (1970), each of which drew inspiration from the contemporaneous developments in cybernetics and the general systems theory (cf. Richardson 1999). Leijonhufvud (1970) developed seminal cybernetic reconstructions of Walrasian and Marshallian models of the market mechanism by regarding "the market as a servo-mechanism which continually feeds back the discrepancy between its actual and "desired" state and (hopefully) adjusts the actual state in the direction required to reduce the "error" towards the appropriate zero value" (ibid, p. 1ff., cited in Richardson 1999, p. 278).

It is however instructive to put the self-regulatory mechanism of the market in the context of what Karl William Kapp called social costs, i.e., adverse and uncompensated effects of the capitalist economy on the social and natural environment. Never denying the self-regulating properties of this economy, Kapp nevertheless pointed out the precarious metabolic dependencies of this economy as an open system: "production derives material inputs from the physical and decisive impulses from the social system which, in turn, may be disrupted and disorganized by the emission of residual wastes up to a point where social reproduction itself may be threatened" (Kapp et al. 1985, p. 152). For this reason, Kapp urged to institutionally embed the market self-regulation into a system of public control and regulation (Valentinov 2014a; Valentinov and Chatalova 2014).

In a similar vein, to take an example from political philosophy, the self-regulatory mechanism of the market as such has been never questioned in the Rawlsian theory of justice. Fully accepting that the market self-regulation enables the maximization of social utility, Rawls raised however serious concerns about the fairness of this self-regulation: "each person possesses an inviolability founded on justice that even the welfare of society as a whole cannot override. For this reason justice denies that the loss of freedom for some is made right by a greater good shared by others. It does not allow that the sacrifices imposed on a few are outweighed by the larger sum of advantages enjoyed by many" (Rawls 2009, p. 3ff). The Rawlsian principles of justice put limits on the self-regulatory mechanism of the market in such a way as to keep it within the bounds of justice (Valentinov 2015a).

Kenneth Boulding, an outstanding economist and systems theorist, proposed to extend the conceptual apparatus of self-regulation from markets to business firms, especially large corporations. He pointed out that "every organism or organization has certain variables to which it is sensitive, and a certain range of tolerance for each of these variables. The behavior of the organism, then, can be described in large part in terms of a machinery to keep these sensitive variables within the range of tolerance – if one of them rises above the upper limit of toleration, various forces will be brought into play to reduce it; if it falls below the lower limit of toleration, forces – perhaps similar, perhaps different – will be brought into play to increase it" (Boulding 1984, p. xxviiff). Examples of such variables for corporations may include profit position, market share, and public reputation (ibid, p. xxx). Maintaining sensitivity to these variables often requires corporations to utilize "defensive machinery" that protects them from erratic changes in the environment (cf. Boulding 1988, p. 7). Echoing Niklas Luhmann's dictum of "complexity increase through complexity reduction", Boulding insightfully connected the self-regulatory properties of corporations with their limited sensitivity to major fragments of their social environment (cf. Valentinov 2015b, 2015c).

Interestingly, Boulding argued that the limited sensitivity of corporations to their social environment must result in the marginalization of certain stakeholders, such as workers and farmers, each of which are likely to be exploited by the steadily growing corporate power. "Workers are part of the environment of the enterprise rather than part of the enterprise itself… Their relationship with the enterprise is continually limited by the fact that they can quit at any time and try to get a job in some other enterprise" (Boulding 1984, p. 19). Farmers likewise stand to lose from their contractual relations with agribusiness corporations which grow much more rapidly and considerably than individual farms can normally do. Again, in full awareness of the self-regulating properties of corporations, Boulding perceived corporate self-regulation to generate a "larger movement, which in its social aspect is a movement for equality of status and mutual improvement on the part of the lower status groups and in its economic aspect is a 'revolt against the market'" (ibid, p. 109). Two relevant examples of this "larger movement" are worker movement and farmer movement, respectively carried by labor unions and farmer organizations (Valentinov 2013).

It is probably true that the activities of nonprofit organizations more generally reflect and seek to redress the sustainability problems caused by the self-regulating properties of both markets and corporations (cf. Valentinov 2012, 2015d; Valentinov and Vacekova 2015; Valentinov et al. 2015). The crucial point though is that these properties engender numerous moral concerns related to social costs and social injustice, exemplified e.g. by the marginalization of weak stakeholders. Even though scholars and professionals must be commended for developing mental models that accommodate the contra-intuitive effects of systemic self-regulation, the persisting moral concerns and market surprises suggest that these models are incomplete.

Explaining the Self-regulation Paradox: A Luhmannian Perspective

The preceding discussion draws a paradoxical picture of modern society which, on the one hand, exhibits complex self-regulation mechanisms embodied in markets and corporations. On the other hand, many of these mechanisms generate unintended and undesirable consequences that thwart many of the intended commendable goals. The unintended consequences are a testimony to the imperfections of human conceptual systems. Crashes of various markets, a sudden flood of refugees, outbreaks of crime, and other surprises are all too common. The remarkable fact though is that these imperfections do not seem to interfere with the highly complex process of self-regulation in markets and corporations. This paradox becomes understandable upon recalling Niklas Luhmann's dictum that social systems increase their own complexity by disregarding the complexity of the environment (cf. Luhmann 2009, p. 121). Ignoring the environment helps social systems to concentrate on the unfolding of their internal complexity which could not unfold if they were distracted by the numerous erratic signals coming from outside (Valentinov 2014b). Luhmann argued that the very high complexity of the modern functionally differentiated society is rooted in this externalization that is practiced by every functional system, such as the economy, law, politics, and science. At the same time, it is due to this externalization that the modern society is erratic, unpredictable, and ungovernable (cf. Brans and Rossbach 1997; Djanibekov et al. 2016; Valentinov and Chatalova 2016; Valentinov et al. 2016).

The externalization of the environmental complexity is the core idea of the "system-environment" paradigm that Luhmann advanced as an alternative to the traditional philosophical "part-whole" approach to systems (cf. Luhmann 1999, p. 171). The system-environment paradigm postulates the divergence between "systemic rationality" and "world rationality" (cf. Luhmann 1989, p. 138). This means that the very rationality of specific social systems, such as conceptual systems and business systems, may render them unsustainable or ineffective in their broader environment. The ongoing deterioration of the ecological and social sustainability of human civilization is an illustration of this point (Chatalova et al. 2016; Valentinov 2015e).

This characterization of modern society is certainly pessimistic (cf. Roth 2015). Not only is this society unable to offer a concerted response to its advancing "ecological degradation" (Luhmann 1989); all the functional system fail to "control interdependencies in their environment. The more we rely on systems for improbable performances, the more we shall produce new and surprising problems, which will stimulate the growth of new systems, which will again interrupt interdependencies, create new problems, and require new systems" (Luhmann 1990, p. 182). Thus it makes sense to differentiate between those conceptual models that reflect intra-systemic complexity of human organizations and those that put the intra-systemic complexity in relation to the environmental complexity. Given Luhmann's above mentioned dictum of "complexity increase through complexity reduction", it seems plausible to conjecture that the former conceptual systems will be more effective and successful than the latter ones. The highly complex self-regulation in markets and corporations is driven by the former conceptual models, while the latter conceptual models are concerned with the much more difficult task of disentangling the effects of this self-regulation on the societal and natural environment. The difficulty of realizing this task reflects, to Luhmann (ibid, p. 138), "the costs of increasingly improbable complexity".

A dramatic example of the discrepancy between the types of conceptual systems can be found in the work of Norbert Wiener (1989) who, after having developed ground-breaking insights into the construction of cybernetic machines, came to develop serious moral concerns regarding the uses to which these machines can be put. In the field of cybernetics, Wiener's work certainly exemplifies a highly effective and successful, indeed widely acclaimed, conceptual system. In Luhmannian terms, however, this work has been a part of the internal operation of the functional system of science. Like all other functional systems, the science system builds up its internal complexity by disregarding the complexity of the societal environment. Wiener's moral concerns about militaristic and other morally questionable uses of his scientific ideas indicate his acknowledgment that the externalization of the societal environment by the science system has probably gone too far. The fact of life seems to be is that practical human action, the systemic complexity-reducing function notwithstanding, cannot externalize the relevant environment. Accordingly, in real life, even physics has societal implications, which may or may not be acknowledged by the relevant conceptual systems.

The Burgeoning Science of Conceptual Systems

Background

The science of conceptual systems is aimed at "the pursuit of knowledge and understanding of conceptual systems using rigorous methodologies" (Wallis 2015c). It focuses attention on the logical and causal structure of propositions of which conceptual systems are composed. The science of conceptual systems seeks to improve the usefulness of conceptual systems through analyzing and optimizing their logic structures (Wallis 2015d) and the abstraction of their concepts/variables (Wallis 2014a). The primary methodology for doing so is Integrative Propositional Analysis (IPA) which is applicable to any type of conceptual system, be it laws of physics (Wallis 2010a) or ethical standards for corporations (Wallis 2010b), for all such conceptual systems contain variables and propositions.

The science of conceptual systems and IPA have been developed by cognitive scientist Steven E. Wallis (2015c) who drew upon a range of disciplines such as grounded theory, dimensional analysis, scientometrics, bibliometrics, a structuralist perspective, systems thinking, complexity theory, and narrative analysis . IPA has been applied to evaluate and improve conceptual systems in a wide variety of fields including entrepreneurship (Wright and Wallis 2015), social entrepreneurship (Wallis 2008), intercultural understanding (Cannavale and Wallis 2015), education (Russell and Wallis 2015), policy (Wallis 2010c, 2011a, 2013b; Shackelford 2014), economics (Cotae 2015), complexity (Wallis 2009a), organizational learning (Wallis 2009b), ethics (Wallis 2010b; Imam et al. 2014), physics (Wallis 2010a), complexity (Wallis 2011b), management (Wallis 2012), interdisciplinary (Wallis 2014c), de-fragmenting sciences (Wallis 2014d), sociology (Wallis 2015a), psychology (Wallis 2015b), a gamified approach to developing knowledge maps (Wright and Wallis 2015b), and in consulting work with an international research center as part of a Fulbright Specialist project.

Integrative Propositional Analysis

IPA is a six-step process to deconstruct conceptual systems into their component propositions and provide objective measures. Concepts (relating to variables) are enumerated to show the Complexity or explanatory breadth of the conceptual system. The causal interconnectedness of those concepts is evaluated for their systemicity (structure, or explanatory depth). Systemicity is measured on a scale of zero to one with one being the highest. For example, a bullet-point list of concepts would score a zero while a law of physics (amenable to algebraic manipulation) would score one.

With IPA, Complexity is held to be a weak indicator of success for a conceptual system because of the difficulty of working with (or even keeping track of) the larger number of variables. The increase in explanatory breadth does not automatically bring an increase in explanatory depth. In contrast, Systemicity is held to be a strong indicator of success because high-scoring theories and laws of physics are highly successful while low-scoring theories of the social sciences are not. Indeed, it has been speculated that we may be able to double the effectiveness of our conceptual systems in the social/behavioral sciences by doubling their Systemicity (Wallis 2015c). This would include the theories we teach in classrooms as well as conceptual systems that are used to guide business firms—often referred to as strategic plans or strategic knowledge maps. We may understand those plans and maps as guidelines for the self-regulation of corporations.

The key insight from the previous applications of IPA is that conceptual systems from the social/behavioral sciences tend to score low on Systemicity, often around 0.25. The low score provides a new explanation why our theories in those fields have not proved highly useful in practical application. For example, the very popular corporate improvement process of Total Quality Management (TQM) is successful only about 25 % of the time (MacIntosh and MacLean 1999). This low level of success has led some to advocate abandoning theory in the field of business (Burrell 1997). A study of Gandhi's ethics shows a Systemicity of only 0.25 (Wallis 2010b). The low level of structure suggests that his ethics will not provide a reliable guide—despite the admirable goals. In our consulting work, IPA assessments of corporate values and strategic plans have found similarly low levels of structure. So, a similarly low level of understanding and responsibility is to be expected.

From the Luhmannian perspective, it seems that the essential reason for the low effectiveness of these conceptual systems is that they are concerned with the environmental complexity which, according to Luhmann, presents the premier object of externalization. Low Systemicity and Complexity of our conceptual systems reflects the lack of appreciation of, and low sensitivity to, the social and ecological environment in which social systems, such as corporations, markets, or even the science system, operate (Hielscher et al. 2016; Wallis and Valentinov 2016). As an example of a scholarly conceptual system, consider Ohm's law of electricity. It is highly useful for accurately predicting changes in Volts, Amps, and Ohms. Thus, it may be used to design such things as radios and computers. However, it cannot be used to predict what might happen when those devices are used, because that law does not include concepts relating to social behavior.

In addition to Complexity and Systemicity, we may also infer some general insights regarding unintended consequences. When a concept/variable is "transformative" or "concatenated" (has two or more causal arrows pointing towards a box on a diagram) it is more predictable (as a good dependent variable should be—with multiple independent variables) so is less likely to result in unintended consequences. Those concepts/variables within a conceptual system with fewer causal connections are more likely to end up representing unanticipated consequences. And, those concepts that are not part of the conceptual system at all are still more likely to be related to unintended consequences, even though it is admittedly difficult to know which ones (unknown unknowns) for the very reason that they are not part of the conceptual system.

The last point identifies the essential limitation of IPA: it cannot be taken to be a success guarantee. First, IPA is in its early stages as a methodology. While it has great promise, additional research is required before it gains unconditional acceptance in academic circles. One limitation of IPA research is the difficulty in comparing conceptual systems of the social sciences such as policies. IPA is focused on the systemic structure of the policy while there are many other variables to consider such as the reliable implementation of the policy (Wallis 2010c, 2011a, 2013a). The many variables under study are additionally confounded by the high failure rate of virtually all policies (Light 2016) and the plethora of alternative explanations.

Further, IPA and the science of conceptual systems more generally do not cancel the Luhmannian observation that social systems, and conceptual systems in particular, externalize the complexity of the social and ecological environment. For example, the laws of physics developed during the scientific revolution led to modern technologies unimaginable then. Technologies which may both cause unanticipated problems today as well as help to resolve them.

Policy Implications

Paradoxically, though, this limitation is its main strength. If the Luhmannian argument is correct and human conceptual systems generate dangerous side-effects, then IPA gives us reason to hope that human society can still be made more sustainable. Toward this end, IPA holds the potential to improve human conceptual systems by making them more systemic, more complex, or both. Furthermore, it holds the potential to identify new conceptual systems.

When we apply the IPA perspective to corporate self-regulation, new insights emerge. Consider, for example, a simplistic corporate strategy instructing all departments maximize the firm's financial profits (cf. Agafonow 2015). Such a single-minded plan would most likely lead to a multitude of unintended consequences as everything from strip mining to bank robbery would be acceptable behaviors under such a mandate. Additionally, we might expect that such a firm would quickly fail as it destroys its own environment or finds its employees in prison.

In contrast, consider a strategic plan which contains a very large number of concepts related to corporate behavior. Such a plan might have concepts relating to finance, legal relationships, and the environment. In addition, such a plan might indicate causal relationships between the many concepts/variables. That way, departments that are using the plan to guide their actions would have a more clear guide for behavior. With a plan of higher Complexity and Systemicity, the corporation would more easily predict the results of their actions, avoid catastrophic problems, and so more easily achieve success and longevity.

From another perspective, plans with low levels of Complexity and Systemicity would be very much hit and miss in terms of their success. Having a simple plan (low Complexity) means that managers will be taking fewer variables/concepts into account. So, whether the corporation is successful or not, there is greater likelihood for fundamental attribution error, e.g. attributing organizational success to the managerial skill when the real source of success was the unaccountable access to natural resources. Thus, managers would be more likely to continue behavior that leads to short term success with greater likelihood for contributing to unanticipated problems including environmental degradation and social injustice.

Generally, approaches such as deploying "value statements" cannot be expected to improve and maintain corporate morality because ethical systems (such as corporate value statements) seem to have low levels of Systemicity (Wallis 2010b). As a result of poorly structured ethical systems, "people find such perspectives unreliable and so are not compelled to alter their behavior to fit any one particular system of ethics… people feel free to switch their ethical allegiances at the drop of a hat" (ibid, p. 549). Thus, the organization cannot expect reliable behavior from its people any more than the people can expect moral behavior from their organization.

These insights suggest important strategies for those who work within organizations. This applies to all organizations which have contact with an outside environment, including for-profit corporations as well as research and educational institutions (cf. Kazakov and Kunc 2015). First, members of organizations (for-profit, non-profit, governmental, educational, etc.) should strive to increase their learning—to become more sensitive to their outside environment (cf. Dzombak et al. 2014; Ariyadasa and McIntyre-Mills 2015). This has the additional implication that the person should recognize what is and what is not within their organizational boundary. This means that individuals should explore beyond their boundaries; not only to gain new information about concepts with which they are already familiar, but also to learn new concepts. This has the effect of increasing the Complexity of one's conceptual system.

As noted above, there is a limit to how many concepts a person might understand and use. Therefore, the second, strategy is to synthesize those new insights and create a knowledge map where concepts are linked through causal connections. This way, the ethical ambivalence of the "invisible hand of the market" which supports ecological decay and social decline may be balanced by individuals who are able to create and deploy conceptual systems of greater Complexity and Systemicity.

Because it is difficult to see those invisible forces, we recommend that individuals use IPA to create maps of their own understanding and maps of their organization's understanding (often found in mission statements and value statements). A simple but effective approach may be found in the form of the ASK MATT game (Wallis and Wright 2015a). This kind of process helps individuals see what is "not there" on the map, thus indicating new directions for exploration and discovery.

For a business manager, this kind of strategy might mean identifying what effects the organization is having on the surrounding community and environment. It might mean working with individuals and organizations as part of a formal or informal coalition and working beyond the traditional scope of the organization to improve the environment, social justice, and financial benefit. For scholars, this kind of strategy might mean identifying a boundary such as one's existing focus on research and publication, and then go exploring beyond that boundary to seek collaboration with other scholars or participation in one's city council or community group.

Generally developing theories of education, thinking, and creativity which have measurably greater Complexity and Systemicity than existing theories would answer this call. Perhaps the most efficient approach would be to synthesize existing theories (Wallis 2014d). While such an approach may seem too complex for some, it is certainly no more difficult than other methods of business analysis such as SWOT which is characterized as both laborious and time consuming (Hill and Westbrook 1997). Indeed, our experience using IPA for individual and organizational development shows that it is possible for non-experts to learn and apply insights with a reasonable amount of effort. Applying such effort to understand a seemingly complex process seems reasonable given the potential benefits. For example, using a "gamified" version of IPA (Wallis and Wright 2015a, b) members of organizations and coalitions have developed and improved their knowledge maps in a matter of hours. As part of a consulting firm, facilitators have been certified to work with clients using IPA. As a Fulbright Specialist, one author of the present paper applied IPA in interviews and workshops to support a research center in its efforts to develop more effective theories, policies, and strategic plans (papers currently under development).

The potential benefit for IPA may be easily seen by comparing the Systemicity of national policies which is often under 0.18 (Wallis et al. 2016) with the success rate of national policies which was recently shown to be about 17 % (Light 2016). If we can use IPA to double the Systemicity of our policies, we may be able to double the success rate of our policies. Thus, the effort of a few hours (or even months) to understand and apply IPA would be amply rewarded. For example, consider the 80 billion Euros earmarked for research and education as part of the EU2020 programme (http://ec.europa.eu/health/programme/docs/maff-2020_en.pdf). A mere one percent improvement in the policy model would suggest a more efficient expenditure of funds suggesting, in turn, an effective savings of 800 million Euros. Certainly, a potential result that would be worth investing a bit of effort.

Finally, it may be possible and desirable to make those integrated theories available for real-time use through an interconnected system of cloud-based hand-held computers. In general, in order to increase our personal and institutional sensitivity, we must become more complex. That is to say, we must gain the ability to identify and understand more aspects of the world than we do today.

Concluding Remarks

The present paper argues that conceptual systems are a double-edged sword. As Luhmann has shown, conceptual systems enable individuals to act and to orientate themselves in the complex societal environment. While this orientation is absolutely crucial in the modern society, it is often bought at the cost of disregarding multiple environmental consequences. The highly complex modern mechanisms of socio-economic self-regulation run on such precarious conceptual systems. The science of the conceptual systems and its central tool of the Integrative Propositional Analysis lay bare this precariousness and thus demonstrate the strengths and limitations of self-regulation, such as the one embodied in the famous Smithian invisible hand.

The original contribution of this paper may be found in the concatenation of insights from the study of conceptual systems with Luhmann's insights to show how people such as managers might promote sustainability for their organizations and communities. While IPA as such has been well described in the literature, its synthesis with the Luhmannian approach highlights the counter-intuitive moral dimensions of the self-regulation of social systems. The crucial point is that people tend to assume responsibility more readily for their own intended and conscious acts rather than for highly complex and impersonal processes of systemic self-regulation, like those traditionally associated with the market mechanism. The emerging moral imperative then is to make sure that the valuable complexity-reducing function of social self-regulatory mechanisms does not eventuate in sustainability deficits, exploitation, alienation, and exclusion. Standing up to this imperative calls for our continual awareness of the blind spots of our conceptual systems, and of the attendant need to make them more complex and systemic.

In a sense, IPA blurs the line between the natural sciences and the social/behavioral sciences by showing how laws, theories, and ethics are similar (all are amenable to IPA and all serve as guides for behavior). We have also blurred the line between research and practice by suggesting that scholars explore beyond the bounds of the ivory tower and place some of their vast expertise toward the benefit of their civic community.

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