Dialogue, Debate, and Discussion

Black Swans and Generative Resilience

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Resisting and recovering from a shock like COVID-19 definitely takes more than 'bouncing back' to a previous state (the original engineering meaning of 'resilience' of a material): in general because, unlike physical systems, social systems are unlikely to 'return' to the past without changes, and in particular because the shock has the disruptive features of a 'black swan' (Taleb, 2010). The impossibility of a return to the past is more an opportunity than a limitation though, as the fragilities of the past order are among the very causes of the disaster. Fortunately social systems (as well as some natural ones) can be resilient in a broader sense and in further ways, more innovative, strategic, and change-oriented. Such a broader notion of resilience is in need of study (Annarelli & Nonino, 2016; Hamel & Valikangas, 2003) and perhaps the analysis of the responses to the coronavirus crisis will contribute to extending our knowledge in this respect. In fact, this type of 'bouncing forward' or 'generative' resilience distinctively involves the imagination of the new in response to the unimagined – indeed a difficult operation, calling for particular forms of thinking, not only for particular structures. In fact, no system is going to be robust if decision making is not robust. No structure would save us from diagnostic errors, wrong inferences, and judgmental biases. Hence this commentary is organized in two sections, respectively dedicated to the forms of thought, and to the forms of organization that may support (re)generative resilience, in the conditions created by the COVID-19 crisis. Empirical examples will be drawn from selected experiences in the management of the crisis and in the modes of learning from experience (observed especially in Italy), enriched by analogies with other experiences and data in the management of the unexpected.

PRECURSORS, PREPARATION, AND RATIONAL IMAGINATION

Not all black swans are equally black (Runde, 2009) and effective responses are likely to vary accordingly. In particular, one distinction makes a lot of practical

difference: are black swan events that are 'unimaginable' in kind, or just 'unimagined' by certain actors in a certain context? Many of the events recently classified as black swans – the attack to the twin towers in 2001, the sub-prime financial crisis in 2008, the current 'Asian disease' pandemic – are actually a mix of the two, in various degrees, as some signal that events 'of that type' might have occurred were present and could have been observed. Actually, those signals had been observed in all those cases, and even 'voiced', but those voices went unlistened by those in power who could have taken appropriate action. In the COVID-19 case, actual previous experiences of virus diffusion had been scientifically studied and a protocol of emergency action even produced by the World Health Organization. This observation leads to distinguish two types of measures: for being prepared to the unprobable but imaginable, and for being robust in the face of the unimaginable.

The first and foremost measure that can be taken for 'managing the unexpected' (Weick & Sutcliff, 2007) is actually to make it less unexpected. Some of the means have actually been identified and prescribed in the study of 'high reliability organizations' and protection from natural hazards: pay the most serious attention to all *precursors*, voices, and signals, even and especially 'weak' ones; *early disclosure* and diffusion of that information; and *distributed decision making* power to make prompt intervention possible – precisely what has not occurred in the early stages of the present crisis in most countries.

The study of learning from rare and unique events under high risk and uncertainty, where high reliability is also necessary (Christianson, Farkas, Sutcliffe, & Weick, 2009; March, Sproull, & Tamuz, 1991) have indicated other paths to effective behaviour in those conditions. In fact, signals and precursors are not always present, or may be false alarms. An essential complementary strategy is *preparation rather than prediction*. Studies on the decision behaviors and systems conducive to the prevention of disasters on airplanes, especially in high risk flights such as military ones, can provide templates of applicable methods (Grandori, 2015). They include keeping systematic note of all occurrences in every flight (data gathering); and analysing those data to generate valid causal models of possible 'types' of actions leading to solve 'types' of problems (data analysis). This systematic analysis generates a 'book' containing part of the valid and reliable knowledge that can be used in a fast way in case of emergency – an analogue of the actually existing, but unbelievably neglected, 'protocol' on which measures to take in an epidemic emergency.

Still, in the context of risky flights, it is stressed that not everything can be imagined and that the 'book' is far from being an exhaustive guide. A major effort is also devoted to be prepared to act, quickly and wisely, *'out of the book'*, acknowledging that *truly unimaginable* types of events may occur. How is it possible to be prepared for the unimaginable? Actually it is possible, and even with method (Byrne, 2005; Simon, 1973): generating hypotheses of action with high chances to solve problems, using pertinent theories (rather than at random or, worse, by

systematically biased judgment); holding a wide repertory of possible explanations (hence wide, multidisciplinary general knowledge, as the diffusion of a disease depends also on social and demographic variables); abducting possible laws (e.g. of contagion) avoiding faulty inductivist inferences; always test hypotheses… – i.e., the same methods sustaining the formulation of good hypotheses in science or design. It has also been shown that those 'rational heuristics' can solve problems more quickly and with less mistakes than the fast and frugal, trial and error, experiential, routine-driven decision behavior (Grandori, 2015). In the context of military flights, the main source of good hypotheses is, for example, scientific knowledge in the mechanics and physics of aircrafts and flight, in which pilots are in fact trained.

The benefits of 'reasoning like scientists', through intendedly unbiased hypotheses generation and testing, even if the decision maker is a manager or a politician, seems difficult to grasp and accept. In the polemics exploded on the issue in Italy, the issue is typically misunderstood as 'giving out government' to scientists and technicians. Yet, the problem is not the revenge of science against politics, but sound scientific reasoning by both scientists and policy makers. In fact, behaviors oriented to gain power and visibility rather than to solve problems where lives are at stake, or behaviors biased by the use of faulty heuristics, is equally bad no matter whether adopted by scientists or by politicians. Another aspect that turned out difficult to understand is the meaning and role of different judgments among scientists. In the Italian debate after having celebrated the rehabilitated importance of competence and science, opinion leaders seem to be ready to renege it again, just because scientists do not agree on everything; overlooking the difference between a confrontation among rival hypotheses (that is a healthy, even normal, epistemological path to approximate truths), and a clash of 'opinions' (the Platonic world of 'doxa', where no amount of discussion is going to bring closer to truths, nor it is even its function).

Providing arenas for deliberative decision making, and instituting connections between the locuses where rival hypotheses are confronted and where rival legitimate interests are represented, seems the main way to go…Rather than striking this balance, the real experiences seen in this crisis seem to be positioned at two opposite extremes: giving too little space to those 'arenas' and bodies (it looks like the UK and the US might be examples) and giving them even too much space (apparently in Italy, the various commissions ended up involving some 400+ experts; and their further integration with the different interests of 20 regions and a variety of industrial sectors became far too complex a coordination task in various moments).

RESOURCEFULNESS, REDUNDANCY, AND MULTIMODAL ORGANIZATIONS

Knowledge is a resource of utmost importance, but of course material and organizational resources matter as well. In particular their abundance, and more

precisely their redundancy (Taleb, 2010). The public debate trying to learn from crisis management typically focuses on attributing guilts and merits to actors' choices, neglecting structural aspects that could have been much more impactful (an instance of 'fundamental attribution error'). Which structural factors have made a difference in comparative resilience?

In a comparative study on organizing for resilience in Italy, including both Military Airforce units and Health Care intensive therapy units,[1] we found that the internal organizational profile on Weick and Sutcliffe's dimensions of high reliability organization were quite similar and reasonably close to a 'mindful' profile. By contrast, what occurred distinctively in healthcare, undermining its resilience, are drastic resource cuts. The lack of qualified personnel, both doctors and nurses, was lamented as a critical issue even before the virus epidemic. Equipment and intensive therapy places – resources that might go underutilized in normal times – had also been cut. The ratio of those places to the population ended up to be 1/3 of that of Germany – one simple reason of the superior response of the German system.

In fact, the first and baseline mode for facing unexpected demands has been early identified in keeping *slack resources* and *resourcefulness* is a recognized component of resilience (Pirotti & Venzin, 2017). But unfortunately this classic principle has been neglected or even openly reneged in times of austerity. A second organizational feature that is expected to make a difference in coping with uncertain events is *'generalism'* rather than 'specialism': be endowed with polyvalent resources, so that new action can be generated by the same resources.

Specialization is indeed a source of fragility, especially if large, irreversible investments are made to optimize a process for one single type of outcome; and if the competences in doing something else get lost. In organizing for resilience specialization should be coupled with maintaining the capacity, the potential of doing something else. For example, it has been often noticed that the international division of labor transforming China in the 'factory of the world', accompanied by the loss of those competences by western economies, has been a major source of fragility. The way out is not to renounce specialization or outsourcing altogether. The point is avoiding the competence loss, the imprisonment into one form of organization. One way of not falling into that trap is cultivating *'plural forms'* (Ménard, 2013), for example coupling out-sourcing and off-shoring with some internal organization of the same activity.

However, black swans may require something more than generalism or polyvalence, i.e., cultivating the capacity to do a wide range of known things. The new things to do may be unknown. What is required is a capacity to do well in a variety of possible circumstances without knowing which they might be.

The most important basis for that capacity is *'multifunctionality'*: the richness and redundancy of functions, albeit only partially known ex-ante, of resources and actions lay at the heart of innovation, design and 'robust action' (e.g., Padgett & McLean, 2006; Taleb, 2010), hence for generative resilience. For

example, many firms in the lockdown situation managed not to stop activities, by putting their resources to new use and reorganize accordingly. People cannot buy clothes? Let's make masks. Cannot go to restaurants? Let's bring restoration to their homes. Declining demand for robotics for automotive? Let's make automatic equipment for agriculture.

Still, there are limits to flexibility and multifunctionality. The reconfiguration of resources and activities is not applicable or convenient in all activities. Organizational ecologists made the observation that *'duration'* matters: if an adverse condition can be expected to be of short duration and the demands are very different, waiting for the environment to return in a favorable state can be better than trying to adapt. This observation could be valid also for black swans. And in fact, the initial lockdown reaction could be seen as a strategy of this sort. Being unknown and very costly to adapt, better to stop and wait. Now, that we are discovering that duration may be long, and that we have learned ways to adapt at a bearable cost (living at distance with protections), we are turning to adaptation.

In some cases, though, it may be close to impossible to 'flex' resources and structures. It would be quite difficult to put Ilva's steel production furnaces to other uses. Hence, for part of our economic systems, adaptation, or exaptation, will necessarily occur at the organizational population level, not at the level of single entities. If a prediction can be made, is that renaissance after crises is likely to walk with the legs of new firms. Public support programs, at least in Italy, are currently understandably focused on keeping people and entire sectors of enterprises alive. But in a growth perspective, providing support to *new firms, born to meet the demands of the future*, will become central. The post-COVID start-up wave has in fact already begun, in Italy as elsewhere.

A third core tenet in our field is that the management of the unexpected requires decentralized and networked organization (Gulati, 2009; Pirotti & Venzin, 2017; Weick & Sutcliff, 2007). However, conditions as those created by many black swans are likely to require something more also in this respect. In fact, events like COVID-19 not only combine the two main dimensions of uncertainty – unexpected events and lack of consolidated knowledge on which action to take – but they are subject to two further constraints: a pressure for fast decision making and the terribly high cost of errors. Hence, non-hierarchical decision making is important but not enough; an essential complement is solid distributed knowledge, let's say '*knowledgeable decentralization*'.

Differences in this respect have been in fact considered one possible explanation of the different performance of the healthcare system in two of the Italian Regions most affected by the epidemics: Lombardia and Veneto. The Veneto health care 'model' is more decentralized and distributed on the territory, with a more intense role played by doctors close to people where they live; while the structure in Lombardia is more based on large specialized hospitals, by the way known for their excellence. Nevertheless, under an epidemic crisis, the verticalized

and specialized system turned out to be more fragile, actually contributing to the diffusion of the virus in early stages, when people went to hospitals for the unknown disease, rather than the doctors going or assisting them where they were.

Still, the comparison between 'centralized' and 'decentralized' systems does not capture the whole story. If a range of partially contrasting performance criteria are to be met, like velocity in decision making, low error rates, generation of new solutions, and low waste of resources, then a mix of mechanisms is likely to be necessary. This claim can be supported by studies on organizational structures performing well in conditions of high risk and high uncertainty.

For example, Bahrami (1992) maintained that the 'secret' of organizational effectiveness of highly innovative Silicon Valley startups is to avoid the typical organizational choice between opposite features on a series of dimensions, such as: centralized or decentralized? formal or informal? planned or adhocratic? The solution is identified in adopting elements of *both those opposite features*, replacing the 'or' with an 'and' to construct a '*bimodal organization*'.

A generalization of that point can be found in Grandori and Furnari's studies in organizational chemistry. Organizations governed in a 'single mode' are relatively fragile, whatever the privileged mode is: either entirely incentive-driven and market-like; or pervasively bureaucratically regulated; or wholly based on socialization and communitarian alignment; or only using committee-like democratic decision making among constituencies with different interests. By contrast, '*multimodal organizations*' governed by a mix of mechanisms of all those different kinds (traditionally conceived as 'alternative') perform better across conditions (different types of sectors and different types of outcomes). Indications that the combination of organizational strategies usually considered opposite increases resilience can also be found in studies on public policies in recent economic global crisis (Wriegley & Dolega, 2011). What those results suggest is that generative resilience in high pressure, high stakes crises as the current one is best supported by a mix of wide expert consultation, communitarian support, democratic control, and fast authority-based decisions.

NOTE

[1] Unpublished Research Report, CROMA, Bocconi University

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