



## Opinion Paper

## Information and communication technologies (ICT)-enabled severe moral communities and how the (Covid19) pandemic might bring new ones

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## ABSTRACT

In this study we present an autopoietic social systems model based on Collectively Prevalent Interpretants (CPIs). We adapt this model to represent and exemplify how Information and Communication Technologies (ICTs) may enable the emergence of severe moral communities. In particular, we argue that ICTs may help severe moral communities promote increasingly polarized, radicalized and even extremist viewpoints. We also discuss our propositions in the context of the current pandemic (caused by Covid19) and warn about the possible emergence of new and related severe moral communities. In an effort to help understand and manage the enabling role of ICTs, the study also presents recommendations for theory and practice, which may prove useful in advancing digital resiliency (by empowering individuals and communities to recognize when this may be occurring).

## 1. Introduction

During these tumultuous and uncertain pandemic days we started to wonder why some individuals, and some communities in particular, could adopt such dramatically opposed stances while we all confront a global pandemic. Thankfully, most people wear masks, uphold social distancing rules, avoid crowded and enclosed spaces, comply when lockdowns are imposed, and in general heed the advice of public health experts and officials. But there are groups of people that have not and continue to refuse to do so, arguably making the effects of the pandemic worse for all. Information and Communication Technologies (ICTs) are playing a critical role in all this. On the one hand, the pandemic could be aggravating one of ICTs' most troubling side-effects, namely: the enabling and promotion of increasingly polarized, radicalized and even extremist viewpoints. On the other, ICTs have emerged as the saviors and ameliorators of the pandemic's many disruptions to almost every dimensions of daily life. Many pandemic-related disruptions to essential dimensions of our lives (healthcare, education, livelihoods, etc.) have been overcome thanks to ICTs and new Information Systems (IS) artifacts.

Indeed, a quick review of Covid19 papers published in this journal (International Journal of Information Management – IJIM) reveals that a significant effort has been devoted to analyzing: the role of ICTs in helping address the effects of the current pandemic on jobs and home life

(Venkatesh, 2020), and what may become the new normal for work practices (Carroll & Conboy, 2020). Other studies have looked at associated business model shifts (Seetharaman, 2020), and to how ICTs may help ensure the business continuity of Small and Medium Enterprises (SMEs) (Papadopoulos, Baltas, & Balta, 2020). By leveraging, for example, intelligent automation (Coombs, 2020), the digital maturity of organizations (Fletcher & Griffiths, 2020) and/or the lessons learnt during this period by Information Technology executives and professionals (Papagiannidis, Harris, & Morton, 2020). And there have also been more general contributions on how the pandemic might present ICT-linked opportunities for education, work as well as life in general (Dwivedi et al., 2020), for teaching and research (Davison, 2020), and for crises management (Luciano, 2020) including its communication strategies (Rao, Vemprala, Akello, & Valecha, 2020).

Of particular interest to us are contributions on artifact design (Sipior, 2020), their adoption (Pan, Cui, & Qian, 2020) and how these might alter our values (Rowe, 2020). Not just because new artifacts might be misused and abused (Bunker, 2020; Doyle & Conboy, 2020; Fahey & Hino, 2020) but especially because we are still working on developing related ethical frameworks and guidelines (Pan & Zhang, 2020). Indeed, insofar as the pandemic serves to affect all dimensions of daily life by, among others, uncovering and magnifying issues (Sein, 2020), it might also exacerbate unequal access to ICTs (Pandey & Pal, 2020) and thus limit the emergence of new knowledge and innovation

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capabilities (Kodama, 2020). All of which would in turn hamper or delay the advancement of our well-being (Barnes, 2020). More specifically, these angles matter for our study as the pandemic might not only affect the way individuals use ICTs (Nabity-Grover, Cheung, & Thatcher, 2020) but also, as mentioned above and perhaps more importantly, it might end up exacerbating polarization, radicalization and the promotion extremist viewpoints.

For example, most accounts of the Tunisian Revolution's (and the Arab Spring's) onset in 2011, point to a video shared in Social Networking Sites (SNSs) of a small crowd gathered in front of Sidi Bouzid's city hall to protest how authorities treated street vendors. This protest took place a day after Mohamed Bouazizi lit himself aflame (and died from his injuries) for being harassed and humiliated in public by a law enforcement officer. Similarly, nowadays, most accounts of how protests against racial injustice begun in the United States (replicated in other countries too), point to a video -again shared in SNSs- of George Floyd's killing by a law enforcement officer. Surely, the misuse and abuse of authority, economic and social conditions, and many other factors contributed to both of these momentous events. However, arguably, the above manifestations probably would not have occurred without the catalyzing effects of content shared in SNSs, or without the ensuing ICT-enabled severe moral communities that helped instigate new polarized, radicalized and even extremist individual viewpoints and associated collective actions (such as protests). Including, of course, those organized against public orders or government mandates meant to help curb the initial spread of Covid19 and/or to help mitigate the effects of a second wave (such as obligatory wearing of masks in public, lockdown restrictions, etc.).

This piece is an attempt at expounding how the above may have unfolded, and at highlighting how the pandemic might exacerbate, and catalyze more of, these processes. To our knowledge previous and extant qualitative IS approaches (such as interpretive research, critical research, socio-technical research, institutional theory, grounded theory, media synchronicity theory, among others) have not yet addressed this question succinctly. Leading to the first limitation of this study. The propositions, models and examples that follow should eventually be placed -and analyzed- against the merits and shortcomings of the theories (and methodologies) mentioned above, as well as others. However, this would entail an entirely different type of effort and should thus be the subject of a separate study. Simply put, our approach here will be to deductively outline a framework, along with an associated model, and then use it in an attempt to explain how ICTs may have promoted and advanced an individual's (and a community's) radicalization process. In particular, we will look in detail at an attack on a pizza place (and, in general terms, to the incidence of hate crimes against refugees in German municipalities, and to lynchings in India). Since we neither have access to the exact sequence of events that transpired, nor to the individuals involved, in any of these radicalization processes (which led to truly calamitous outcomes), we will use what could amount to bounded backward induction (based on an adaptation of the model developed) to take a stab at reconstructing how the process may have unfolded.

Now, insofar as the pandemic has "created remarkable experiences, fueled large-scale experimentation, and inspired innovations, while revealing dark sides and weaknesses, across a breadth of contexts" (Rai, 2020, p. vii). Our effort would be in line with Rai's suggestion that IS researchers have a unique opportunity to help build resilience to extreme events (including pandemics). Specifically, by for example by helping redesign public health surveillance systems, transform organizations, and also by empowering individuals and communities. Within this last category, two main aspects are considered. First, using ICTs to help individuals and households cope and adapt to extreme work and life demands. Second, leveraging ICTs "to empower individuals and communities so truthful, potentially life-saving, content has wider prominence" than falsehoods and content meant to capitalize on the prejudices and biases of anxious and uncertain individuals and communities. In case this study's propositions and recommendations might

be of relevance for helping individuals and communities recognize when increasingly polarized, radicalized and even extremist viewpoints are being promoted through ICTs, then perhaps they might also serve as a tool for advancing the empowerment dimension of digital resiliency strategies.

In an effort to attain this, the following section discusses how individual viewpoints may come about, in general, and strives to elucidate associated ICT-enabled processes. We will subsequently examine how viewpoints may shift from individual to collective realms in general so as to present an autopoietic social systems model. In the third section of this study, we adapt the model developed to represent severe moral communities and again assess how they may be facilitated by ICTs. The fourth section presents an application of the adapted model to describe and exemplify how ICTs may have helped promote increasingly polarized, radicalized and even extremist viewpoints. As well as, how ICTs may enable the emergence of severe moral communities, which in turn may work to further embed, promote and expand these viewpoints. We proceed to discuss our propositions in the context of the current pandemic and warn about the possible emergence of related worldview gaps. We then present implications for theory and practice. And finalize by pointing out limitations, along with recommendations for future research, and presenting concluding remarks.

## 2. Analytical framework and general model

In this section, we outline a framework for developing an associated model for how social systems may produce and reproduce themselves in general. Before doing so three clarifications are in order. First, some of the propositions below have already been offered by other qualitative IS theories, but from different perspectives (e.g., hermeneutics as providing occasion for individual interpretation, or considering differences between operational and informational domains). Second, other propositions (such as how prevalent interpretations may spillover from individuals to groups of people) have for the most part not been explicated in settings that do not necessarily involve pecuniary incentives and/or corporate (or firm) goals. In particular, it has been problematic for traditional qualitative IS theories to grasp the role of ICTs in how protestors -taking part in a manifestation (or march) -may emerge and be characterized as a social system with bounded organizational closure, albeit of the transient kind (more on this ahead). Critically, previous qualitative IS research has tended to overlook ways in which propositions pertaining to the two above clarifications may come together normatively, while leveraging ICTs, to advance economic evolution and human development. However, as previously clarified, the necessary task of positioning the below framework and model under the light of qualitative IS literature is an endeavor that ought to be undertaken in a different study.

For now, we shall delve into the question at hand using neuroscience along with semiotics (Interpretants) to help elucidate how individual viewpoints may come about. In particular, the association between neuroscience and interpretants is explored in a manner aligned with, and that strives for, the advancement of human development (the Capability Approach - CA). We then look at the relevance of informational and operational domains from a qualitative IS research perspective, as well as from an institutional and evolutionary economics standpoint. We proceed to detailing CA adaptations for studying ICTs (to highlight the importance of interpretants) before explaining how interpretants may become collectively prevalent. Interpretants (and associated actions), of the collectively prevalent kind, are presented as constitutive elements of autopoietic social systems. In addition, ICTs, by granting recursive performative affordances, are deemed to enable the provision of inspirational and grounding instances that are not only more effective at enabling the emergence of new individual interpretants and capabilities, but also more efficient at turning these new interpretants and capabilities into collectively prevalent ones. All, as we shall see, essential for ICT-enabled autopoietic social systems to emerge

and endure.

### 2.1. Individual viewpoints

At the turn of this century, neuroscientists analyzing how the hippocampus was involved in spatial navigational learning of rodents, proposed replay as a possible general mechanism involved in learning and memory. Thus, replay -understood as the reactivation of temporally sequenced memories from previous behavioral experience- was key to reinforcement learning processes (Foster & Wilson, 2006). Further exploration of rodents' hippocampal representations of different events (e.g., by varying locations, contexts, etc.) revealed that distinct and hierarchically organized neural schemas helped integrate memories into the development and organization of new relational representations (McKenzie et al., 2014). Finally, last year, Liu, Dolan, Kurth-Nelson, and Behrens (2019) discovered that replay also helps transfer knowledge abstracted from previous experiences to aid new learning in humans. Furthermore, they also identified factorized representations (or codes that help identify and position sequences being replayed) acting as rules or schemas that facilitate the generalization of previously learned abstract knowledge to new experiences, and thus help integrate past knowledge with current experiences. In essence, "recent experience is embedded into a preformed backbone of network dynamics guided by the brain's existing knowledge base" (Buzsáki & Fernández-Ruiz, 2019, p. 513). In sum, memory and planning behavior rely on learning compact representations of environmental structures which are updated through replay (Momennejad, 2020)

The above findings appear to conform to epistemological constructs by which individuals may recombine embodied experiences, or informational distinctions, into interpretants (i.e., neural schemas, factorized and compact representations, etc.), which then help endow individuals with new knowledge, perspectives and viewpoints (Parra & Yano, 2004). This, from an economic development perspective, is beneficial insofar as it aligns with individual decision-making processes by which interpretants turn into an individual's choices as they become embodied distinctions through practice (Parra & Yano, 2002). Choices in turn are the things that people may value doing or being (or functionings), which may be re-combined into alternative bundles to constitute a capability (Sen, 1999). Please note a couple of fundamental points: first, "the process of economic development has to be concerned with what people can or cannot do, e.g. whether they can live long, escape avoidable morbidity, be well nourished, be able to read and write and communicate, take part in literary and scientific pursuits, and so forth." (Sen, 1997, p. 497). Accordingly, in this study we adopt an understanding of economic development that involves expanding people's capabilities (i.e., the Capability Approach - CA). Second, capabilities as alternative bundles of functionings may be thought of as action laden counterparts to interpretants (or to the neural schemas and factorized and compact representations that help bring about new knowledge and viewpoints). In fact, Sen's focus on functionings and capabilities may be characterized as operational (or pertaining to an *operant domain* in which actions prevail), while interpretants are informational (and would thus pertain to a *generic domain* in which thoughts, intuitions, beliefs, among other meaning attribution entities, prevail).

#### 2.1.1. Generic and operant domains

Qualitative IS researchers long ago recognized the importance of individuals' ability to ascribe completely different meanings to similar experiences (or phenomena) (1991, Boland, 1985). As eloquently explained by Checkland and Scholes (1990), p. 309) what "one observer perceives as 'a terrorist system' is to another observer 'a freedom-fighting system'. Because of this, meaning attribution is crucial" in order to be able to describe the "set of activities [...] regarded as [...] a 'human activity system'." The distinction between meaning attribution and human activity systems is of the essence. Because of this distinction, Hirschheim and Klein (2012), p. 200) characterize Soft

Systems Methodology as involving "the 'meaning attribution system' and the 'human activity systems'." These two systems are connected and feed off each other, pointing to the duality of structure by which "social systems are both medium and outcome of practices that constitute those systems" (Giddens, 1979, p. 69).

This duality of structure helps Barley (1986) explain structuration theories as those involving the inquiry of how the institutional realm (i.e., meaning attribution system) and the realm of action (i.e., human activity system) configure each other, especially in organizational contexts (Orlikowski & Barley, 2001). Indeed, this duality of structure or dialectic relationship between the realm of thought and the realm of action has been brought up repeatedly in philosophy. Kant (1908), as explained by Hirschheim (1985), p. 21), "noted a difference between theoretical and practical reason. The former dealt with the knowledge of appearances (realm of nature); the latter with moral reasoning." In the same vein, Hegel, Brockmeyer, and Harris (1869) propose that human existence is a constant interaction between the individual's consciousness and its object form (i.e., the external world). Which coincides with Weber (1978) who suggests distinguishing between human action and human behavior, by understanding human action (where the purpose of the action is obvious to the observer) along with an explanatory understanding (where it is not). Because of this, the observer should then "seek an understanding of the action 'by placing the act in an intelligible and more inclusive context of meaning'" (Hirschheim, 1985, p. 24).

Cybernetics also recognizes the importance of distinguishing human action from meaning attribution (i.e., the two domains in question) for self-regulation, control, and feedback in technology, biology and society (Bertalanffy, 1968; Wiener, 1948). Finally, evolutionary economics, since its initial conception as Veblenian Institutionalism, recognized the existence of and interdependence between these two domains. Veblen (1909) cited by Hodgson (2004), p. 177) explains:

"Not only is the individual's conduct hedged about and directed by his habitual relations to his fellows in the group, but these relations, being of an institutional character, vary as the institutional scene varies. The wants and desires, the end and the aim, the ways and the means, the amplitude and drift of the individual's conduct are functions of an institutional variable that is of a highly complex and wholly unstable character."

Based on this seminal idea, Dopfer (2005) proposes two levels of investigation for evolutionary economics. The generic domain, which involves people's thoughts, feelings, dreams, inspirations, perspectives, viewpoints, intuitions, unconscious rules, norms of behavior, institutions, prejudices, and other meaning attribution entities that individuals may be consciously aware of or not during learning and decision-making processes, which are difficult to grasp, observe and measure. On the other hand, the operant domain encompasses individuals' choices, capabilities and actions (including economic transactions) that are observable and measurable (Dopfer, Foster, & Potts, 2004). Moreover, evolutionary economics sees economic evolution as a knowledge growth process that requires external impulses -provided by creative destruction (Schumpeter, 1942)- in order to prevent systems from dying entropy deaths (or the eternal exchange of the same products and services at the same prices) due to the lack of new knowledge and innovation (Dopfer, 2005). These impulses correspond to the slippages (usually brought about by exogenous shocks) that change patterns of action -in the operant domain- and reconfigure the system's institutional structure -in the generic domain (Barley, 1986).

When economic evolution is defined as a knowledge growth process, interpretants and their diversity are of the essence for generic domain evolution. Just as capabilities are key for operant domain evolution (as well as for the understanding of economic development adopted here). Our contention is that ICTs can play a fundamental role in expanding individuals' interpretants and capabilities. Indeed, economic evolution and economic development have been increasingly brought about by the

positive influence of ICTs on key dimensions of an individual's life. For example, ICTs have enhanced and expanded access to healthcare (Freeman, Fisher, Baum, & Friel, 2019; LeRouge, Gupta, Corpart, & Arrieta, 2019), education (Kelley-Salinas, 2000; Selwyn, 2010) and financial services (Tchamyou, Erreygers, & Cassimon, 2019), as well as alternative income streams and livelihoods (M. Graham, Hjorth, & Lehdonvirta, 2017; Lehdonvirta, 2018). Furthermore, ICTs increasingly help shape how we think, what we end up doing, and who we are! Thus, exploring ways in which ICT-enabled functionings and capabilities help catalyze economic development is of the essence. This has been the focus of a whole research stream that we will briefly describe next.

### 2.1.2. ICT-enabled capabilities (and interpretants)

In their review of CA adaptations for the study of ICTs, Stillman and Denison (2014) classify them as follows: information capability and information capital (Gigler, 2014), capabilities, empowerment and sustainability (Grunfeld, Hak, & Pin, 2011), choice framework (Kleine, 2011), and theory of justice, which takes as "starting point human capabilities and functionings, and would seek to make judgements about the deployment of technology in terms of its role in enhancing or diminishing these." And thus, this approach places the focus "not only on capabilities themselves but also on their actual and possible patterns of distribution, and the normative evaluation of such patterns" (Johnstone, 2007, p. 81). There's also capability sensitive design, by which IS artifacts and more generally "engineering products are far from neutral instruments to be used at will for either good or bad, but rather value-laden or inherently normative" (Oosterlaken, 2009, p. 94). A point that again was made long ago by qualitative IS researchers (Barley, 1990). Along with the fact that social and environmental factors can also influence the way in which ICTs are adopted and leveraged by individuals and organizations (Orlikowski, 1992). As well as, functional diversity for disability (Toboso, 2011), and indigenous communities on the margins approach (Vaughan, 2011). And finally, capability exclusion in the e-society, which highlights the importance of considering the channels of communication (and associated flow of information) that enhance individuals' ability to pursue lives that they have reason to value (Zheng & Walsham, 2008). Ominously, one of the two empirical studies conducted using this approach delves into the 2003 SARS outbreak and posits:

"the lack of information freedom as constitutive of, and a contributor to capability deprivation. In the SARS case, Chinese health workers suffered deprivation of agency freedom in terms of being able to communicate effectively with other health workers, to be informed of an epidemic crisis and thus to perform their health care role effectively. Similarly, the Chinese public are deprived of the freedom to participate in public affairs. This resulted in deprivation of well-being freedom, in terms of catching SARS, on the part of both patients and health care workers." (Zheng & Walsham, 2008, p. 236)

It seems appalling that a similar situation could have helped catalyze another pandemic within just a couple of decades. And we all have stakes in exploring ways of preventing this from happening again in the future. But let us conclude this recount by clarifying that researchers have also pointed out that CA adaptations for studying ICTs have not yet taken the "hermeneutical dimension into account" to help elucidate for example: what "the capability 'health' is and means for a particular person in a particular context"<sup>1</sup> (Coeckelbergh, 2011, p. 89). This void is also evidenced by the fact that some of the above approaches allude to unpacking the indirect effects of ICTs on enhancing an individual's informational capabilities (Gigler et al., 2014). Or to separating direct from indirect influences of ICT on knowledge capabilities (Johnstone,

2007).

For us the influence of ICTs on human capabilities (and associated interpretants) is direct. Moreover, insofar as informational interpretants precede operational capabilities (Parra, 2005), ICT-enabled interpretants (viewpoints) must also precede ICT-enabled capabilities, and thus we contend that interpretants would be well suited to fill this hermeneutical void. Finally, considering new knowledge as emerging out of re-combined embodied experiences, which help constitute new interpretants that endow individuals with new perspectives (and viewpoints) -along with associated distinctions, choices and capabilities- also seems appropriate from the standpoints of neuroscience, evolutionary economics and human development. We will now present an example to help illustrate this process, while conferring how it may shift from the individual to the collective realm (in the span of an evening or less).

### 2.2. Collectively prevalent interpretants (CPIs)

Let's consider a couple, (a man and a woman) newly inducted into a group of experienced tango dancers and aficionados, who are dancing to live tango music for the first time in front of the group. The male dancer interprets the music, feels the lyrics, and has the capability to express his interpretations with operant moves and gestures; accordingly, the female dancer does the same thing, only her interpretations depend on her partner's moves, and in turn her moves become part of the male's experiences and interpretants. If they manage to dance following the music's rhythm, beat, etc., as well as according the norms of behavior (or rules, or institutions) followed by the group, the couple could then be characterized as a structurally coupled social system (for themselves as well as in the eyes of those playing the music, watching them dance, etc.). This is the case because the couple as a system is behaving and acting in correspondence with its environment. Furthermore, since the dancing couple is distinguishable from the environment, the components of the unity (i.e., the male and the female dancer) are themselves distinguishable, and the unity's properties (the couple's dancing capability) are the outcome of the relations between its components, they would also have the properties of an organizationally closed and autonomous social system (Urrestarazu, 2014). We assume that thanks to these characterizations both the couple dancing, the musicians playing, and the audience watching start tuning into similar interpretants amalgamated by the joy of belonging to, and having managed to expand, the group tango aficionados.

Now, please imagine the newly inducted couple deciding to come up with new, spontaneous, rhythmic moves, which they manage to repeatedly (or recurrently) enact; and because of this, become new prevalent interpretants and capabilities for the couple. Even though, the couple deviates from the group's accepted norms, if those new, spontaneous rhythmic moves are considered in-step with the music and appealing to the group watching, other couples may ascribe merit to performing in a similar fashion. The couple, after having showcased their spontaneous new move, realizes others are discussing it and watching more intently their repetitions of the new move. This emboldens the innovative couple to come up with more new moves -in the same vein of the first one- but applied other steps, beats, etc. The collection of new moves becomes more expansive, more generalizing, and might even be characterized as the onset of a new style. Which then attracts even more attention and more discussion. Because of which, eventually, other couples actually decide to start imitating the innovative couple, attempting to copy their first new move and also to emulate their style.

If imitating couples also manage to enact these new, rhythmic moves, and are not only able to repeatedly do so, but are also able to come up with new moves themselves in accordance with the innovative couple's new style, their interactions become self-replicating. This in turn serves to embed and promote the group's new shared interpretants, which would be reasonable to assume intensifies and augments their feelings of collective joy. So much so, that even more couples may decide

<sup>1</sup> We will return to this fundamental question in section five (5) while discussing and exemplifying our propositions in the current pandemics context.

to start imitating the new moves and style, wishing to join in the joy and embody the newly developed *Collectively Prevalent Interpretant (CPI)* so as to be able to enact associated *Collectively Prevalent Choices/Capabilities (CPCs)*. The structurally coupled, organizationally closed, autonomous social system now grows and expands as it produces and reproduces itself. This means that new components are entering a new dancing unity as a result of the interactions between components (e.g., between the innovative dancing couple and imitating couples), and also that all components of the dancing unity are participating in the production of new components, which means that the social system may now be referred to as autopoietic (Maturana & Varela, 1987; Urrestarazu, 2014).

You may have experienced a version of the above process yourself too! Please try to remember the first time you heard and danced to the song Macarena.<sup>2</sup> Even though, this song is not usually danced in couples, please attempt re-living the initial break in ontological security, the mixed feelings guiding the embodiment of new experiences as distinctions, as well as the incorporation of new choices along with the enactment of new dancing capabilities. All enticed and maintained by new CPIs, amalgamated by collective joy. Please note three crucial points. First, the sense of bewildered accomplishment associated to having embodied a new CPI, and thanks to this enabling the dancing unity to expand, as well as of having joined in the joy. Second, how this seemingly complex process -by which new individual interpretants, enacted into new choices and capabilities, turn into collectively prevalent entities (i.e., CPIs and CPCs)- may actually occur within the span of a song. Third, as soon as the song was finished, the autopoietic social system you were part of simply disappeared.

### 2.2.1. Autopoietic social systems

There has been a robust debate on whether social systems may be characterized as autopoietic. Mingers (2002) analyzed Luhmann's social theory (1986, Luhmann, 1982) and determined that even though it embodied a version of autopoiesis, ontologically it failed to be wholly compatible with Maturana's original formulation. In particular, because Luhmann defined the components of social systems as communications (instead of people, or their social practices, etc.). Mingers (2004) also analyzed structuration theory, as proposed by Bhaskar (1979) and Giddens (1979), and concluded that despite the fact that components and processes of production could be identified (e.g., rules, resources, positions and practices) "it was extremely difficult to identify empirically the bounded closure of a particular social system." (Mingers, 2004, p. 421).

We agree with this assessment, not just because the structurally coupled, organizationally closed, autonomous and self-producing nature of the dancing unity exemplified above would simply end with the song. Or because the same would also happen if the music was somehow interrupted, or if there were no components willing to start imitating other components. But especially because we believe that autopoietic social systems' organizational closure is highly dependent on the emergence of new CPIs (along with associated CPCs). This is the case since CPIs and CPCs help make a social system distinguishable from the environment, while allowing its components to still be distinguishable themselves. And the social system's properties (i.e., the social system's CPIs and CPCs) are the outcome of the relations between its components.

Johannessen (2008) coincides with our propositions through an alternative understanding of Luhmann's communications (as foundational to social systems). In particular he posits that "Luhmann's conceptual pairings (normatively closed and cognitively open) make it possible for a social system to be simultaneously self-producing in terms of social norms" (Johannessen, 2008, p. 404). These social norms allude

<sup>2</sup> Readers not familiar with the song "Macarena" are encouraged to watch videos of it so as to experience its infectious effect, which is eloquently portrayed at the end of the movie Hotel Transylvania 3.

to our CPIs and CPCs. Moreover, Johannessen (2008) also sees capabilities as being developed primarily on the basis of social norms, insofar as social norms determine what kinds of knowledge are sought and nurtured, what kinds of knowledge building activities are tolerated and encouraged (Barton, 1995). Finally, social norms are defined as "a generally accepted way of thinking, feeling or behaving that is endorsed and expected because it is perceived as the right and proper thing to do. It is a rule, value or standard shared by the members of a social group that prescribes appropriate, expected or desirable attitudes and conduct in matters relevant to the group." (Turner, 1993, p. 3).

There's a couple of key differences between the above construct and ours. The above definition does not consider generic and operant domains, which are essential for differentiating between interpretants/CPIs and capabilities/CPCs. In addition, we posit that new CPIs and new CPCs will fail to emerge without the provision of *inspirational and grounding instances* to help trigger new spontaneous individual interpretants and capabilities, for eliciting the buy-in from other social system components. Since without these instances it will be extremely difficult to achieve and maintain the organizational closure required by autopoietic social systems. After all, sooner or later people are bound get tired of dancing if/when macarena is the only song that keeps on playing. In essence, the social system's components and processes, without new and additional inspirational and grounding instances to provide renewed impetus for driving and maintaining its reproduction, would simply die entropy deaths (primarily due to the eternal use of the same old CPIs and CPCs, over and over).

### 2.2.2. Inspirational and grounding instances

Even so, macarena-enabled CPIs and CPCs, amalgamated by collective joy, still manage to attract new dancers all over the world, independent of cultural affinities, and for a fleeting moment allow those dancers to experience being part of an autopoietic social system. A similar process unfolds when a group of musicians composes a new piece, or when a sports team implements a new successful play, or when a group of protestors comes up with new chants that they start repeating while they march. In general, CPIs and CPCs spontaneously emerge out of an autopoietic social system's *inspirational instances*, amalgamated by shared emotions, while undergoing *Jointly Experienced Generic/Operant Fuzziness (JEGOF)*. By means of simultaneously occurring processes that entail *continuous group level reinforcement learning-by-doing*, which serve to *ground inspirational instances operationally*. Crucially, these inspirational and grounding instances yield (and are maintained by) the continued production of new CPIs and new CPCs. Please note, how for the musicians, sports team and protestors exemplified above the following conditions are essential for inspirational and grounding instances to effectively yield new individual interpretants and capabilities, and facilitate their efficient transition into new CPIs and CPCs: spatial proximity, ease of interaction between social system components (i.e., actors interacting with environments composed of other actors) engaged in a coalescing activity, as well as individuals seizing action possibilities that entail showcasing their innovative viewpoints through associated enactments (i.e., the seizing of performative affordances), which in turn help their social systems become autopoietic (as a new piece is composed, a new play is implemented successfully, or a new chant entices protestors to march on, etc.).

There are many sources of inspirational and grounding instances, for example, interactions between social system components leading to new and innovative individual interpretants (and to associated CPIs). Also, the guidance provided by prominent social system components to others (i.e., followers). Or the acquisition of new social system components bringing in different experiential bases and thus alternative individual interpretants, which in turn help renew the CPIs/CPCs produced by an autopoietic social system (as the innovative dancing couple does for the group of experienced tango dancers and aficionados in the initial example), etc. In sum, inspirational and grounding instances help renew and maintain an autopoietic social system's CPIs and CPCs. CPIs and

CPCs have been around for a long time (perhaps since humans opted for sedentarism and realized the benefits of organizing themselves) and have been critical for helping groups of all kinds gain cohesiveness by means of coalescing activities such as group dances, rituals, ceremonies, etc. Crucially, these activities also bring about inspirational and grounding instances (in the form of JEGOF and of group level reinforcement learning by doing, respectively), which provide a group with shared experiences and anecdotes that scaffold and eventually grow into the group's shared histories, beliefs (i.e., CPIs) and customs (i.e., CPCs). As explained by J. Graham and Haidt (2010), p. 147) activities that "bind the group together, increase trust, and increase the monitoring and punishment that are so effective in suppressing cheating and free-riding" would also help the group "gain an enormous advantage over less cohesive neighboring groups." All while working to further embed and promote the group's customs and ideologies, which in turn may be understood as:

"Projections of unacknowledged fears, disguises for ulterior motives, emotional expressions of group solidarity—they are, most distinctively, maps of problematic social reality and matrices for the creation of collective conscience." (Geertz, 1964, p. 220)

In essence, CPIs are a group's collectively prevalent way of interpreting the world, and CPCs are operational enactments associated to those collectively prevalent interpretations. We shall now turn to discussing how ICTs may enable the emergence of CPIs and CPCs.

### 2.2.3. ICT-enabled collectively prevalent interpretants (CPIs) and recursive performative affordances

We contend that ICTs in general, and SNSs in particular, have the ability to facilitate the organizational closure required for autopoietic social systems to emerge. This is the case since ICTs help extend and amplify the song, while significantly expanding the dance floor. In essence, ICTs -and especially SNSs- offer virtual spatial proximity, immediacy as well as frictionless and algorithmically-coupled interactions between social systems' components. And these unencumbered ICT-enabled interactions allow SNSs users, for example, to more easily and more frequently seize *recursive performative affordances*. Recursive performative affordances are akin to traditional performative affordances in that they allude to possibilities for action that help groups of actors coalesce as a community by leveraging individuals' need for attention, recognition and sense of belonging (Agre et al., 2004) as well as the importance of imitation in social life (Baldwin, 1902).

In this study, recursive performative affordances (as action possibilities) can be seized in the operant domain, as it happened for the tango and macarena dancers, musicians, sports team and protestors, alluded to in illustrations discussed above. However, *recursive performative affordances pertaining to the generic domain are affectively laden possibilities for thought, judgement, meaning attribution, understanding and interpretation, among others, which when seized (thanks to ICT-enabled platforms) imply informational interactions between users* that: first, do not cease to revolve around a dominant topic (independent of whether they are supporting or dissenting expressions for or against the topic at hand) and are thus monothematic, consistent, repetitive, and may thus be characterized as *recurrent*. Second, these informational interactions feed off each other and escalate (i.e., gain an increasingly expansive and generalizing nature, which in turn allows them to seamlessly blend into other topics or contexts) so as to become *recursive*. Third, these informational interactions act as either -or rather, can act as both- inspirational and/or grounding instances, which means they are *self-replicating*. This last characteristic is attained when interactions are able to turn inspirational instances into grounding instances, and vice-versa. For example, an interaction meant as an inspirational offering, may also serve as a grounding instance. And then subsequent informational interactions as reactions to that grounding instance may provide further inspiration to social system components. From now on when alluding to

recursive performative affordances (or to their seizing), it will be for those pertaining to the generic domain unless it is clarified otherwise. For this same reason, from now on informational interactions will be simply referred to as interactions.

Clearly, ICT-enabled, virtually close, immediate, frictionless and algorithmically-coupled interactions can readily augment the availability of recursive performative affordances. Furthermore, since ICTs (and especially SNSs) entice users to enthusiastically seize recursive performative affordances, the seizing of these recursive performative affordances helps yield new, and expands the availability of, recursive performative affordances. Which not only helps augment virality and network effects but also makes the seizing of ICT-enabled recursive performative affordances even more effective and efficient at ensuring the unencumbered and continued provision of ICT-enabled inspirational and grounding instances that help social systems attain an autopoietic character. This also means that, ICT-enabled interactions in which actors seize recursive performative affordances -in the pursuit of attention, recognition and belonging, through imitation- are capable of triggering associated recursive learning processes (Parra & Yano, 2002). As such, recursive performative affordances act to pave the road and serve to more effectively facilitate the smooth emergence of processes that yield new spontaneous individual interpretants and capabilities (based on a social system's CPIs and CPCs). Similarly, recursive performative affordances work to more efficiently facilitate the transition of these new spontaneous individual interpretants and capabilities into associated new CPIs and CPCs.

Social systems that coalesce using ICTs (especially SNSs) by seizing *recursive performative affordances -understood as immediate, recurrent, recursive and self-replicating interactions-* can ensure the *unencumbered and continued provision of inspirational and grounding instances*. In general, thanks to the permission granted (and obtained) by recursive performative affordances, these ICT-enabled inspirational and grounding instances can be *more effective at yielding new spontaneous individual interpretants and capabilities*. As well as *more efficient at helping new interpretants and capabilities become new CPIs and CPCs*. And, as emphasized before, new CPIs and CPCs are essential to the continuous reproduction of autopoietic social systems (digital or otherwise).

What seems so new to us, once again, is ICTs' ability to facilitate these unencumbered, recurrent, recursive and self-replicating interactions. And thus, of granting individuals with ICT-enabled recursive performative affordances, which when seized can enable SNS users, for instance, to constantly showcase their viewpoints (i.e., get others' attention), as well as to effectively elicit (and obtain) buy-in for them from other SNSs users (i.e., obtain others' recognition). All of which allows ICT-enabled autopoietic social systems to more effectively and efficiently produce themselves. Please note how this works to exponentially increase the probability that new spontaneous individual interpretants and capabilities (as well as new CPIs and CPCs) may emerge in an inordinate amount of settings and contexts, and around an extravagant number of topics (which may or may not have any bearing on facts or science). As always, this is a double-edged sword. Thanks to ICT-enabled recursive performative affordances, and possibly because of them, SNSs take special pride in their ability to help people all over the world coalesce, and build new knowledge, around all kinds of interests. However, ICT-enabled recursive performative affordances, owing especially to their monothematic, escalating and self-replicating nature, can also enable the promotion of increasingly polarized, radicalized and even extremist viewpoints. These propositions are in line with empirical studies that have looked in the ways ICTs may have advanced the fragmentation (or balkanization) of electronic communities (Van Alstyne & Brynjolfsson, 2005)

Other types of media are also able to provide social systems with inspirational and grounding instances. Indeed, manipulative propaganda has been advanced in different cultures and contexts arguably since the advent of the printing press. However, newspapers, radio, TV, cinema and other types of traditional media (including books and

academic journals) find it much harder to enable the unencumbered, recurrent, recursive, and self-replicating interactions -and subsequent relations- between social system components granted by ICTs (and SNSs in particular). In essence, recursive performative affordances granted by traditional media are sparse and too far apart in time and space, compared to those offered by ICTs (especially SNSs). Which leads to encumbered and friction-ridden interactions (e.g., through regulations, licensing agencies, editorial boards, watchdogs, etc.) that usually make traditional media take much longer and a lot of coordinated effort to enable the emergence of new CPIs and related CPCs.

Even though traditional media can also help extend and amplify the song, as well as expand the dance floor, it takes much longer and a lot more work for traditional media to grant, and allow their audiences/users to seize, recursive performative affordances. And thus it is usually harder for traditional media to enable the unencumbered continuity of inspirational and grounding instances essential to the emergence of new spontaneous individual interpretants (and associated CPIs) and capabilities (and associated CPCs). This is why we believe that without content shared in SNSs, the Arab Spring, the protests against racial injustice and/or lockdown restrictions, among others, probably would not have gained so much traction in a matter of hours or days. Fig. 1 below presents a generalized model associated to the framework outlined above by which autopoietic social systems (digital or otherwise) may continuously produce themselves. This figure illustrates and summarizes the process in question by pointing to the section in which each concept is explained.

### 3. Model adaptation: moral communities and severe moral communities

In this section, we adapt the above autopoietic social systems model -using social and moral psychology- to represent moral communities as well as severe moral communities, while highlighting how ICTs can play an essential role in facilitating their emergence.

#### 3.1. Collectively prevalent moral judgements (CPMJ) and moral communities

We will now explain how the evolutionary nature of fear-based credulity, as well as of disgust (e.g., associated to disease exposure), may be compounded by anger, in order to enable the emergence of autopoietic social systems -amalgamated by these emotions- based on associated recursive performative affordances, and adept at making and emitting moral judgements.

##### 3.1.1. Negatively-biased credulity and disgust

ICTs have the ability to offer customized content with emotional intensifiers that lend more credence to it, and also serve to more effectively elicit buy-in for interpretants associated to this customized content from other social system components. This not only helps autopoietic social systems embed their CPIs (and associated CPCs), but also -more importantly- helps autopoietic social systems disseminate, and promote the adoption of their CPIs and CPCs among new and more components. In particular, Fessler (2019) determined that when content shared in SNSs concerns threats or losses it has greater attentional salience, evokes stronger emotional responses, is more memorable<sup>3</sup>, and thus has greater chances of motivating action than content related to opportunities or gains. Fessler, Pisor, and Navarrete (2014) labeled this effect *negatively-biased credulity* and explained how evolution may have helped craft learners' minds so as to be more credulous toward information concerning hazards and threats. Across cultures, beliefs around hazards are more predominant and the key emotional enablers of this

type of bias tend to be fear of threats, or of loss. A cynic might propose that SNSs probably discovered this a long time ago while analyzing data in order to figure out ways of maximizing user engagement (as well as associated network effects). If content relating to threats or losses could generate more user engagement, it would be reasonable for SNSs to prefer disseminating it. Not just because it would help generate more credence-based virality but especially because doing so could also help grow SNSs' advertising revenues.

Now, some threats, in addition to fear-based credulity, can provoke emotions of repulsion and disgust. Navarrete and Fessler (2006) found that ethnocentric attitudes increase as a function of threats (such as those related to *exposure to diseases*), and accordingly that in-group attraction increases as a function of disgust sensitivity related to the possibility of being exposed to out-group diseases. These findings were corroborated by Van Leeuwen, Park, Koenig, and Graham (2012), who looked at whether pathogen (i.e., disease) prevalence in different regions helped predict endorsement of the binding moral foundations in Moral Foundations Theory, namely: in-group/loyalty, authority/respect, purity/sanctity (J. Graham et al., 2013). They found that indeed pathogen prevalence significantly predicted endorsement of these binding moral foundations, and that this was true even after controlling for individual-level variables (such as gender, age, education and political orientation). Perhaps it is because of this, that: first, disgust elicitors in the form of threats associated to disease exposure can be found in many cultures. And second, more importantly, that embodied schemata (i.e., individual interpretants) alluding to imaginative structures or patterns of experience, based on bodily knowledge or sensation, are drawn upon by cultures in order to help define their social and moral life (i.e., CPIs and associated CPCs) (Haidt, Rozin, McCauley, & Imada, 1997).

In sum, fear of threats brings about negatively-biased credulity. And threats concerning disease exposure elicit disgust, enhance in-group attraction, as well as the endorsement of binding moral foundations (i.e., in-group/loyalty, authority/respect, and purity/sanctity). All of which may lead autopoietic social systems to *adopt CPIs and CPCs, amalgamated by fear and disgust, based on ethnocentrism and increased in-group attraction*. There are at least two problematic issues with this. First, CPIs and CPCs revolving around the avoidance of out-groups, initially due to threats associated to disease exposure, may morph or escalate into the avoidance of out-groups that just happen to be more tolerant of bodily sounds and odors, or that happen to eat different foods (or to cook food differently), or simply happen to be less bothered by what women may choose to do (e.g., the type of clothes they may wear), or that happen to find certain types of humor amusing (or conversely, deeply offensive), etc. This is plausible not just because interpretants are neural schemas that facilitate the generalization of previously learned abstract knowledge to help elucidate and embody new experiences, and thus individuals' interpretants may in general be driven by their prejudices. But also, because related CPIs, as an autopoietic social system's collectively prevalent way of interpreting the world, may serve to embed, magnify and extrapolate these prejudices thanks to permissions granted by related recursive performative affordances as well as the nature of associated inspirational and grounding instances subsequently on offer. The second problematic issue is that groups adopting this kind of CPIs and CPCs would probably have xenophobic characteristics.

##### 3.1.2. Moral judgements

It also turns out that emotions, disgust in particular, may influence moral judgements. Using a posthypnotic suggestion to feel a flash of disgust, Wheatley and Haidt (2005) found that moral judgments (e.g., rating of moral transgressions) were more severe when a flash of disgust was present. Suggesting that moral judgments may be grounded in affectively laden moral intuitions. Similarly, Schnall, Haidt, Clore, and Jordan (2008) established the importance of gut feelings in making moral judgments by inducing disgust in study participants by means of a disgusting working room, by recalling a physically disgusting experience

<sup>3</sup> Which thanks to neural replay would work to augment the effectiveness of associated individual reinforcement learning processes

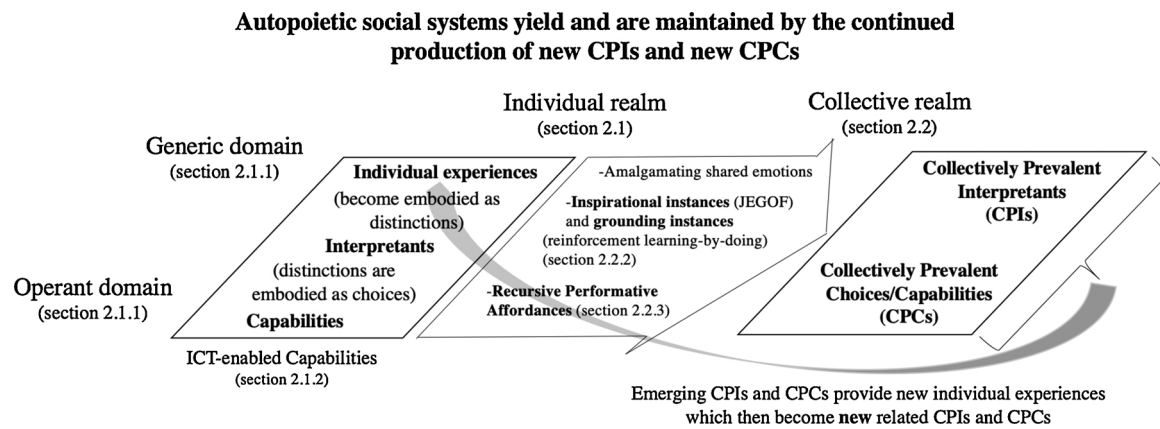


Fig. 1. General model of autopoietic social systems that yield and are maintained by the continued production of new CPIs and new CPCs.

as well as through a video. They found a causal relationship between feelings of physical disgust and moral condemnation, by which disgust increased the severity of moral judgments depending on participants' sensitivity to their own bodily sensations. Which meant that results concerned actual feelings of disgust rather than merely the concept of disgust induced by each experiment.

Furthermore, it appears that disgust and anger have different effects on moral judgements. Seidel and Prinz (2013) explored the divergent effects of anger and disgust using sounds to elicit those feelings while participants considered moral vignettes. They found that anger increased severity of judgments about crimes against persons, while disgust increased severity of judgments about crimes against nature. This partly coincides with Giner-Sorolla, Kupfer, and Sabo (2018) who -in their review of related experimental, personality, and neuroscientific work- found disgust responding more to bodily moral violations (such as incest), and anger responding more to sociomoral violations (such as theft). For purposes of this study what matters is that both disgust and anger are emotions of condemnation that increase the severity of moral judgements. As well as the fact that expressions of disgust can serve as signals of an individual's moral intentions (e.g., to signal one's own virtue and thereby enhance one's moral reputation by publicly condemning the immoral actions of other people) even when a different emotion may be felt (Giner-Sorolla, Kupfer, & Sabo, 2018).

This means that individuals may pretend to have adopted a new interpretant (while making severe moral judgements) by enacting CPCs befitting to groups that actually do have CPIs (and enact CPCs) that revolve around those moral judgements. All in an effort to imitate and appeal to those groups, get their attention, obtain their recognition, and thus feel part of them. Independent of the fact that cohesive groups appear to be better at detecting deception than ad hoc groups (McHaney, George, & Gupta, 2018), what matters most is how this constitutes yet another way in which recursive performative affordances may act as both inspirational and grounding instances. In particular, recursive performative affordances may not only be used to signal the adoption of new CPIs (i.e., to provide inspiration), but also to evidence the embodiment of these CPIs through related enactments (e.g., by also evidencing the adoption of related CPCs, which entails operational grounding). Critically, recursive performative affordances, compounded by the attention, reassurance, validation and corroboration granted by the group, can work to embolden and augment the emission, as well as to increase the severity, of the moral judgments being made (and being enacted).

### 3.1.3. Moral communities

So now we have disgust and anger as emotions of condemnation (compounded by fear-based credulity) that work to increase the severity of moral judgements, along with expressions of disgust that individuals may use to signal their moral intentions. Which means that individuals

may pretend to have adopted interpretants to signal their moral virtue and enhance their moral reputation, while making and emitting increasingly severe moral judgements to seize recursive performative affordances, which in turn ensure the continued provision of associated inspirational and grounding instances. Please note how moral judgements act just like interpretants. But these interpretants also serve to qualify and assess individuals' moral intentions through the type of moral judgements they espouse and subscribe to. Thus, moral communities may be characterized in general as *autopoietic social systems, amalgamated by shared emotions, enabled by the seizing of associated recursive performative affordances and adept at making and emitting moral judgements*. By means of processes that entail the provision of related inspirational and grounding instances, which yield and are maintained by the continued production of *Collectively Prevalent Moral Judgements (CPMJs)*.

Ominously, it appears to be much easier for moral communities to emerge as autopoietic social systems when they are amalgamated by fear, disgust and anger. Not just thanks to negatively-biased credulity, but especially because condemnation, severe moral judgements and *Collectively Prevalent Severe Moral Judgements (CPSMJs)* are much easier and faster to arrive at when they are elicited by negative emotions. Fredrickson (2004), cited by Strohminger, Lewis, and Meyer (2011), found that positive emotions serve to expand thought-behavior repertoires -which would abstract more tolerant and accommodating interpretants and thus extend individual as well as collective deliberations before arriving at and making moral judgements- whereas negative emotions work to narrow these repertoires. Thus, it is more arduous for moral judgements elicited by positive emotions to emerge and also to become collectively prevalent. This in turn weakens the organizational closure of associated social systems as the provision of associated inspirational and grounding instances is now encumbered by the increase in individual (and collective) deliberations about whether to seize related recursive performative affordances. Which means that, thanks in part to a much stronger and more reliable organizational closure, *severe moral communities* would tend to exhibit more cohesiveness. However, because of this greater organizational closure, the nature of severe recursive performative affordances, as well as thanks to repeated exposure and use of CPSMJs (as lenses through which the world may be seen and also guide for how life should be lived), severe moral communities may lead their members to adopt increasingly polarized, radicalized and even extremist viewpoints.

### 3.2. Collectively prevalent severe moral judgements (CPSMJs) and severe moral communities

Severe moral communities may thus be construed as *autopoietic social systems, amalgamated by fear, disgust and anger, enabled by the seizing of severe recursive performative affordances and adept at making and emitting*



severe moral judgements. By means of processes which entail the provision of severe inspirational and grounding instances that yield and are maintained by the continued production of CPSMJJs. It cannot be over-emphasized that severe moral communities may more effective at leading their members to adopting increasingly polarized, radicalized and even extremist viewpoints and capabilities. Fig. 2 below presents an adaptation of the general model to depict severe moral communities (virtual or otherwise).

Naturally, there would be a broad spectrum to consider, from CPSMJJs that entice people to volunteer for -and/or donate to- radical political causes, along with CPSMJJs enthusing protestors to march, ask for, and achieve institutional changes. All the way to CPSMJJs inspired by religious fanatics and extremists that endorse and encourage terrorist acts, along with CPSMJJs of xenophobic, nationalistic and racist character that may justify mass shootings. Please note that this spectrum does not encompass autopoietic social systems amalgamated by shared emotions of love, kindness, compassion, tolerance, solidarity, stoicism, forgiveness, etc. These moral communities could still be enabled by the seizing of related recursive performative affordances and be adept at making and emitting related moral judgements, while espousing related CPMJs from a diametrically opposed vantage point. However, these might be harder to come by due to their weak organizational closure (primarily because of how difficult it is for moral judgements elicited by positive emotions to emerge and become collectively prevalent). Other moral communities may be amalgamated by shame, or by mixed feelings, etc. But none of these would qualify as severe moral communities. Our aim here is not to discuss the differential merits or shortcomings of CPMJs or CPSMJJs, or to develop detailed associated taxonomies, but rather to attempt elucidating how ICTs may enable severe moral communities to disseminate, promote and embed increasingly polarizing, radicalizing and even extremist CPSMJJs. However, please do note that all moral communities (severe or otherwise), just like any other autopoietic social system, will endure for as long as their members continue to make -and act upon- new related CPMJs.

3.2.1. ICT-enabled severe moral communities

ICTs, once again, can work to grant unencumbered continuity to the provision of severe inspirational and grounding instances that help trigger new spontaneous individual interpreters and capabilities (related to a severe moral community's CPSMJJs). In particular, ICTs enable innovative members of severe moral communities to constantly seize severe recursive performative affordances by showcasing their new productions of CPSMJJs, as well as to constantly elicit the buy-in from other members. All while working to embed, expand and promote the severe moral community's CPSMJJs. Again, it is thanks to this, that ICTs facilitate the continuous provision of severe inspirational and grounding instances that yield and are maintained by the continued production of

new CPSMJJs. Please note, however, that traditional media targeted at severe moral communities may also leverage fear-based credulity, disgust and anger (along with the much stronger and more reliable organizational closure of their audience), in order to become more agile at granting, and at allowing their audiences to seize, severe recursive performative affordances. Traditional media tailored to serving severe moral communities can be more effective and efficient at enabling the provision of severe inspirational and grounding instances essential to the emergence of new severe moral judgements (and of CPSMJJs) than traditional media aimed at general audiences.

This differs from the debate around whether some online forums, characterized by ideological homogeneity, could work to amplify their own viewpoints due to the lack of dissent, opposition and disagreement -or what Sunstein (2001) labeled echo-chambers. Which could in turn help explain polarization of opinion across communities, as well as radicalization and extremism (Edwards, 2013; O'Hara & Stevens, 2015). Empirical studies looking whether SNS users are more likely to be active when they are surrounded by like-minded individuals, or when their environment is heterogeneous have found evidence contradicting the echo chamber amplification theory. Dyagilev and Yom-Tov (2014) found that activity is actually invigorated by disagreement. Moreover, Bright, Marchal, Ganesh, and Rudinac (2020) corroborated this finding by determining that the most common "echoes" in echo chambers are in fact the sound of opposing viewpoints being undermined and marginalized. In sum, cross-cutting exposures are a more common feature of SNS than virtual echo-chambers.

Our propositions would support this assessment insofar as virtual echo-chambers, understood as ICT-enabled moral communities adept at listening to and repeating the same old CPMJs over and over, would die rather quick entropy deaths. Simply because there would not really be any new inspirational and grounding instances yielding -and maintained by- the continued production of new CPMJs. And also, because -once again- the social system's components and processes would not have much continuously renewed impetuous helping drive and maintain its reproduction. Conceivably, echo chamber amplification theory may have been unintentionally ill-conceived due to its unfortunate acoustic repetition connotation, as well as by the subsequent -but perhaps unnecessary- exclusion of opposing viewpoints. The ICT-enabled severe moral communities considered here, endure as autopoietic social systems thanks to the repeated exposure to, and use of, new related CPSMJJs. Which means that a severe moral community's CPSMJJs must be permanently renewed through the continued provision of inspirational and grounding instances. As explained before, the recurrent nature of recursive performative affordances (severe or otherwise) offer new inspirational and grounding instances when social system components' interactions stay on topic (independent of whether these instances emerge out of supporting, dissenting or even neutral

**Severe moral communities as autopoietic social systems that yield and are maintained by the continued production of new CPSMJJs and related enactments**

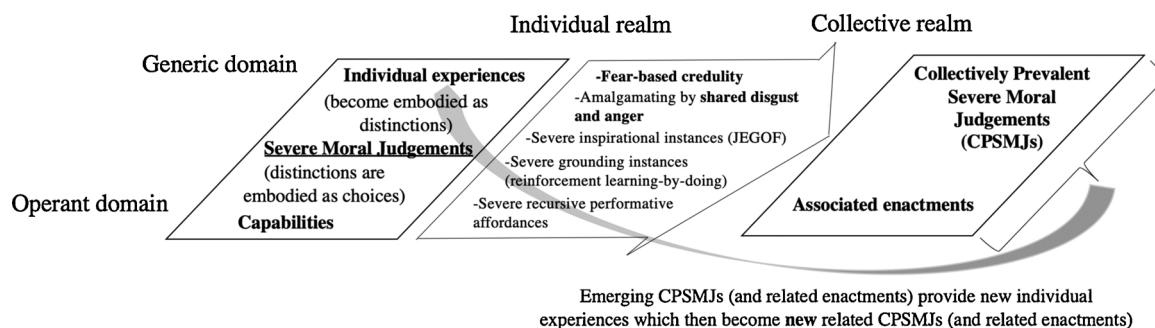


Fig. 2. Severe moral communities enabled by the seizing of severe recursive performative affordances and adept at making and emitting severe moral judgements that yield and are maintained by the continued production of new CPSMJJs (and related enactments).

interactions), escalate and self-replicate. Let's now exemplify how severe moral communities (understood as autopoietic social systems, amalgamated by fear, disgust and anger, based on severe recursive performative affordances and adept at making and emitting severe moral judgements), which yield and are maintained by the continued production CPSMJs, have actually lead their members to adopt increasingly polarized, radicalized and even extremist viewpoints and capabilities.

#### 4. Application: Edgar's ICT-enabled severe moral community

Please imagine an individual named Edgar looking for content on the internet, when an algorithm (using his input preferences, as well as perhaps information from his cookies) makes a suggestion. Edgar intriguingly clicks on the recommended link and then finds himself, a couple of hours later, avidly reading more and more related content. Let's assume that this was the case thanks to the fear-based credulity offered, as well as the disgust and anger elicited, by the content Edgar has been reading. Based on this, another algorithm suggests that Edgar should join a group chat and enter a live discussion on related topics. Edgar consents and starts to actively engage with the same type of content now on a SNS. Edgar interacts, initially by reading posts, which he interprets and reacts to by liking and/or re-sharing them. Edgar, after a few days of constantly checking and recurrently engaging with the group's posts, pictures and videos (acting as emotional intensifiers to help amplify fear-based credulity, disgust and anger), starts to believe that whatever is discussed merits the severe moral judgements emitted by the group. Edgar decides to signal his adoption of the group's CPSMJs by imitating the group's viewpoints and comments. Edgar is glad to get acceptance and recognition from group members who admit his interpretations as valid and innovative. Please note that by having showcased his viewpoint and received acceptance (i.e., associating successfully to the group's CPSMJs), the IS artifact (i.e., the SNS) effectively allowed Edgar to seize an action possibility that enabled his coalescing with the group. If these interactions were sporadic, then this would simply amount to seizing traditional performative affordances.

However, Edgar decides to interact repeatedly in a recurrent fashion. And thus thanks to repeated exposure to, engagement with, and recurrent use of associated CPSMJs -but especially thanks to the validation, reassurance and corroboration granted by his severe moral community- Edgar feels emboldened to come up with increasingly expansive, generalizing and severe associated viewpoints. This in turn helps the severe moral community's CPSMJs start to take hold of Edgar's perspective. Edgar starts to experience, distinguish, recognize and generate additional new viewpoints through the lens offered by his severe moral community, even when Edgar is not using ICTs. Indeed, individuals may get to see the outside (offline) world through the lens of algorithms (Shin, Zhong, & Biocca, 2020) and/or through their experiences online (Kizgin et al., 2020). Culminating in Edgar's complete adoption of the group's CPSMJs, as an eminently digital acculturation process characterized by the adoption of others' individual and social preferences (Reyes-Menendez, Saura, & Thomas, 2020). Eventually, Edgar's innovative viewpoints become an integral part, and perhaps even new guiding principles, of his severe moral community. Edgar, as a new component of this autopoietic social system, now also engages in self-replicating interactions that seize generic domain severe recursive performative affordances. Which help yield, and are maintained by, the continued production of new related CPSMJs. Insofar as other group members can now consider whether to feel and/or think how he does, the group's generic domain severe recursive performative affordances have been expanded.

After this, it is easy to see how Edgar may also start to find merit in performing (in public) as other group members do. And in showcasing new increasingly severe viewpoints and associated enactments (related to the group's CPSMJs, still amalgamated by fear, disgust and anger) on the group's site so as to seize increasingly severe recursive performative

affordances now pertaining to the operant domain. In other words, Edgar now starts enacting the group's CPSMJs, and to take pictures and make videos of his enactments. And, of course, Edgar is sure to share these pictures and videos with his severe moral community to seize recursive performative affordances that elicit (and actually obtain) others' buy-in. Evidencing, how seizing severe recursive performative affordances in the operant domain may also act as grounding instances (as Edgar must enact the group's CPSMJs) as well as inspirational instances (as Edgar shares those enactments not just to evidence his embodiment of the group's manners and style, but also in an effort to inspire others, and thus assist in the constant renewal of his severe moral community). Edgar's seizing of operant domain severe recursive performative affordances (or enactments related to the group's CPSMJs) expands the group's operant domain severe recursive performative affordances (as other group members can now consider whether to imitate Edgar's actions). In sum, Edgar's new interpretants and capabilities are deemed fully "in-step" as they conform to (and help advance) the group's accepted norms of behavior. And ICTs have served to advance and ensure the unencumbered provision of new severe inspirational and grounding instances, which in turn helped trigger not just the adoption of the group's CPSMJs (and related enactments), but also the generation of new associated interpretants and capabilities in a new component.

The severe moral community's properties (its continued production of CPSMJs) are now also the outcome of relations with this new component. All of which worked to gradually radicalize Edgar's viewpoints, as well as to brain box him cognitively by means of ubiquitous CPSMJs as primordial lenses for seeing the world and main guiding principles for living life. Because of this, he ends up agreeing with the group that decisive action should be taken in relation to the content in question. Edgar then decides to seize a fundamental recursive performative affordance provided by his severe moral community: he posts that *he is going to be the one to actually do something* about the situation being discussed. He is not going to wait any longer for anyone else to do so. This outcome, this new spontaneous rhythmic move (or choice) proposed by Edgar, is what his severe moral community -as an autopoietic social system- ultimately strives for.

On Sunday December 4th, 2016 Edgar Maddison Welch, age 28, drove from his home in North Carolina to a family-friendly pizzeria in Washington D.C. called Comet Ping Pong. Edgar believed rumors circulated on social media (under #Pizzagate), which falsely linked Hillary Clinton to an alleged child sex trafficking ring. So, Edgar walked into the restaurant with a .38-caliber Colt revolver as well as a Colt AR-15 rifle and fired the assault-style weapon a couple times inside the restaurant to investigate the matter and save the children who he believed were being held captive in the pizzeria. He was arrested and charged for interstate transportation of a firearm and ammunition, assault with a dangerous weapon, and possessing a firearm during the commission of a crime of violence. This example encompasses a progressively radicalized (and eventually brain boxed) individual who -by means of repeated exposure to, engagement with, and use of increasingly stern CPSMJs- decided to act upon them. Edgar's original decision making was overtaken by the lens/guide provided by his severe moral community. We should all be concerned with the fact that Edgar ascribed real meaning to misleading digital experiences. And especially with the fact that Edgar decided to take deliberate violent action upon them. This underscores the relevance of seizing severe recursive performative affordances to ensure the continued provision of severe inspirational and grounding instances, which yield associated new interpretants (and CPIs) and capabilities (and CPCs). We now have an idea how ICTs (and SNSs) may have enabled this dreadful situation to occur, and realize how thanks to ICTs the realm of fanatic extremism may have been exuberantly expanded.

For many of us, Pizzagate's content was clearly disingenuous and even delusional. However, for some in Edgar's severe moral community it continues to be a true possibility. LaFrance (2020) eloquently

describes what these ICT-enabled severe moral communities look like in the United States nowadays:

“If you were an adherent, no one would be able to tell. You would look like any other American. [...] you are hard to identify just from the way you look—which is good, because someday soon dark forces may try to track you down. You understand this sounds crazy, but you don't care. You know that a small group of manipulators, operating in the shadows, pull the planet's strings. You know that they are powerful enough to abuse children without fear of retribution. You know that the mainstream media are their handmaidens, in partnership with Hillary Clinton and the secretive denizens of the deep state. You know that only Donald Trump stands between you and a damned and ravaged world. You see plague and pestilence sweeping the planet, and understand that they are part of the plan. You know that a clash between good and evil cannot be avoided, and you yearn for the Great Awakening that is coming” (LaFrance, 2020, p. 28).

Thankfully, as clarified above, ICT-enabled severe moral communities usually last only for as long as their members continue to seize recursive performative affordances by making -and acting upon- related CPSMJs. For example, Müller and Schwarz (2019) looked into SNS users (and their location) who interacted around anti-refugee content on Germany's far-right party's (Alternative for Germany) page, in order to explore whether it could be related to 3300 anti-refugee incidents in Germany. They found that anti-refugee sentiments in municipalities with high SNS use coincided with the occurrence of local hate crimes. Moreover, the overlap between SNS interactions around anti-refugee and the incidence hate crimes disappeared when there were internet disruptions or outages in these municipalities. Similarly, the severe moral communities that lynched innocent bystanders in India (assuming that their intention was to kidnap children) have been for the most part managed after the dissemination of such unfounded threats, unfortunate CPSMJs (and associated enactments), was limited by the platform in which they were being shared (Vasudeva & Barkdull, 2020). This should give us hope that there are ways of mitigating the risks associated to severe moral communities focused on promoting increasingly polarized, radicalized and even extremist viewpoints and capabilities. Notwithstanding the fact that extant research has looked into the relevance of cultural differences: regarding lying (i.e., spreading rumors) through ICTs (Marett, George, Lewis, Gupta, & Giordano, 2017); and with respect to what would entail inappropriate SNS behavior (Gupta et al., 2018), it would be interesting to examine the propensity of different cultures to believe misinformation in different contexts (i.e., to examine cultural gullibility in different settings). We shall now turn to discussing our propositions in light of the current pandemic, as well as how related Worldview Gaps (WGs) may emerge.

## 5. Discussion

Before providing specific examples of how the above model(s) and propositions might be of relevance for the pandemic, let us first discuss WGs. WGs can severely limit the identification of any common grounds on which individuals may agree or disagree. Most importantly, WGs can lead to irreconcilable differences that make impossible any form of communication, coordination or collaboration. Because of this, it may be argued that WGs play an important role in helping tear apart social fabrics. This is the case, as WGs can make individuals decide to give up on attempts to communicate and collaborate with others. Or even start to think and act as if they have nothing in common, except the willingness to condemn and make severe moral judgements against each other. WGs can emerge anywhere, anytime and have surely been around for a long time. Our contention is not just that ICTs are increasingly facilitating and exacerbating them, but also that thanks to the pandemic additional WGs might emerge.

### 5.1. Worldview gaps (WGs)

Going back to the key point made by Checkland and Scholes (1990) regarding the possibility that one observer may perceive certain actions as those of a terrorist system, while another might interpret them as those of a freedom-fighting system. It should be clear that these two dramatically different interpretations of the very same actions correspond to severe moral judgements made by diametrically opposed severe moral communities, whose existence is implicit in the example. This is what characterizes WGs. In essence, *WGs imply the existence of diametrically opposed and increasingly polarized and radicalized CPSMJs, along with an increased probability of confrontation between the severe moral communities adopting them.*

Please note that this is by no means an argument in favor of homogenous CPIs. Quite the contrary, we adhere to the importance of expanding individuals' phenomenological diversity, to augment their capabilities, such as the ability to understand how/why newspaper “editorials differ; and then having, or caring to have, an opinion about those editorials (i.e., basic democratic values), or experiencing and appreciating different religions, varied cuisine and music (i.e., celebrating cultural diversity). In sum, opportunities that allow individuals to experience experiences that make them realize they are an integral part of a social and ecological whole” (Parra, 2005, p. 108). Because of this, we also adhere to the fact that diverse CPIs are essential for innovation and economic development (Bassett-Jones, 2005; Østergaard, Timmermans, & Kristinsson, 2011). The difference is that diverse CPIs do not necessarily indicate the presence of severe moral communities making diametrically opposed CPSMJs against each other. It might even be argued that the availability of diverse CPIs could help mitigate, or perhaps help prevent, WGs.

For better or worse, ICTs have helped exacerbate WGs, as evidenced by how they helped catalyze the Arab Spring, as well as protests against racial injustice, lockdown restrictions, etc. Unfortunately, ICTs have also been leveraged by severe moral communities to promote and advance religious extremism along with associated terrorist actions. Similarly, ICTs have enabled the livestreaming of mass shootings along with the posting of racist manifestos justifying them. Along these lines, as promised above (while discussing ICT-enabled interpretants and capabilities), we will now elaborate on what the health capability may mean to different individuals. We do so to highlight the relevance of our model adaptation for the current global pandemic juncture, and to exemplify how severe moral communities may radicalize their members under, or perhaps because of, the current dire circumstances brought about by Covid19.

#### 5.1.1. Severe moral communities choosing (NOT) to wear masks

For most of us, during these tough pandemic days the health capability entails wearing masks in public, upholding social distancing, washing hands periodically, as well as avoiding crowded and enclosed spaces, among others, for the sake of our own well-being as well as others'. However, for some groups (perhaps members of severe moral communities such as Edgar's) these actions would entail sacrificing what they seem to consider as constitutional and/or god given rights. Independent of how one may feel about these rights, it seems dreadful that amidst the worst pandemic in a century- not all of us have a somewhat aligned understanding (or CPI) of what the health capability should entail. In particular, the decision about whether to wear a mask or not seems to be one of the most revealing about individuals' understanding of the health capability, as well as about the moral intentions they may wish to signal, during this critical juncture.

For most of us, deciding to wear a mask is a sign of concern, consideration and precaution, while for others it signals an offensive political statement, lacking virtue and even nation pride. Fig. 3 below depicts this situation. Associated WGs may be cause and consequence of the very polarized and divisive CPSMJs that both sides cannot help but end up making about each other. The key is to see that those of us

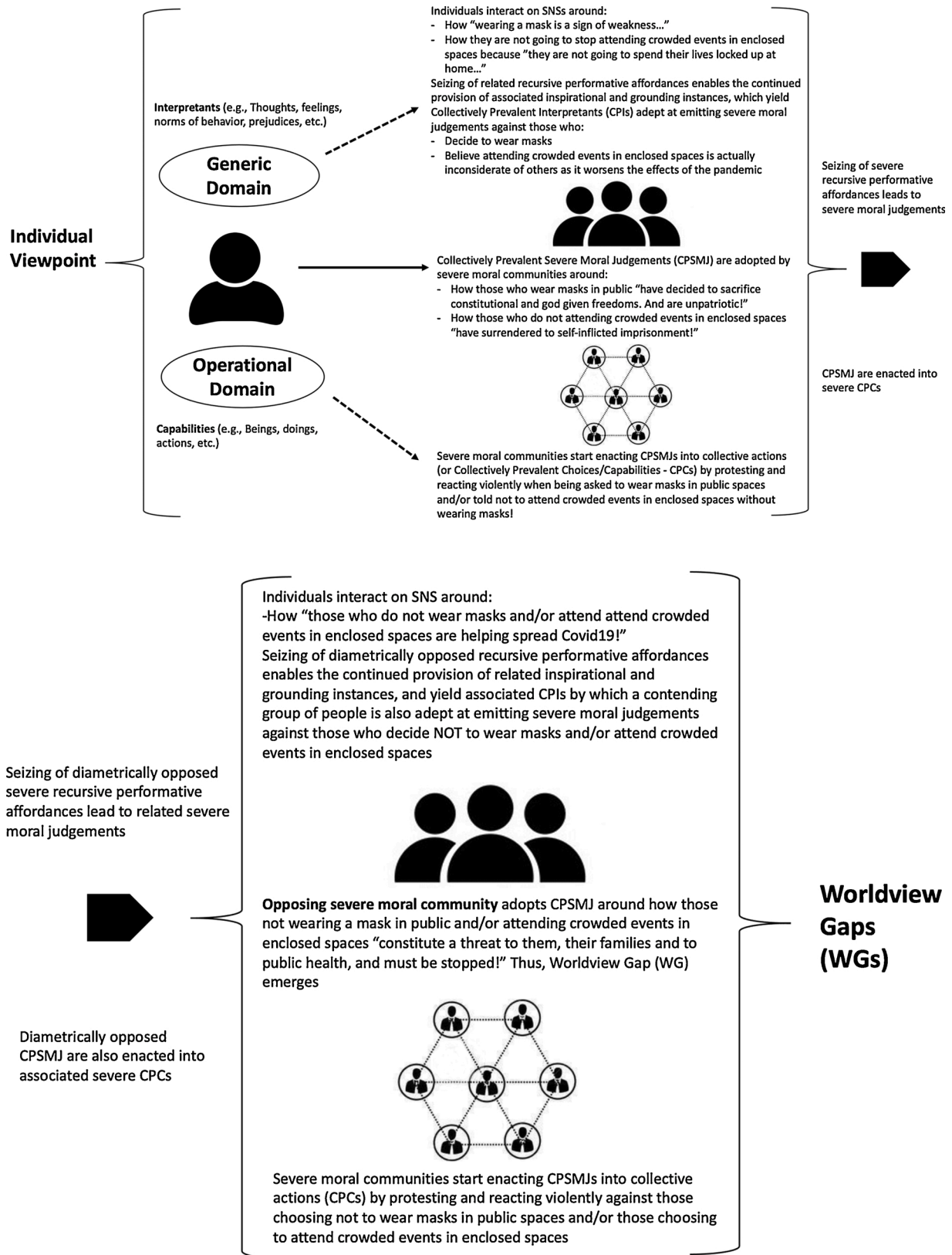


Fig. 3. From Individual Viewpoints to Worldview Gaps around Choosing (NOT) to Wear Masks and/or to Attend Crowded Events in Enclosed Spaces.

adhering to the former understanding of the health capability (choosing to wear masks in order to protect ourselves and others) are just as likely to make CPSMJ against those adopting the latter (who prefer upholding their rights irrespective of the circumstances). Precisely because we may

feel threatened by their choices and actions insofar as they seem to be exposing us to a dangerous disease! However, please note that this does not necessarily mean that those of us heeding the advice of public health experts and officials will suddenly decide to gang up against those who

do not. Not all those who make or emit CPSMJJs move on to enact associated CPCs (otherwise we would have Edgars everywhere, every day).

The above and below examples, attempt to highlight the possibility that a group of people (who decided to abide by the pandemic rules but unfortunately ended up losing a loved one to Covid19, and/or happens to be disgruntled because of similar reasons) may decide to start interacting on a SNS. And start seizing severe recursive performative affordances around topics related to the way “individuals deciding not to wear masks in public and/or to attend crowded events in enclosed spaces are helping spread Covid19.” In turn enabling the unencumbered and continued provision of inspirational and grounding instances, which may yield CPSMJJs adept at making severe moral judgements about how “those who do not to wear masks in public and/or to attend crowded events in enclosed spaces are a threat to us, to our families, and to society and need to be stopped!”

### 5.1.2. Severe moral communities choosing (NOT) to attend crowded events in enclosed spaces

In addition to not wearing masks, individuals may also choose to attend crowded events in enclosed spaces as they figure it is not possible (or “healthy”) for them to stay at home, to lockdown, or to quarantine (if they happen to actually be sick). Moreover, people asking them to do so would in effect be asking to imprison themselves. Fig. 3 above also illustrates this example. WGs may emerge when those opting to avoid attending crowded events in enclosed spaces and/or to follow stay at home orders (i.e., lockdown restrictions), so as to protect themselves and others, see pictures and videos of others’ flagrant disregard for safety recommendations and end up making severe moral judgements against individuals enacting those CPCs.

In essence, the CPIs and CPCs of those choosing not to wear masks and/or to attend crowded events in enclosed spaces are just as likely to elicit fear, disgust and anger, along with associated severe moral judgements (but not necessarily associated enactments, as explained above). It ought to be sobering that people may surmise such antagonistic interpretations (i.e., severe moral judgements) from an individual’s decision, especially in light of the fact that this may eventually help lead to the emergence of an opposing, and increasingly polarized and radicalized, severe moral community. It should be also clear that the moral communities exemplified above are severe not just because they are amalgamated by disgust and anger, but especially thanks to the fear-based credence related to the fact that we are in the middle of a pandemic (i.e., there’s a disease/virus spreading that has killed many of us and may still infect us). We will now turn to implications for theory and practice of our work.

## 5.2. Theoretical and research implications

Admittedly, we have focused on extreme circumstances, on outliers, which are by no means representative of ICTs’ overall influence on society. We have deliberately focused our discussion on CPSMJJs because they are more likely to result in momentous events. Their rarity is no justification for dismissing them, or reason to avoid embarking in the bristly endeavor of attempting to analyze them. We would continue to ignore them at our peril. Surely there are many other ways of embarking in this journey and of subjecting the topic to academic scrutiny. Specifically, the model presented here along with its adaptation, heeds the advice from Dwivedi et al. (2019) in terms of considering people-centered perspectives of the impacts of ICTs that adopt multi-disciplinary research approaches involving a combination of moral philosophy and economics.

Nevertheless, qualitative IS research approaches in general may be in need of upgrades, in order to be more effective at analyzing and making sense of contemporary and emerging social issues brought about by ICTs. It may be the case that an excessive focus on corporate contexts, which could be alluded to as the meso level (as it is done in evolutionary

economics), may have led IS researchers to place the spotlight on macro level conditions (mainly by means sociology and anthropology). Focusing on macro and meso levels to the detriment of micro level ones, may have delayed the adoption of recent neuroscientific discoveries, or of propositions from fields that overlap with the micro level (e.g., moral and social psychology). For instance, in terms of ICT adoption research, even though both Technology Acceptance Model (TAM) (1993, Davis & Venkatesh, 1996; Davis, 1989) and Theory of Planned Behavior (TPB) (Ajzen, 1991; Bamberg, Ajzen, & Schmidt, 2003) recognize the importance of generic and operant domains, by differentiating between behavioral intention and actual use (or behavior) -as well as of social norms (our CPIs and CPCs) in the case of TPB. These theories do not really help elucidate how transitions between individual and collective realms may occur without pecuniary incentives or the pursuit of corporate/firm goals. Or how emerging collectively prevalent ways in which ICTs may be interpreted (and actually used) could influence other individuals’ interpretants and capabilities. Thanks to processes similar to the way protesters may decide to start marching to a new chant.

In particular, other studies have actually focused on highlighting the importance of an organization’s epistemic stance (Fayard, Gkeredakis, & Levina, 2016), or the attitude that organizational actors collectively enact while pursuing knowledge. This, we believe, relates to the fact that amalgamating shared emotions, the seizing of recursive performative affordances, and the provision of inspirational instances (i.e., JEGOF) and grounding instances (i.e., group level reinforcement learning-by-doing) that could help characterize organizations’ epistemic stances are of the essence. However, a detailed elaboration on how our propositions might also be of relevance in similar organizational contexts ought to be the subject of a separate study. But please note that ICTs themselves are increasingly the ones helping define organizational characteristics (such as the ones mentioned above) by leveraging them to, for instance: “direct workers by restricting and recommending, evaluate workers by recording and rating, and discipline workers by replacing and rewarding” (Kellogg, Valentine, & Christin, 2020, p. 366). Insofar as how workers are directed could help define the nature of generic domain recursive performative affordances and related inspirational instances (Scheibe & Gupta, 2017), and the way workers are evaluated and disciplined would help characterize operant domain recursive performative affordances and related grounding instances. Thanks to this, the amalgamating shared emotions of an organization may in part be determined by the ICT adopted.

## 5.3. Practical and policy implications

As shown by Edgar’s example, an individual’s ability to differentiate between information pointing to a valid difference that should indeed make a difference (Bateson, 2000; Dell, 1985), and misinformation (which should not), is becoming an increasing essential digital capability, albeit increasingly complex as well (George et al., 2018). In general, we should all be weary of anyone claiming to know the difference between what should count as information and what should be identified as misinformation. We contend this is an in-principle undecidable question for which the ethical response ought to entail augmenting the options available to individuals (Parra & Yano, 2002). In practice, our findings could mean for example that when users find information regarding threats in general (or alluding to exposure to diseases in particular), these threats ought to be automatically qualified by peer-reviewed scientific research (before users get a chance to seize related recursive performative affordances). In these instances, SNS should also strive to clarify that our minds as wired to lend more credence to information (or content) related to hazards. As well as, the fact that threats related to exposure to diseases may elicit disgust and anger, which may in turn trigger condemnation along with severe moral judgements. And finally, that repeated exposure to such information (or content) may eventually lead individuals to adopt CPIs, which could morph into CPSMJJs. This is critical not just because CPSMJJs may

become increasingly polarized and end up brain boxing users' viewpoints, but also because they may lead to associated enactments, which may themselves elicit disgust, anger and severe moral judgements in opposing groups (and yield WGs). In general, insofar as these recommendations could help mitigate the risks associated to severe moral communities promoting polarized, radicalized and extremist viewpoints, they could be incorporated into tactics focused on advancing the individual and community empowerment dimension of digital resiliency strategies.

Furthermore, CPSMJs (and associated WGs) as lenses through which to see the world, and guides by which to live life, may actually work to limit phenomenological diversity (digital or otherwise) and thus the acquisition of new perspectives, interpretants and capabilities. It is because of this that ICTs can have a lasting and enduring impact on an individual's life and on the outlook with which she may decide to live it. The purpose of ICTs should be to help *expand individual liberty - understood as the depth, range and scope of an individual's experiences-* which help endow her with new perspectives, and thus are essential to her meaning attribution and decision-making processes. Liberty depends on an individual's phenomenological base, and its diversity helps determine the individual's capacity to acquire and produce new knowledge, innovate, and contribute to economic evolution and development. In sum, WGs based on CPSMJs of severe moral communities (along with the associated enactments of some of their brain boxed members), by limiting individuals' liberty, may actually limit individuals' chances of contributing to economic evolution and human development.

## 6. Limitations and future research

As emphasized before, a comprehensive positioning of this study's propositions in previous and extant IS literature was not undertaken here due to space limitations but remains a pending task. In addition, detailed guidelines on how to design and implement IS artifacts to help advance the empowerment dimension of digital resiliency strategies based on our propositions and recommendations should be explored. In general, our hope is that this study acts as a conversation starter, as a steppingstone, in the process of helping ensure that ICTs augment and expand, instead of limit and hinder, our individual interpretants (or CPIs) and individual capabilities (and CPCs).

We look forward to seeing alternative frameworks and models that could also help elucidate how ICTs may enable the emergence of severe moral communities and allow them to disseminate, promote and embed increasingly polarized, radicalized and even extremist CPSMJs. Some have proposed focusing on individuals' gullibility and their propensity to believe conspiracy theories (Van Prooijen & Douglas, 2018). Although this research line is promising it would not address how ICTs may enable the emergence of autopoietic social systems in general. Hopefully, these and other alternatives are better equipped to tackle issues we have stayed away from, such as delving into the differential merits of CPSMJs (within the spectrum of severe moral communities). This should eventually be the case insofar as IS scholars have become increasingly focused on proposing generic governance mechanisms to help prevent ICT misuses and abuses (Floridi & Cowls, 2019; Poort & Zuiderveen Borgesius, 2019; Zuiderveen Borgesius, 2018)

## 7. Conclusions

In this study we have presented a framework along with a generalized model by which autopoietic social systems may reproduce themselves in general (without the need for pecuniary incentives and/or the pursuit of corporate/firm goals). We discussed the seizing of recursive performative affordances as helping groups, coalescing in ICT-enabled platforms, be more effective and efficient at becoming, and enduring as, autopoietic social systems. In particular, we endeavored to describe the role of ICTs in enabling the emergence of severe moral communities (as well as the promotion of increasingly polarized, radicalized and

extremist viewpoints, and associated WGs). We also exemplified how this process has taken place (i.e., as it happened to Edgar) and how it may do so again in the current pandemic juncture. With this, we believe we have also identified a key set of considerations for helping advance the empowerment dimension of digital resiliency strategies. Most importantly, we have strived to outline the role of ICTs in helping advance economic evolution and human development.

In particular, the framework and model presented here subscribes to the importance of enlarging the depth, range and scope of individuals' experiences (i.e., individuals' liberty), and thus of expanding individuals' interpretants and of augmenting individuals' capabilities, for advancing economic evolution and human development. Brain boxes based on CPSMJs (and associated WGs), by limiting to liberty (i.e., by limiting CPI diversity), are deemed to be a burden on this process. Because of this, we believe liberty ought to be considered as a theoretically sound and practically feasible way of assessing the benefits of ICTs (Duan, Edwards, & Dwivedi, 2019). In particular, individuals (e.g., SNS users) ought to become more aware and conscious before seizing ICT-enabled severe recursive performative affordances, which may lead them to adopt increasingly polarized, radicalized and extremist viewpoints. And have them see the world and live their lives following the precepts (i.e., CPSMJs) of severe moral communities.

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