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Filippo Reale

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‘Selling the monster’ or the relevance of cultural-cognitive conditions in creating demand for innovation: the case of COVID-19 vaccines and beyond

Filippo Reale

Faculty of Social Sciences,
Goethe-University Frankfurt,
Theodor-W.-Adorno-Platz 6,
60323 Frankfurt am Main, Germany
Email: reale@soz.uni-frankfurt.de

Abstract: Starting from the current, problematic inertia in citizens’ demand for coronavirus vaccinations, the article argues that public demand for innovations crucially depends on consumers’ ability to cultural-cognitively process the degree of novelty that the innovation brings about. This is not only of major importance for entrepreneurs who aim to commercialise innovations or otherwise create markets and demand, but as importantly, it concerns innovation and industrial policy who have a responsibility to establish and maintain reliable demand structures. Lastly, it strongly concerns contemporary ‘mission-oriented’ or transformative innovation policy, since ‘grand challenges’ can be addressed, and transitions performed only if the technological dynamics involved are accepted on a wide scale. The proposition is that, given the cultural-cognitive origins and the emotive form of certain impediments to demand, rational incentives are largely ineffective remedies for them. Instead, in the short run, social structures are necessary by which to comfort and ‘solace’ potential consumers.

Keywords: coronavirus; COVID-19; vaccine; vaccine hesitancy; vaccine reluctance; innovation; technological change; market formation; commercialisation; generalisation; innovation policy; technology policy; entrepreneurship; mission-oriented innovation; grand challenges.

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Biographical notes: Filippo Reale is a Post-doctoral Researcher at the Faculty of Social Sciences of Goethe-University Frankfurt. He received his PhD from the University of Cologne as a Research Fellow of the International Max Planck Research School on the Social and Political Constitution of the Economy. His research focuses on entrepreneurship and innovation, organisational learning, and societal transitions.

1 Introduction

When the COVID-19 pandemic broke out in 2020, economists Azoulay and Jones (2020), in an essay in *Science*, called upon the transformative potential of 'innovation society' (Rammert et al., 2018) and claimed that it was both possible and promising to, as they say, try and 'beat COVID through innovation'. After governments across the globe immediately started to subsidise innovation processes to search after an efficient COVID-19 vaccine, the authors' optimism has turned out justified given that reliable vaccines have in fact been available for quite a while already at the point of writing this article. However, distributive complications abound, especially with distributing vaccines fairly to the Global South and other areas of weak infrastructure and contested statehood. But, interestingly, even in the Global North where availability is no longer any kind of an issue, vaccination rates are stagnating on levels that far fail to fulfil common policy goals. On 11 March 2022, the ECDC reports that roughly just 75% of the population in EU/EEA countries have received at least one dose of a coronavirus vaccine (ECDC, 2022), while, additionally, the trend seems to have been stagnating visibly for weeks. Here, moral appeals as well as economic incentives have proven somewhat almost futile lately in invigorating vaccination uptake among the groups that remain, leaving policy makers increasingly helpless. The following argument now starts from the observation that, in discussing the complexity of reasons for this, little has been said about the relationship between the public whom current policies are addressing and the innovation that such a vaccine is. In that, it picks up a fruitful exchange that has taken place between *socioeconomics* and *science and technology studies* about how the materialities of innovation co-determine economic dynamics in current innovation society (Pinch and Swedberg, 2008). More concretely, this suggests how the relations and interactions between actors and technologies, which STS analyses, serve to explain the formation of markets that involve these technologies, which are of crucial interest to the *socioeconomics* of innovation. Understanding now the mediocre rate of vaccination, socio-economically, as a mediocre *demand* for these vaccines, it may be possible to contribute to explaining present dynamics by applying to them such interdisciplinary models of demand for innovation.

Put briefly, the argument starts from Mary Douglas' anthropological model of 'objects out of place' and applies the propositions which this model delivers with respect to innovation to COVID-19 vaccines, arguing through Douglas that these vaccines may have invoked a fundamental form of fear among potential consumers which, in turn, increases their reluctance and, on aggregate, hampers demand. Again, the case of COVID-19 vaccines shares these properties and challenges with any kind of new technology. The type of problems that will be discussed to occur in creating a firm public demand for COVID-19 vaccines remains the same with respect to diffusing, distributing, and commercialising innovation across the board. This means that the following argument will yield two distinct analytical and policy advancements: It will not only deliver some timely propositions as to why the rate of vaccination against COVID-19 currently remains stagnantly mediocre, thereby leading to some policy implications with regard to current immunity governance. It is also going to carve out a basic social mechanism that potentially impedes commercialisation and other dimensions of creating demand for innovation as a vital step of the innovation process, whereby it suggests yet a more general set of fundamental policy measures for innovation governance at large.

The argument now proceeds as follows: first, Douglas' model of 'objects out of place' is discussed more in detail and, subsequently, in relation to novelty and innovation. A discussion follows which concerns the criteria for possible remedies which result from this. Then, consequences are derived, and policy implications drawn, first, with respect to COVID-19 vaccination policy and, secondly, with regard to innovation and entrepreneurship more generally as well as the related policies. The article ends with some final remarks and a brief conclusion.

2 Selling the monster

In their seminal *Purity and Danger*, Douglas explains how objects or 'things', including procedures, are 'out of place' [Douglas, (1966), Chap. 2]. This happens if an object falls outside of existing cultural categories. Objects 'out of place' elude existing symbolic orders, they are difficult to grasp and describe by the terms and concepts that are available. They are 'anomalies' in the most basic sense. A special case of this occurs when an object falls into two categories at once. Here, the object eludes the symbolic order, too, but the symbolic reference is not as useless as it is rather ambiguous, at times paradoxical. In their reading of Douglas, Smits (2006) terms such objects 'monsters' (*passim*). Monsters, Smits says, have the effect of deeply challenging cultural-cognitive patterns of making sense of the world, in a way that they turn out to arouse intense feelings among the cultural subjects, of either fascination or fear. Furthermore, an even more special form of this phenomenon are those 'monsters' which simultaneously fall into what culturally counts as 'natural' and into what does not. These are the ones which, to Smits' judgement, create the strongest cultural-cognitive ambiguity and which produce the strongest emotional polarisation between fear and awe. Interestingly enough, a different sociological perspective would expect fear or discomfort among subjects even much earlier. As Durkheim has seminally pointed out in *Suicide*, failing sense-making structures alone suffice to put severe strain on subjects' life-worlds and their emotional balance (Durkheim, 1897). Transferring this concept of anomy (*anomie*) to Smits' approach, it follows that cultural subjects may already suffer emotionally as soon as an object is 'out of place,' whether or not it necessarily covers two categories, since this already serves to challenge, sometimes obliterate, the existing cultural-cognitive sense-making structures. Note also that Durkheim is much more hesitant than Douglas and Smits to attribute *awe* to anomic situations or objects. What follows will pursue Douglas' and Smits' more rigid definition of 'monstrosity', remaining sensitive however about Durkheim's suggestion that anomaly alone may already suffice to produce fear and awe.

It seems necessary to qualify further what has been said so far. 'Monstrosity', as it is being described here, does not reside in the object or the procedure in question, as much as it rather describes the relationship between certain subjects – or, more precisely speaking, actually their cultural-cognitive frames – and the object in question. As these frames vary, it is expectable that different objects or procedures are in fact most likely a different degree of 'monster' to different groups. So, more often than not, scientists may have unambiguous categories or taxonomies at hand to describe and classify a substance or a procedure while, at the same time, it is still beyond most cultural-cognitive frames for the wider, 'lay' public. Inventors and technicians who have participated in the path of developing and creating a certain technology should usually have a far clearer

understanding of what the technology is and what it does than the wider population who lacks not only the technological expertise but also the participation in the development process. In contrast, it also happens often enough that an innovation merely recombines existing, well-established technologies or procedures, in a way that is comprehensible to almost anyone. Still, recurrently, scientists do discover something that is beyond their schemes as well as engineers build a technology that is beyond their own professional categories, too. In any case, it can generally be said that this and other causal mechanisms, then, span a matrix of cultural-cognitive accessibility or adaptability to any given innovation, the negative of which directly corresponds to a matrix of potential 'monstrosity' of this innovation to different groups. In conclusion, it thus seems tempting but somewhat oversimplified to see monstrosity inscribed indiscriminately into the 'novelty' (Witt, 2009) that defines innovation. Innovations are 'innovations' by their element of novelty, but this novelty need not by necessity concern cognitive categories. And, where (or for whom) it does, it need not automatically reach anomic dimensions. Still, innovation in procedures and technologies is probably *the* major source of anomaly and 'monstrosity' in society. Thus, it seems that, rather, the potential for 'monstrosity' is somewhat *indeterminately*, but at the same time firmly, or *inherently* inscribed into the *principle* of innovation.

For similar reasons, it is inviting but difficult to identify 'monstrosity' with 'disruptive technologies' (Utterback and Akee, 2005; Christensen et al., 2018), seeing that 'disruptiveness' may concern structures other than cultural-cognitive ones. There have probably been technologies available for decades that would be disruptive with regard to the dynamics of human-made climate change but not at all any more for cultural-cognitive categories. Others have discussed 'paradigmatic innovation' (Dosi, 1982; Freeman, 1991) – and a shift in 'paradigm' that these by definition bring about is somewhat closer to the idea of transgressing cultural-cognitive patterns of understanding and doing. Still, then again, not every paradigm shift is necessarily cognitive or epistemic; it might instead re-arrange ways of doing without however challenging ways of understanding after all. For example, wind energy is a major paradigm shift in energy production but the turbines that it requires are common enough that they are not as much of a cognitive challenge to the public, apparently. Hence, suffice perhaps to point out possible connections or correspondences between the current varieties of distinguishing 'far-reaching' innovations on the one hand and the issue of 'monstrosity' on the other hand; yet any further discussion does not seem to yield substantive insights into the question at hand for now.

Again, 'monsters' may create fear as much as they may create awe. Hence, potentially, so does innovation for all we know. This concurs with everyday experience in that novel technologies, such as flight, for example, tend to create rejection among many while they invoke fascination within others. Hence, at least with respect to innovation, Durkheim's focus on fear alone somewhat seems overly pessimistic. Perhaps there is even a sociological explanation behind who is drawn towards fascination and who is towards reluctance instead when faced with a novel technology. This, however, is beyond the scope of this argument. In any case, as successful innovation depends on demand, the much more practical problem of the two (for whoever depends on the demand for the innovation), as well as the focus of the problem of this article, effectively lies in reluctance and fear. Therefore, the remainder of the argument will continue to work further with the conditions that produce 'monstrosity' and fear, aiming to reach a

variety of conclusions as to how to manage it and mitigate its hampering effects on demand for all kinds of innovations.

Some points come to mind now after looking at Smits' conceptualisation. First of all, as the author points out already, medicine, pharmaceuticals, and biotechnology are among the most evident areas where technologies constantly transgress the boundary between what counts as 'natural' and what does not. It is almost among these sectors' express task to build 'technical' interfaces for manipulating 'natural' objects and processes. This is a first, strong hint at what might be so difficult about establishing a firm demand for COVID-19 vaccines among such remarkable shares of the population. Then, secondly, note that none of this relates to the actual technical risks that do or do not inhere in the technology in question. That is to say, none of the fears so far discussed stem from an evaluation – misled, misinformed, or otherwise – of the actual dangers involved. Thirdly, the fears that originate in cultural-cognitive anomaly are independent of whether the effects, uses, or outcomes of the technology in question are positive or negative; desirable or dubious; right or wrong. This last point resonates particularly strong with Durkheim's proposition that a positive social dynamic, if it happens too fast, is as anomic to structures of sense-making as a negative one.

Some conclusions follow from this: Where subjects reject a technology or a procedure for such cultural-cognitive reasons, it is impossible to reduce their refusal by means of convincing them of its *safety*. In other words, however evidently absent risk and danger may be, such a persuasion will have to fail to reduce the cultural-cognitive problem that is responsible for their rejection. The same can be said, for similar reasons, about trying to convince them of the obvious good that the object or the procedure will do to them or to others, that is, the object's *morality*. This also suggests that such rejection that depends on fear, caused by a cultural-cognitive anomaly, is, more generally, difficult to grasp in terms of utility and cost. Something similar can be said, again, for rational moral discussions. This means that the fear for an object 'out of place' seems badly conceptualised as a mere negative utility attached to this object that could be done away with by compensating it with a sufficient amount of positive utilities. Or seen from another angle, it appears that price signals are largely ill-suited instruments to increase demand for something of which consumers are in fact afraid for the cognitive reasons just discussed. Rational incentives, in sum, have an insignificant effect on the consequences of 'monstrosity'. This is also not much of a surprise, more abstractly speaking, since, how could subjects be expected to rationally calculate, discuss, and decide over something which they currently fail to grasp and organise cognitively, to begin with? Instead, from a communicative perspective, continuing to address people with rational considerations, as if their reluctance was a matter of persuasion, although they are in fact struggling with a cognitive problem, might leave them feeling increasingly misunderstood. This, in turn might further diminish their trust in whoever is propagating the innovation, making it even more difficult to establish firm demand. As for policy, a policy that narrates issues in an overly rational mode throughout, although they are indeed (also) emotional issues for citizens, might turn out not only ineffective but also appearing somewhat 'technocratic', effectively alienating citizens further from the policy process that is supposed to incentivise their demand.

So now, theoretically, what are effective remedies for the challenge of 'monstrosity'? Quickly remember, though, that mitigating this kind of rejection does not automatically mean that anyone will then demand the object or the procedure right away; it rather only means that they hereby reach a point where they can more rationally assess the remaining

parameters of their individual decision to demand or not, be they economic, moral, and otherwise. This in turn depends on quite a variety of other social conditions. Governing this, then again, might require a whole other set of incentives, policy measures, or institutions. Now, generally, the most obvious and most thorough way to manage such patterns of rejection would be to bridge the cultural-cognitive discrepancy that produces it in the first place. This would amount to normalising the anomaly through sort of an evolution of cognitive schemes (Douglas, 1966). This, however, is bound to the time that it takes for cultural-cognitive categories to adapt and new categories to emerge. It seems that the time that this requires is out of proportion by several magnitudes relative to both the usual pace of innovation in contemporary economies as well as, more importantly, the time pressures of grand societal challenges (Reale, 2021). It follows that, in the short term, the task would be to provide reliable structures by which subjects can confidently *cope with* or manage their fears rather than straightforwardly losing them. In other words, structural conditions are required which provide the socio-economic equivalent of a 'symptomatic treatment' while the 'curative' treatment of the cultural-cognitive discrepancy at hand may (or may not) unfold much more slowly, in the background. Now, functionally speaking, given that the major impediment to demand is fear, it follows that creating demand in the short-term that regards a 'monstrous' technology is a question of structures of *solace*. One variant of such a structure is a stable set of social roles that establishes a certain kind of experts, or specialists, who produce solace through *emotional labour* (Hochschild, 1983; Veldstra, 2020). Empirically, for example nurses or flight attendants come to mind. Their emotional labour has evidently been discussed extensively already (Whitelegg, 2002; Williams, 2003; Theodosius, 2008; Smith, 2012), yet it seems noteworthy that parts of this emotional labour can be attributed to the fact that they perform it in a remarkably technicised environment, where surgery and passenger flight, respectively, potentially and in their own specific way transgress what counts as the limits of the human body. Where these roles occur, innovative dynamics and commercialising innovation are – more directly than is usually acknowledged – tied to, as they are facilitated by, structures of *care work*.

3 Discussion

Concretely, with respect to the case at hand of vaccinations against COVID-19, one might ask whether the COVID-19 vaccines that are being offered are in fact 'monsters' to some of the citizens who refuse to undergo this vaccination. Hearing that mRNA and vector vaccines effectively use various kinds of 'genetic code' in order to entice body cells to produce parts of the SARS-CoV-2 virus, aiming to, then, activate an immune response (BioNTech, 2022; CDC, 2022) may be a severe challenge to their cultural-cognitive frames for some. Not only does the entire idea of vaccination blur the boundaries between technology and nature, as hinted earlier, something which is not at all specific only to COVID-19 vaccines. Similarly, some might quite basically struggle with the seemingly paradoxical logic of in fact provoking the immune system by what appears as a controlled infection if, however, the aim is to avert the disease after all. Even more basically, virtually injecting elements of what is supposed to be erased, and from what the body is supposed to be protected, *into* the body may immediately turn the vaccine substantively 'out of place'. Here, 'monstrosity' may explain vaccine reluctance

across the board. With respect to mRNA and vector vaccines more specifically, some may be uncomfortable imagining that they are in some sense teaching their own bodies how to produce (elements of) the coronavirus themselves. All of this can be said to boil down to the vaccines questioning, for instance, the distinction between health and disease and, more importantly, between friend and foe. Also, ‘genetic code’ altogether might invoke images – however unjustified if it comes to strands of mRNA or, in vector vaccines, pieces of DNA – of genetic manipulation, of mutation, or of transhuman development that, again, transgress the idea of the (sane, complete, or natural) human body and which possible consumers do not wish to have happening to themselves. An observation that speaks for these propositions – although it has yet to prove itself empirically – is that some parts of the population have strongly welcomed Novavax’ protein subunit vaccine as they seem to perceive it as much more conventional (Kopp, 2022). Other aspects of the COVID-19 vaccines are perhaps much less ‘monsters’ in the narrow sense that they span two or more cultural-cognitive categories, than they are also anomalous and challenge existing systems of categories in general.

The suggestion that follows is that there is some reason to believe that both economic nudging and moral appeal have clear limits to their effectiveness, at least when addressing those citizens whose refusal has a more fundamental cognitive origin. The same seems to be true, crucially, for public educational campaigns, if they address the *safety* and not the *nature* of COVID-19 vaccines and the emotions that this arouses. For example, the German government currently (as of March 2022) advertises the vaccination against COVID-19 through (own translation throughout) “7 Good Reasons to Get Vaccinated [against Covid-19] Now” (Bundesregierung, 2022) all of which however appeal to the morality, the safety, or the utility of getting vaccinated. There is, in contrast, no element in this campaign that could be suited to address the fear that could result from the fact that the COVID-19 vaccine severely challenges some people’s cultural-cognitive categories. Put differently, there is no element of producing solace. In terms of possibilities, and with respect to solace, at least for the German case, distributing vaccines through family doctors (*Hausärztinnen*) seems a constructive step as this allocates vaccinations to a ‘role set’ which, ideally, comes already somewhat ‘infused’ with solace with regard to the dissonance between nature and technology that resides in scientific medicine to begin with. This contrasts strongly with the emotive circumstances of bureaucratic, anonymous vaccination centres through which vaccines have been distributed exclusively in the beginning. Complementarily, of course, public communication needs to address cultural-cognitive issues more intentionally than it does now – although, again, it is difficult to estimate if the cognitive differential that may be responsible for such rejection can in practice be filled quickly enough to serve current policies. Among other things, this means revising current public information campaigns that aim to explain the basic functioning of COVID-19 vaccines to citizens (Gouvernement, 2021; World Health Organization, 2021). Such kind of communication should be aware that scientific explanations, even if given in lay vocabulary, are anything but neutral and could rather, to some, constitute descriptions of ‘monsters’. For example, although they are perhaps aimed at building comfort through knowledge and transparency, explanations of how vaccines work may in reality rather deliver the exact knowledge which institutes a feeling that vaccines are ‘out of place’ to begin with. Unless such informational campaigns are specifically aimed at building or bridging cultural-cognitive categories as well as, possibly, accompanied by messages of solace, it follows that, cynically and paradoxically, their content might rather exacerbate

cultural-cognitive ambiguities among certain audiences, failing to reach their goal to begin with. They might turn out to be, in other words, unintended and unmitigated *proofs of monstrosity*.

The current argument also obviously speaks to broader debates about vaccine reluctance. Reluctance towards vaccines (Navin, 2015; Hausman, 2019) as well as compulsory vaccination as a possible corresponding policy instrument (Navin and Largent, 2017; Brennan, 2018; Giubilini, 2018; Navin and Attwell, 2019; Ward et al., 2019) had been discussed earlier already, even quite extensively. However, the severity of COVID-19 as well as the salience and urgency that it put on the question of vaccination side-lined any debate that had been pursued until then: debates that had been led either in philosophic principle altogether or with respect to much less salient diseases in comparison such as measles or influenza. Now, what has been discussed here adds to one of the most fundamental questions of the debate, which is about the very motivations that lead people to refuse vaccination. Specifically, a cognitive-cultural perspective challenges behavioural models such as the prominent ThreeC (3C) model that exerts a major influence on the policy paradigm of the WHO (MacDonald, 2015). This model explains vaccine reluctance as being a combination of confidence, complacency, and convenience (*passim*). These acronymic metaphors, put briefly, translate into the following explanatory factors for vaccine reluctance:

- a mistrust in either the safety of the vaccine or the reliability of the institutions who distribute or provide it
- b lacking sense of importance or urgency
- c difficulty of access.

Obviously, none of these suggested major explanations for why citizens refuse to (demand to) get vaccinated concerns the cultural-cognitive inhibitions that have been discussed until here – or, for the sake of acronyms, *comprehension*. Thus, with regard to vaccine reluctance, the present argument not only aligns with more interpretive, qualitative, cultural, and value-oriented approaches to explaining the refusal to get vaccinated, such as, for example, Hausman (2019), Reich (2014, 2020), Ward et al. (2017) or Navin (2013), and others; it also delivers a clear hypothesis of how cultural-cognitive discrepancies between what is being perceived as ‘natural’ as opposed to unnatural or ‘technical’ could explain wider parts of the common refusal to get vaccinated, against COVID-19 as well as other diseases after all. This, in turn, provides a starting point for critically reviewing contemporary immunity policies with special regard to managing the COVID-19 pandemic.

Now with respect to innovation as a whole, what has been said speaks to studies of public acceptance of innovations as it addresses the preconditions for such acceptance. Correspondingly, it addresses current debates on ‘generalising’ innovations (Bundgaard and Borrás, 2021). It also concerns questions of market formation as a specific institutional vector of generalisation (Flanagan et al., 2022; de Haan et al., 2021; Mazzucato, 2016). More generally, what has just been argued concerns the demand side of innovation the importance of which is increasingly being (re-)acknowledged in the literature (Godin and Lane, 2013). Among other things, recent debates have emphasised that a stable demand structure is an essential element of ‘innovation systems’ (Lundvall, 1992; Nelson, 1993; Storper, 1996; Edquist, 1997; Blätzel-Mink and Ebner, 2020)

whereby the specific conditions of this demand are among the conditions for the innovation system to work as a whole. Not least, by the possible requirements and remedies that it implies, the current argument also adds some policy implications to the corresponding and accelerating debate on demand-sided innovation policy (Edquist et al., 2000; Edler and Georghiou, 2007; Boon and Edler, 2018). This, again, is especially important when it comes to major socio-technical transformations or transitions, a failure of which is not only detrimental on a societal or global scale, but which more often than not depend on public demand or at least on public legitimation (Edquist and Zabala-Iturriagoitia, 2012; Kuhlmann and Rip, 2018; Mazzucato et al., 2020; Wanzenböck et al., 2020). To all of these debates, it adds the insight that public and other demand for certain innovations may hinge on whether these innovations fit into existing ways of thought or whether they in fact transcend them enough to actually invoke fear and rejection in those who are supposed to use, consume, demand, or at least approve of them. Entrepreneurs may get stuck trying to commercialise an innovation that is safe, cheap, useful, and sustainable if however they are trying to ‘sell a monster’. Consequently, economic entrepreneurship potentially has a very specific aspect of cognitive or emotive entrepreneurship after all. The potential for anomy by ‘monstrosity’, then, introduces a conservative bias into innovation and entrepreneurship unless handled properly. Functionally speaking, a functioning ‘innovation system’ thus requires effective structures for mitigating the ‘monstrosity’ and the corresponding reluctance that are inscribed into innovation as a social practice as one of its ‘latent tensions’ (Parsons and Smelser, 1956). Only then is the demand secured that appears as a crucial condition for innovative success across the board. Innovation policies that aim to not simply mitigate market failures but rather sustain a functioning innovation system, for whichever motivation specifically (Bergek et al., 2008; Nelson, 2009; Dodgson et al., 2011; Reale, 2019), then, must take the possible necessity for structures of solace, or at least for other corresponding remedies, into account. In addition, such a view on ‘monstrosity’ as a cognitive gap plus the variety of social processes by which to handle it suggests how collective innovative activity entails not only straightforward *learning* but, more importantly, a specific, structural management of variants of *ignorance* and differences in cognitive understanding, which instead *persist* in the medium run. Such a perspective contributes some critical perspectives to debates on innovation in the knowledge economy (Rodrigues, 2003; Leydesdorff, 2005; Lundvall and Lorenz, 2012) as well as it, simultaneously, adds to the economics and sociology of social structures and mechanisms of sustaining and managing ignorance that are being reinvigorated at this moment (Shackle, 1979; Proctor and Schiebinger, 2008; Ungar, 2008; Abbott, 2010; Bösch and Wehling, 2015; McGoey, 2020).

Then again, the normative implications of this argument strongly depend on the context, especially on the implications of the innovation in question. Specifically, the context determines to which degree the absence of structures of coping with ‘monstrosity’ actually appears as a dysfunctionality. If the innovation merely serves entrepreneurial interests in establishing markets or market shares, then inhibitions to demand of the kind just explained are perhaps inhibiting certain forms of economic dynamism but remain more of an individual challenge to the entrepreneur(s) who aim to profit from this dynamism than anything else. It should be clear, however, that the problem is different once the innovation and its acceptance affect public interests or common welfare. Here, ‘monstrosity’ and the failure to mitigate it may appear more normatively problematic, as sort of a substantive friction in sustainable and equitable

societal governance. This is obviously the case, for example, with COVID-19 or human-made global warming, but also with regard to economic development and 'inclusive innovation' (Heeks et al., 2014). Especially where these challenges are pressing, any innovation policy that is on a 'mission' to solve them (Mazzucato, 2018; Mazzucato et al., 2020; Reale, 2021) seems to have both a functional interest and a normative obligation to apply policy instruments which help mitigate potential 'monstrosity' in the short run in order to sustain the 'mission'.

4 Conclusions

It has been discussed how innovation processes may produce objects or procedures which are novel in such a way that they elude the cultural-cognitive categories by which certain groups structure their understanding of the world. Such a 'monstrous' character may result in fear or awe, and where it produces fear, it contributes to hampering demand for the innovation in question. This constitutes a challenge for whichever economic dynamic or policy process depends on this kind of demand, acceptance, or outright commercialisation. It follows that, if demand is to be guaranteed nonetheless, 'monstrosity' requires adequate structures that counteract its effects. Ideally, these structures address the emotional nature of the challenge rather than aim at incentivising demand in economic or moral terms. One important proposition that results is that 'monstrous' innovations can however be commercialised and demand can be created if these technologies are combined with reliable patterns of providing solace. Through this, structures of emotional labour and of care work towards consumers have hypothetically turned out crucial for dynamic innovation-based economies, yet in a sense much different from the many ways that their relevance to the economy has been discussed so far. For COVID-19 immunisation policies, this implies the necessity of structures of solace in order to improve vaccination uptake (i.e., demand) among the population; for innovation and entrepreneurship more generally, it points to the emotive aspects of entrepreneurial activity and to the emotive requirements for successful innovation processes.

Of course, much of what has been said resonates in various ways with the question of how to help or incentivise consumers to demand something that, simultaneously, they can be said to not fully understand. This touches upon a broader ethical question that affects 'innovation society' or 'knowledge society' almost every day. Especially in medicine, but also in law, and, obviously, in innovation, it sometimes seems impossible to distribute 'functional knowledge', as Ungar (2002) calls it, in a way that fulfils every ideal of rational self-determination among citizens. Instead, situations occur where 'functional knowledge deficits' (ibid.) are widespread and where they impede political or economic dynamics. It is a different question, impossible to discuss here, under which conditions it is or is not normatively justified to establish structures – political, narrative, or otherwise – which 'symptomatically' (vide supra) treat this deficit without immediately relieving it. Some might think that it is in fact justified, to some degree, with respect to COVID-19 immunisation policies, given the urgency that exists and the common welfare deficit that it at stake. Still, all that has been provided so far is an understanding of what would be *functional* solution, here and in other contexts. Thus, in sum, any argument that is being made should always be made with the clear understanding that what is functional is not necessarily legitimate.

One last remark regards possible contributions of literary fiction and other elements of imagination to innovative dynamics. If ‘monstrosity’ is effectively caused by a lack of categories and concepts, perhaps, through fiction, communities may establish a form of repertoire of concepts, categories, and expressions from which to draw to address and organise future innovations. Compare, for example, Deaca’s approach (2017) who analyses the potential of science-fiction as a set of so-called *Gedankenexperimente*. This is to say that today’s fantastic stories may turn out to yield a crucial concept and help prevent (or ease) occurrences of ‘monstrosity’ in the future. Following this thought further, this implies an interesting set of criteria for such pieces of fiction or ‘imaginaries’, since the more abstruse a figment, the bigger is the cultural-cognitive differential that it might one day serve to bridge. Simultaneously, the bigger the variety of imaginaries, the bigger the chance that the repertoire holds a concept for when it might be needed. In some sense, there are no limits to imagination with regard to such a repertoire. In an interesting way, this adds quite a different type of imaginations to the set that has already been discussed as being crucial for collective innovative dynamics. Different contributors have underlined the role of ‘hypes’ (Ruef and Markard, 2010; van Lente et al., 2013), promises (van Lente, 2000; Merlin et al., 2021) or collective socio-technical ideals (Jasanoff and Kim, 2015), among others, for innovation processes as they motivate entrepreneurial action as well as stakeholder and shareholder commitment. And although such imaginaries have been discussed as necessarily being ‘fictions’ (Beckert, 2016; Beckert and Bronk, 2018; Savage et al., 2018) or ‘stories’ (Garud et al., 2014; Chapple et al., 2021), there seem to be much more rigid requirements with regard to how reliably these fictions must eventually relate to, and be convincing with respect to, reality. Therefore, in a certain sense, whereas the whole of the ‘sociology of expectations in innovation’ (Borup et al., 2006) has tended to convincingly focus on something like possible fictions or credible fictions, it also appears that a lively ‘innovation society’ (Rammert et al., 2018) is one who manages its potential ‘monsters’ through playfulness and the imagination of the incredible.

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