Invitation to Information Sociology

Shing-Chung Jonathan Yam

Department of Sociology,

The Chinese University of Hong Kong, Hong Kong

Email: chung@link.cuhk.edu.hk

Abstract

While there have been substantial developments in the sociology of knowledge, communication, technology and the internet since the 20th century, an 'information sociology' remains underdeveloped with respect to both emerging societal changes and insights into older sociological problems. Centring on informational interactions among people and structures, I explore the ways these interactions manifest in four analytical levels: 1) information society: sustenance of both structures and their inequality as the consequence of the historical development in ideologies, which now co-exist: devotional / loyal ideology (traditional society), economic paradigm (industrial society) and permission ideology (information society); 2) knowledge generation: the rise of personalized and epistemological knowledge; 3) information experience: how characterizing the internet as 'virtual' has undesirable overtones that could obscure the understanding of information technology and its users; and 4) heterogeneous operationalization: the discrepancy between (orthodox) game theory with empirical findings of human behaviour. Through these four examples, I suggest starting points for information sociology to explore how informational interactions characterize, sustain and transform social institutions and relationships.

Keywords: Information inequality; Personalized knowledge; Epistemological knowledge; Orthodox game theory; Heterogeneous operationalization

Introduction

The concept of 'information' is probably too vague and informal for philosophical pondering. But sociologists are not essentialists, and it is the diverse use of the word in multiple contexts that allows us to glimpse into its pervasiveness in the moving-on (Wittgenstein 1953) of everyday life and academic discussions. In this paper I thus present this diversity through an investigation of the characteristic forms of *informational interactions* at four different analytical levels, starting from the societal and ending at the interpersonal. Information is indeed a broad concept. It occupies the fuzzy region between data and knowledge in terms of meaningfulness (Ackoff 1989). Information theory extends it down to data (Shannon 1948), while Lyotard (1979) stretches it up to occupy at least a problematic slice of knowledge. The optimistic renaming of information society to knowledge society, however, does not readily create knowledge, and the legitimate / tolerated use of information is defined historically – by

ideologies before information society has come into existence. It is therefore natural for our journey of the sociological understanding of information to start at the societal level.

1. Information Society: Information Inequality and Ideologies Long Circulated

With power dynamics moving into and residing in the global network, Castells' (1996, 1997, 1998, 2009) original and recent analyses appear functional and optimistic – while they depicted how the managerial elite develop and thrive while the static, unwired powerless cannot, there was a disproportionately slim discussion of how the masses can be wired but still power-less. This reductionist worldview hence recognizes the network in the network society so that the power to connect is the power to communicate, but the next step to understand the information society requires more: the investigation of *the power over content*, which requires connectedness but does not necessarily depend on how nodes connect. Our

understanding of the information society thus has to be socio-historical, because power is distributed long before intranets start to connect. This marks a departure from network analysis (Latour 2005) as a metaphor for society (Baldamus 1982; Erickson 2012) in particular, and the sociology of communication in general, and instead moves into the realm of a sociology of information, whose centrality is reflective of its surroundings: the sociology of knowledge, science, technology, the internet, philosophy, and sociology itself.

Information, popularly conceptualized as whatever enters the sensory system (transmission) and is processed in the brain, has undergone massive codification in storage devices in the information age (Dizard 1982; Melucci 1996). The rapid rise in the exchange and creation of information and knowledge, resulting from and leading to the accumulation of several centuries of technological development, creates the technological condition for the control of accuracy (Beniger 1986). What accompanies this developmental worldview is the other side of the story: human society develops but can also un-develop. The fear of going backwards becomes increasingly urgent and suffocating. Societies do fall: power overcomes rationality, cultures clash, and falling can be made in the name of rising (either by design (ideological) or with historical residues lurking in the collective subjectivity (cultural)). A higher starting point evokes the fear of greater falling, and how the industrial society develops into the efficiency of information society leads to both the fear of increasing inequality and ubiquitous risks (Beck 1992; Renn 2008).

We can trace the tendency of increasing inequality with the history of three ideologies, which I shall refer to as devotional / loyal ideology, economic paradigm, and permission ideology. Our story starts with primitive societies (tribes), which fought with nature and religions / ideologies resided in collective subjectivity and sustained the tribal social structure. Cooperation is one of the strengths of the human race. But when the tranquillity of cooperation combines with the

institutionalization of threats into traditional society (civilization), these threats also embark on a hidden mission – the sustenance of the **devotional / loyal ideology**, laying down the seeds of political inequality. Humanity's triumph over nature thus parallels with the turning of cooperation into conflict, whose severity compounds through the reproduction of power.

The devotional / loyal ideology sustains political inequality through the rule of kings. Later, the (political) equality doctrine comes in opposition. While the equality doctrine led to the replacement of authoritarianism with republics, novel forms of inequality that manage to get around the equality doctrine have emerged – economic inequality during the industrial age and information inequality (Schiller 1996) during the information age. Economic inequality remains unresolved and compounds with the rise of information inequality.

This happens through the subjugation of the equality doctrine under the next ideology in history, **economic paradigm** (not to be confused with the economic mode of production or economics, although the paradigm develops strategically from the discipline), the latter of which arises in the industrial society and sustains economic inequality in the name of neoliberalism. Here, the negation of negation of freedom does not lead to freedom because of the subtle addition of the paradigm – systematic negligence of structural rules (theoretical realism in neoclassical economics) and their normative discussions.

The economic paradigm is merit-based and attracts attention to aggregated mechanisms, hence dispersing responsibility and ignoring the human-made contexts in which the market operates. These contexts comprise the historical accumulation of capital (economic inequality), threat-based capacity to set rules (political inequality), and the two ideologies sustaining them. This ignorance disables one to speak of legal restrictions to morally unacceptable business practices, because the vocabulary / variables to describe and discuss morality does

not exist in the paradigm. Lobbying efforts to create and sustain loopholes in legal practice create moral violations of the equality doctrine, emphasizing market efficiency rather than the human-made preconditions (political / economic structure and structural positions) that determine who is getting what from the market.

Attempts to solve economic inequality in mid-20th century failed and instead reinvented political inequality; the economic paradigm uses this failure to confuse economic equality with political inequality. This leads to rising conservatism and cynicism, preventing further societal changes. Solutions for the upsurge of economic inequality as corporations grow and merge during the industrial age are still absent to this day; the problem is instead alleviated with the welfare system and antitrust laws. The possibility of falling and reinventing old problems renders moving forward a fearful exercise.

The merging of electronics, computers and communication systems into an encompassing system of information technology (IT) propels an information revolution (Lamberton 1974) that transforms the industrial society into information society (Berkeley 1962; Davis & Stack 1997; Dordick & Wang 1993; Godin 2008; Helvey 1971; Lyon 1986; Oettinger 1971). Because IT arises from the accumulation of knowledge especially in the fields of engineering and computer science, its development is largely external to the wider society, where an 'externality' of sudden shocks of technological advancement has created points of discontinuity in economic developments. The process in the opposite direction – the commercialization of academia and the rise of applied academic knowledge – brings in the logic of economic development and with it, specific forms of logic of societal change (Lyon 1988).

This logic is assumption-bound, and in the case of technology, centres on the technological fulfilment of societies' own needs and ideological, selective self-imagination – namely, the economic paradigm. Meanwhile, industrial and post-industrial systems (service and

financial sectors) further develop with the technology in the information society. The economic / service sector embarks on brand building to escape stiff price competitions with softer than soft advertising, blending into the social networks of Web 3.0 (Fuchs *et al.* 2010). With novel IT, the financial sector, which arose during the late industrial society, performs transactions nearly instantaneously and globally, thus embarking on worldwide opportunities of arbitration and risk shifting (Tung & Wang 2012). The possibility of finding and using legal loopholes (O'Connor 1973) to gain and mitigate risks overshadows the provision of goods and services in the economic sector.

The economic paradigm exaggerates the meaningfulness of *transactions*, legitimizing the financial sector's short-term trading and banking activities despite their remoteness from economic meaningfulness. Short-term trading relocates rather than produce wealth, hence following the logic of gambling as in Strange's (1986) 'casino capitalism'. Banks, by charging interest with once non-existent money through the fractional / zero reserve system, generate profit by coordinating others to produce. Both steadily removes wealth from the masses to the economically privileged. Both are overheads of and one step away from production. The paradigm thus ignores wealth generation at the societal level (economic meaningfulness) as well as, ironically, mechanisms behind wealth distribution (individual meaningfulness). These omissions become the paradigm's key disinformation (Rothkopf 1999) so as to performance its ideological function of structural conservatism. Through the accumulation and reproduction of symbolic and monetary power, economic inequality increases over the course of industrial society.

The expansion of both academia and mass communication gives rise to countless theories (Beniger 1986) and data, but their accumulation into 'big data' does not necessarily lead to more effective solutions or accurate problem descriptions. On the one hand, society is more intertwined, with increasing interactions between social problems and institutions. On

the other, there is the fear of solving problems by creating or reinventing more. This fear is captured by postmodernism, which haunts and builds on modernity. The concept of 'modernity' sustains the celebratory atmosphere in both academia and the wider society, stabilizing them with confidence of solved problems and extending it indefinitely with its connotation of the present. Problems continue to be identified because humans are good at pattern recognition and its discontinuation. The celebration continues indefinitely, but then some start to wake. These would be the critics and the postmodernists – occupying a corner of the party, the critics point out the problems and the postmodernists tell sensational tales. These problems and tales circulate in the party but remain marginalized. Hence, the celebration lingers, its atmosphere persists, and most guests are still enjoying their time when political inequality develops.

After the information revolution, **(information) permission ideology**[1] further develops from the economic paradigm by imposing increasingly more criminal and civil liabilities on the use of existing information. Borrowing legitimacy from the economic paradigm, the permission ideology stresses the importance of information production and creates a 'permission culture' (Lessig 2004, 2008), which forbids anyone to create unless they accept the terms and conditions of existing rights holders (Lessig 2004). The ideology thus emphasizes the benefits of motivating production of information while ignoring its input process as well as educational and information rights, the latter two being diffused in the society and hard to quantify with the economic paradigm's vocabulary set.

Information inequality encompasses the issues of information access (the 'digital divide'), distribution and use (data collection for marketing or surveillance [Abe 2009]), all made effective through the expansion of intellectual property laws. Oppositions include the advocacy for a free (information) culture to

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[1] The permission ideology accompanied the rise of the printing press. My discussion here thus entails only its recent upsurge.

replace the original permission culture (Lessig 2004). The 'free culture' (Lessig 2004) is prevalent among the masses but less so within the government and information beneficiaries, which means that its influence remains minimal in the early 21st century.

Paradoxically, the use, sharing and modification of information in everyday life follow common sense and are hence vulnerable to the expansion of intellectual property laws. This expansion comes in two forms: the removal of the mass's rights and decreasing requirement of what qualifies as intellectual property. The permission ideology is even more powerful than its predecessor because it restricts not physical goods or services, but concepts, constraining what the masses can know, read, watch, talk about and ultimately think. Hence, while the information age is a time of explosion and convenience of obtaining information, it comes with the struggle over the legitimate (tolerated) use of information and the construction and propagation of ideology sustaining information inequality.

Long-lasting ideologies stack on top of old ones and coexist in the same time period. It is this complication that a discussion of the information society must constantly refer back to its predecessors – primitive, traditional and industrial [2] – and the social structures as technological and ideological consequences: hunting-gathering; farming (feudalism) / trading / pastoralism / nomadism; and industrial production / investment. These ideologies not only self-sustain through informational interactions between actors whose conversational content is subject to a political structure, but also, after globalization, are delocalized and interact with each other quickly through global communication.

With novel inequalities emerging, independent developments across borders mean that some societies can experience one, two or all of these inequalities simultaneously (in addition to the three inequalities, primitive societies of the isolated fourth world [Castells

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[2] The terminology here suggests that such a viewpoint arose during the industrial age—it ponders and describes previous ages as primitive and traditional.

1998] also experience the problem of survival). The characteristic informational interactions at the societal level are thus threat-based and can also be material-based or permission-based. They sustain political, economic and information inequality respectively but also interactively as the three inequalities form their intersectional system (Crenshaw 1989).

2. Knowledge Generation: Rise of Personalized and Epistemological Knowledge

In the previous section I adopt Mannheim's conceptualization of (cultural) knowledge as ideologies, which is practical, purposive, strategic, generated unevenly and by the powerful. With the rising production of ideology and the need for applied knowledge comes the *instrumentalization* of knowledge (Holmwood 2011; Lyotard 1979; Malik 2005) into information. Ideologies facilitate the stabilizing of societal structure (and their reaction, transformation) and are hence inherently political endeavours; they displace morality and knowledge with strategic reasoning embedded in threats.

But the last sentence has demonstrated a different kind of knowledge – **epistemological knowledge**, which has the stringent requirement of being true. Here, the nature of information is completely different. Information becomes raw materials for the generation of knowledge. Epistemological knowledge accumulates monotonically in data systems but so does non-knowledge (Innerarity 2013). With the rise of urgent problems following the industrial society (Beck 1992; Ravetz 1999), incalculable risks stemming from unknowns and unknown unknowns (Faber and Proops 1993; Kerwin 1993) have to be evaluated qualitatively, or subjectively, hence cannot rely on deduction or positivist research alone. Complex problems of this sort are abundant: environmental issues, nuclear crises, and in general, problems in the social science. These problems, having such complexity, are subject to the Central Dogma of Social Science (Yam 2015) – they span a vast social scope and so are indeterminable with incalculable probability irrespective of what research methods we choose. Emotive reactions

such as postmodern pessimism arise when existing epistemological knowledge fails to deliver.

With the rise of IT, there have been alternative methods for the generation of epistemological knowledge besides our familiar academia. Bulletin board systems and forums have facilitated social interactions of simple questions and answers. But they can also further institutionalize, resulting in free-content, voluntary, mass cooperative knowledge generation projects such as Wikipedia (O'Sullivan 2009; Yam 2012, 2013a) and Open Directory Project (Goldman 2009). Ambitiously creating a *cooperative knowledge repertoire*, academics have been divided as to their efficacy (Giles 2005) while these IT, cooperative models are also being applied back to business settings (e.g. Fuchs-Kittowski & Kohler, 2005).

Doubts about cooperative knowledge generation projects come in two varieties. These projects rely on and tolerate diverse participants and hence lack academic legitimacy (e.g. Sherry, 2007). They are also inherently incompatible with the permission ideology, rejecting information ownership or its restriction on others' rights. Promoting the 'free culture' (Lessig 2004), they rely on generalized reciprocity – a sharing of information and mutual help – but there is also more besides being voluntary. This is because they also need to aggregate a large amount of small bits of efforts through institutionalized social interactions (Surowiecki 2005; Yam 2013b, in press) and attract and keep volunteers. It is thus these purposefully maintained interactions that allow the masses to contribute their respective expertise in a variety of knowledge both general and obscure.

Another kind of knowledge generation does not share the goal of creating a public repertoire. It instead relies on an extended, mediated form of social interaction, creating **personalized knowledge** as these interactions unfold. From bulletin board systems to personal homepages to guest books to blogs to social websites, simple chatting systems are replaced with personal pages. Each page signifies the

centre of one's online universe. Through privilege settings and a login system, people can decide what personal data to share and their respective audiences. Offline rules continue to apply, such as reciprocity, friendliness, altruism, self-interest and respect. The novelty of these online system instead lies in distant communication and interface design (standardized information selection, collection and presentation). However, automation cannot replace human contributions because interactions rely on social signals – IT are thus facilitators rather than ends, and its merging with sociality becomes a sociotechnical system (Niederer & van Dijck 2010).

Both the creation of the cooperative knowledge repertoire and personalized knowledge require the processing of information (raw materials) into knowledge. Repertoire projects borrow methods from academia but replace authorship with crowdsourcing (O'Sullivan 2009). Contrarily, the legitimacy of personalized knowledge comes from more intimate social spheres, hence

entails the evaluation of intentions using social signals. IT as facilitators are thus ubiquitous and functionally more diverse than earlier internet theories would suggest.

3. Information Experience: Limitations of the Virtuality Thesis

Understanding new and strange phenomena typically starts with attaching familiar adjectives to them. Unfortunately, attaching 'virtual' to the experience of IT, contrasting it with a 'real' world, can obscure the true natures of IT and hence confuse academic discussions. In the following I thus contend that this 'virtuality thesis' has a serious limitation, because *virtuality is neither the intentional design nor the necessary goal of our use of IT.*

Characterizing the world of the internet as virtual is abundant in the literature. For example:

Furthermore, electronic communication, and the culture of Internet in particular, has provided an audience interested in the development of better modes of interface, up to

the extent of simulations of everyday life through graphics and sensory interfaces which present a 'virtual reality'. (Shields 1996:6)

Internet does propel and rely on the design of interfaces; after all, it is ease and convenience that foster popularity. But seeing the internet as developing towards virtual reality is a rather limiting view, not to mention its historical inaccuracy: virtual reality is another class of technology, with specialized devices such as head-mounted display and gesture recognition. Viewing the internet as a virtual experience is thus misleading, for the internet is only a generic facilitator of information exchange – there is no restriction on why and how people come to it for information. As in the case of epistemological or personalized knowledge generation, the two kinds of knowledge generation represent different needs – accurate content and intimacy, neither of which provides simulation. An online encyclopedia is not trying to simulate the experience of visiting the library, nor does a social website simulate social gathering places such as restaurants or bars.

Seeing IT as only providing simulation functions has led to confusions as to why people use it. By viewing IT use as the 'chasing' of reality with virtuality, sceptics of IT have advocated for more offline, 'real' activities, which they contend are healthier and more meaningful. But people who use IT for a long time need not be confusing the two 'worlds' (e.g., see Griffiths [2000] for a critique on internet addiction studies) or doomed to fall into social isolation (e.g. Nie and Erbring 2000). These confusions are unnecessary. As with offline activities, it is only the pathological, ill-intended or self-harm behaviour that we should be worrying. Both offline and online friendships can also transform into more intimate relationships, and the absence of visual cues in online activities can actually facilitate relationship due to the absence of prejudice (Griffiths 2000) or conflict of interest. The internet, whose functionality is multidimensional, thus provides more options to friendship and relationships, and, as in offline

sociality, allows the reaching-out to others only in amplified magnitudes and efficiency.

This is not to say that the internet cannot simulate reality; in fact, many pre-IT, simulated art forms and technology have carried on their development on the internet. This would include stories – storytelling, radio dramas, television dramas and films – which require a high level of audience indulgence. Online role-playing games combine all these with user participation. Following this line, virtual reality technology can further use the internet for user interactions, hence becoming one of the functions the latter provides.

If virtual experience is neither the goal nor the distinctive feature of IT, it is worthwhile to rethink what IT has actually revolutionized. The rise of IT has brought about another wave of globalization / time-space compression (Castells 1996), hence moving information at an ever faster place and to ever further places. This amounts to the abundance of *distant information*, reflexively creating our need for it. This renewed information experience thus relies on

sequences and webs of informational interactions for propagation.

There are two dimensions to this information distance. The first is physical distance, implying that the need for and relevance of closer information decrease, giving more way to distant information. The loss in reliability in long-distance propagation is inevitable, especially because information spreads through the addition and intermingling of opinions and facts. Radically, Baudrillard characterized the postmodern world as having the virtue of being more real than the real, contending that the media has destroyed the social with their overwhelming information, producing an undifferentiated mass. But the rise of the internet has shown once again how active participation changes assumptions about media. This means that the virtual (to use Baudrillard's terminology) needs not equal to falsity, the opposite of reality, the ambivalence to truth, or mere simulation. Active efforts such as institutionalized cooperative knowledge generation projects have instead demonstrated

humanity's pursuit for truth and accuracy.

IT is thus not an alternative, strange world. Information activities are real just as any everyday activities. Instead, the distinctiveness of distant information is that it is fuzzy and, as a form of personal communication, is always at least second-hand. If we really need distant information, we must pay the price for obtaining it and do our own critical evaluation, which can be institutionalized for efficiency. The dark side to this would be non-cooperation – the deliberate manufacture of false information and maintenance of hate and confusion (Perry & Olsson 2009).

Another dimension of distant information is social distance. The internet enables interaction with strangers on a global scale. It allows interest groups / communities and relationships to form regardless of who they are. But this is only one side of the story, for the offline and the online can interact. While the literature has focused on technological constraints on these interactions and communities, social constraints apply. Offline interactions often rely on facial expressions and responses, while online interactions require alternative skills such as data mining and triangularization. These critical assessment skills thus amount to IT literacy, and netizens have to form their own judgments, take responsibility, and protect themselves in a fuzzy world of trust.

4. Heterogeneous Operationalization: Complexity Explosion in Empirical Game Theory

Game theory models social experience in the form of players and an *a priori* utility matrix. As the most reductionistic interpersonal framework possible, it is an example of a perfectly determinable formulation of interpersonal dynamics – in fact, its results are based on deduction. I shall therefore use it as the representative of interpersonal dynamics and discuss the informational limitation of its empirical interpretation, an interpretation that I shall refer to as 'orthodox game theory' (OGT)[3].

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[3] While game theory is a mathematical formulation of to rational choice / action theory and utilitarian theory, my argument in this section applies to these theories as well.

OGT comes from economics and is hence subject to the same economic paradigm. It is therefore both social science and mathematics. But the two roles are conflicting. Mathematics enjoys perfect determinacy, with conclusions attained through sequences of deduction. In this role, OGT thus addresses abstract issues – hypothetical interactions between hypothetical agents. But the requirement of social science to explain empirical reality would make its complexity surge so that multiple, mutually-contradictory perspectives emerge (e.g. different ways to define equilibrium concepts and the modelling of social situations), each capturing partial truths. These perspectives split through interpretive problems and destroy OGT's perfect determinacy, leading to Kroneberg and Kalter's (2012) dilemma of rational choice theorists – to adopt 'a narrow version' or to incorporate 'new concepts and mechanisms'.

The modelling problem of OGT lies in the under-description of *social motivation and informational interaction*. This under-predicts mutual expectations, cooperation, and personalities and cultures behind strategic choices. To illustrate how these interactions take place, let's start from OGT's core assumptions regarding deductive processes. OGT starts with hypothetical agents' utility preferences and a situation that determines how much utility they get for their own. Separate deductions based on common knowledge of these pieces of information can then lead to choices resulting in a Nash equilibrium (or equilibria, or none at all). Criticisms of these assumptions typically come from two directions:

a) There is empirical evidence that people often deviate from the Nash equilibrium strategic profile but at the same time obtain better payoffs on average (Gintis 2009a, 2009b; Guth, Schmittberger & Schwarze 1982; Smith 2011).

b) OGT rationality often deviates from intuition, leading to paradoxes, suggesting that OGT could be an incomplete model of true and complete rationality (Basu 1994; Binmore 1987; Hollis & Sugden 1993; Pettit & Sugden 1989; Tosic & Dasler 2011).

With regard to criticism (a), experimental results have shown that cooperation can exist despite OGT's prediction. When cooperation leads to better payoffs, these deviations in behaviour are highly rational. This exposes hidden assumptions of rationality in OGT. In the field of biological and social psychology, studies have shown that cooperative or altruistic behaviour can contribute to the wellbeing of the individual or group. Biological explanations regarding brain structures and thinking processes (see Millet and Dewitte [2007] for individual differences in cooperative behaviour) provide a physical basis for these kinds of behaviour. They are thus evidence of successful adaptations. Experiments have also shown that complex social attachments, such as hierarchies and coalitions, help sustain cooperation (Bazzan, Peleteiro & Burguillo 2011). These interpersonal dynamics can form in-game and thus changes the utility matrix – for example, the maintenance of relationships becomes part of the utility calculation. It is thus impossible to be sure that a given game is modelling a given social situation. The simplicity of games means that it cannot capture the complexity of the latter.

A huge literature has emerged[4] (Simon 1972; Gintis 2003a, 2003b, 2009a, 2009b) to incorporate empirical insights into OGT. In particular, these attempts would include the addition of social motivations:

1) *Reciprocity* (Carpenter & Matthews 2005; Gachter & Fehr 1999; Ledyard 1995; Nikiforakis 2008; Page, Putterman & Unel 2005; Yamagishi & Cook 1993),

2) *Altruistic punishment* (Barclay 2005; Egas & Riedl 2008; Fehr & Gachter 2002), and

3) *Inequality aversion* (Gintis 2009b:68; Loewenstein, Thompson & Bazerman 1989).

(4.1)

The list can go on and these motivations together can give conflicting results, giving rise to individual differences in personality and culture (dispositions).[5] Also, motivation relies

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[4] Some of these proposals, such as Simon's bounded rationality, point to the constraint of the human brain in processing information and forming strategies. This paper on the other hand focuses on deeper logic that incorporates contextual information that OGT rationality ignores.

[5] E.g., Charness & Haruvy (2002) have investigated

on informational interactions; for example, reciprocity rests on deviance from the logic of consistent logic maximization to an *ambivalence to small risk*. Trusts entail risk. Expectations of trustworthiness can be proven wrong, and being nice to an exploitative player would be futile. Alternatively, the possibility of an *ambivalence to small[6] loss* points to altruism and is in direct contradiction with OGT's core assumptions. But then small losses can be informative. Taking up risks / losses thus allows one to gain dispositional knowledge. Further complications arise when risks and/or losses are incalculable, where qualitative guesses come into play.

Hollis and Sugden (1993:17), following from Binmore (1993), pointed out that when human players approach a game, they may as well be playing another in which 'a disposition to keep one's promises can be described (in "another game") in the language of utility indices, and thus understood *within the standard theory*' (brackets and italics in original). Hence, human players consciously or subconsciously adjust the original utility matrix and continue to reason in the adjusted game. Altruistic behaviour can thus be modelled by adding utility of satisfaction to players. Because reasoning in the adjusted game can sometimes lead to better payoffs, this enlightens a myopic side of OGT and the economic paradigm in general.

Adjusting games bring in additional complexity because people experience satisfaction differently. This results in a reduction of empirical determinacy[7] – instead of deductions based on a common knowledge set, this adjusted model relies on the understanding of each player's disposition, a prediction that differs from person to person depending on their knowledge set of others. Elegant solutions are unlikely to exist in these complex situations. OGT thus faces the same dilemma as faced by other social sciences – the

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the relative strengths of human natures.

[6] Had the consequences been more detrimental, risky behaviour would be unthinkable. See Diekmann and Preisendorfer (2003) for their 'low-cost hypothesis'.

[7] This fact opens up research opportunities for the use of game theory to study and provide typologies for organisms and cultural differences and personality types.

Central Dogma of Social Science (Yam 2015), which requires a choice between scope and determinacy. OGT can thus either retreat from analyzing these kinds of complex situation (reduced scope) or to embrace the complexity and forgo OGT's simple mathematical elegance (reduced determinacy). The first choice places OGT as one of the many perspectives within the repertoire of social science while the second is unlikely given OGT's mathematical orientation.

With regard to criticism (b), rationality is often vaguely defined in OGT's literature. The normal usage of the word 'rationality' can refer to the means (basic logical operations such as deduction and Boolean logic) or the goal (utility maximization), including:[8]

1) *Consistency in utility preference*

2) *Choice of dominant strategy*

3) *Backward induction*

4) *Probability assignment to other players' actions*

5) *Common knowledge of (1)-(4)*

$$(4.2)$$

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[8] This list is not exhaustive; it only aims to exemplify common, distinctive features of OGT reasoning.

(1) is the ultimate goal and (2)-(5) are the means that facilitate / initiate deduction. The empirical inadequacy of OGT lies in the fact that reasoning in simply-defined games with (4.2) fails to take into account *all* means of obtaining information in actual social situations, such as the exploration of others' motivations. Hence, from a Bayesian perspective, people acquire additional knowledge instead of relying on deterministic or probabilistic reasoning; they are more intelligent than these two styles of reasoning. These better performances can then lead to Pareto improvement of strategic profiles. OGT's use of (4.2) is thus too myopic and greedy (Aumann 1995; Nagel & Tang 1998). It assumes that players seek to maximize utility at every possible moment rather than to test out hypotheses on the run or modify others' behaviours through informational interactions. Based on the assumption that past and future behaviours correlate, the benefits of additional information thus rest on individual differences, i.e., culture / personality exists.

(4.2) can thus be enriched with (4.1). For example, consider adding reciprocity. To initiate, a person shows their sincerity hoping that others would follow. While this tactic makes them vulnerable, studies such as Smith and Wilson (2011) have demonstrated that people have no difficulty coordinating this tactic in iterative two-person games.[9] In the event that the other player is uncooperative, the person can always switch back to (4.2) reasoning in future iterations, minimizing future losses. On further consideration, this model is much closer to how human interactions occur in the real world, as compared to thinking with (4.2) alone. The Bayesian approach would then be to iteratively update priors so as to better predict others' behaviour at each iteration.

But there is a downside to this approach. Many everyday situations are incalculable and reasoning has to be done qualitatively. Things can go wrong in all sorts of directions including poor initial conditions (brainwashing), insufficient updating (confirmation biases) and

collective positive-feedback causal loops (groupthink and biases). To further complicate the problem, cultural and social norms affect the perception of trustworthiness, breaking the symmetry of common knowledge. OGT thus depicts an extreme situation – the nonexistence of these additional informational interactions and motivations. Causes of social motivation can come from any level of analysis: social norms (sociological), cognitive processes (psychological), human nature (biological), natural environment (ecological and geological) and ultimately, chemical and physical laws. *They give rise to empirical theories whose articulation can sometimes be facilitated by but cannot be deduced from OGT.*[10]

The mapping from intended consequences to utility function is personally determined and hence empirical. The economic paradigm thus silences this heterogeneity and restricts the empirical development of OGT. In a similar vein, Bourdieu and Wacquant (1992) criticized rational action theory in that interest is a

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[9] The discussion here refers to iterative games. But paradoxes in OGT can also occur in one-shot games such as traveller's dilemma (Basu 1994).

[10] Note the distinction between causality and deduction here.

'*historical arbitrary*, a historical construction that can be known only through historical analysis, *ex post*, through empirical observation, and not deduced *a priori* from some fictitious-and so evidently ethnocentric-conception of "Man"' (italics in original). While this quote has a rather restrictive stance on the methodology of sociology and predictability of sociological theories, it does exemplify the *a priori* in OGT – the normative assumptions of what humanity should pursue. The ideological consequences of our industrial and information society, with the cultural remnants of their preceding times, thus have a mark on our formulation and application of 'rationality'.

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