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Dignity and utility of privacy and information sharing in the digital big data age

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Abstract
Today enormous data storage capacities and computational power in the e-big data era have created unforeseen opportunities for big data hoarding corporations to reap hidden benefits from individual's information sharing, which occurs bit by bit in small tranches over time. This paper presents underlying dignity and utility considerations when individual decision makers face the privacy versus information sharing predicament. Thereby the article unravels the legal foundations of dignity in privacy but also the behavioral economics of utility in communication and information sharing. From legal and governance perspectives, the outlined ideas may stimulate the e-privacy discourse in the age of digitalization but also serving the greater goals of democratisation of information and upheld humane dignity in the realm of e-ethics in the big data era.

Keywords: behavioral economics, behavioral political economy, democratisation of information, dignity, education, exchange value, governance, preferences, social media, utility, values

1. Introduction

Although communication and non-communication are day-to-day decisions of individuals; to this day, there is no stringently tested utility theory of information sharing and privacy. We lack a coherent decision science framework about when people choose to share information and when they rather want to stay silent for the sake of privacy. From the economic perspective, information sharing may impose temporal irreversible lock-ins or tipping points. The point of information sharing may be a reference point, in which one bit of more communication gives less utility than one bit of less information shared, hence one bit of more privacy, grants more utility in the sense of Kahneman & Tversky's (1979) behavioral decision science finding 'losses loom larger than gains.' There may also be a marginal decreasing utility derived from one bit more information shared but an exponential marginal utility gain from one more unit of information received given the fact that information can be put into context and an exponentially increasing marginal utility of information. Education, for instance, is the only good with an exponential marginal utility increase, as the more information one holds, the more complex connections one can make and use.

In the past, communication was depicted to decentralize organizations (Crémer, Garicano & Prat, 2007). Media was initially promoted to offer means of information transfer, political participation and protection against political abuse (Delli Carpini & Keeter, 1989; Neuman, Just & Crigler, 1992; Norris & Sanders, 2003; Prat & Strömberg, 2005; Snyder & Strömberg, 2010). Evidence suggests that media coverage increases voter information, which increases the responsiveness of votes to policy, which increases the effort and selection of politicians, thus producing better policies (Prat & Strömberg, 2013). Media thus traditionally was portrayed as helping to keep politicians accountable (Prat & Strömberg, 2013). Media coverage was found to improve selection and incentives of politicians alongside voting responsiveness (Iyengar & Kinder, 1987; Snyder & Strömberg, 2010).

Critical studies in this regard show that there are negative downsides of transparency (Prat, 2005). Mass media can also erode social capital, as they potentially isolate people from real-world experiences (Olken, 2009; Putnam, 2000). A positive relation between federal funds per capita allocation to areas where the media covered political parties in power was found (Snyder & Strömberg, 2010). Research has been done on the effect of conventional media on politics including a nomenclature of biases that impose problems – especially against minority opinions (Prat & Strömberg, 2013). Ideological biases are found in conventional media and media effects captured on vote choice (Prat & Strömberg, 2013). While the negative facets of information on elections and the role of social media on voting outcomes has been widely discussed recently; yet to this day no stringent theoretical or empirical framework for the utility of privacy and information sharing on social media exits.

In the digital age, to study the trade-off between information sharing and privacy has leveraged into unprecedented importance. Social media revolutionized human communication around the globe. As never before in the history of humankind, information about individuals can be stored and put in context over time and logically placed within society thanks to unprecedented data conservation and computational powers. The big data era, however, also opened gates to unprecedentedly reap benefits from information sharing and big data generation (Puaschunder, 2017). The so-called nudgital society was recently introduced, shedding light onto the undescribed hidden social class division between social media users and social media providers, who can benefit from the information shared by social media users. Social media users share private information in their wish to interact with friends and communicate to public. The social media big data holder can then reap surplus value from the information shared by selling it to marketers, who can draw inferences about consumer choices. The big data can also be used for governance control purposes, for instance border protection

and tax compliance control.

Drawing from the economic foundations of utility theory, this paper seeks the introduce the first application of utility theory to a preference-values predicament between communication and privacy in the new media era. Behavioral economics insights are advanced in shedding novel light on the conflict between the humane wish to communicate now versus combined information held by unknown big data compilers in the future. An exponential loss of privacy and hyper-hyperbolic risks in the future for the information sharer are introduced as behavioral economic decision-making fallibilities. For the overconfident information sharer, it remains largely unforeseeable what the sum of the individual information sharing tranches can lead to over time and what information its Gestalt holds for those who have big data insights over time, which can also be analyzed in relation to the general population. Governance gains a critical stance on new media use for guiding on public concerns regarding privacy and information sharing in the digital age (Puaschunder, 2017). While there is some literature on the history of media on politics (Prat & Strömberg, 2013), the wide societal implications of fake news and discounting misinformation has widely been overlooked in contemporary behavioral economics research and the externalities literature. Social sciences literature on privacy and information sharing has to be reconsidered in the age of social media.

The article is structured as follows: An introduction of the theory of utility and communication and information sharing is followed by an outline of the impetus of the digital big data age on privacy. The first utility theory of information sharing and privacy will be theoretically introduced. Hyperbolic decision making fallibility will become the basis of argumentations around hyper-hyperbolic discounting – the novel argument that information sharing in tranches may lead to an underestimation of the privacy infringements when these bits of information can be put together over time and are compared to big data in order to infer about the individual in relation to the general population.

The subjective additive utility of information-shared tranche by tranche may underestimate the big data holder's advantage to reap benefits from information shared. The discussion introduces problems of the contemporary nudgital society (Puaschunder, 2017), in which big data compilers can reap a surplus value from selling compiled information (The New York Times, November 14, 2017) [1] or manipulate vulnerable population segments based on their previously shared information (The Economist, November 4, 2017) [2]. Implications lead to open questions about ethics in the information age and recommendations for a reclaiming of the common good of shared knowledge in education about information sharing in the digital age as well as the democratization of information. Challenging contemporary behavioral insights theory aims at fostering a more informed, self-determined and protected digital society in the wish to uphold e-ethics in the 21st century big data social media era.

2. Utility theory

Economic theory is built upon the idea of utility, which captures people's preferences or values (Fishburn, 1968). Human are believed to strive to maximize utility on a constant basis by weighting their preferences and values on the pleasure they would receive from different options. In neoclassic economics, utility theory primarily focuses on prescriptive utility maximization giving recommendations how individuals should behave to maximize their utility. Prescriptive utility maximization theory serves as normative guide in helping the decision maker codify preferences. If preferences would violate rational preference choices, the theory suggests strategies so the informed decision maker can revise their rational reference choices and judgments to eliminate preference inconsistency. Using utility theory, preferences are constantly transformed into corresponding numerical utility data that is portrayed to maximize the individual's pursuit of happiness. Utility theory provides a powerful set to determine how to compare actual alternatives. It enables the decision maker's optimal preferences to be transformed into a numerical utility structure guided by an optimization algorithm.

In doing so, standard microeconomic utility theory has been of aid to explain how to maximize individual outcomes in very many different domains ranging from marketing research (Greenberg & Collins, 1966; Marquardt, Makens & Larzelere, 1965; Stafford, 1966), food industry quality control of products and corporate strategies (Read, 1964; Stillson, 1954) and production (Aumann & Kruskal, 1958, 1959; Suzuki, 1957).

2.2 Dignity

Dignity is the right to be valued and respected for one's own sake and to be treated ethically. Everyone has a right to respect for their dignity [3]. As an inherent, inalienable right, dignity is a core concept in fields such as morality, ethics, law and politics. Often connected to identity and respect for integrity and other fundamental freedoms and rights, dignity is often used to uphold the ethical considerations around oppressed and vulnerable groups, who do not have insights about the consequences of their actions. Individuals derive self-worth from dignity. While dignity itself seems to be a vague concept, it is often used as a boundary condition of what is right, just and fair to argue for the improvement of conditions for discriminated, vulnerable and targeted. Violations of dignity are felt as humiliation, instrumentalization or objectification, degradation and dehumanization. Privacy infringements have been argued to hold concerns regarding dignity. In the age of digital media and big data, when individual decision makers may have hyper-hyperbolic discounting fallibility regarding their share of data, dignity infringements may happen mainly unnoticed. Individuals may be endowed with reason and conscience but their decision making capabilities may not be able to discount the worth of their information in the future and in relation to other individuals' data forming big data insights. The freedom of expression may hold a shadow of the

[1] https://www.nytimes.com/2017/11/14/business/dealbook/taxing-companies-for-using-our-personal-data.html?rref=collection%2Fsectioncollection%2Fbusiness&action=click&contentCollection=business&region=stream&module=stream_unit&version=latest&contentPlacement=8&pgtype=sectionfront

[2] https://www.economist.com/news/leaders/21730871-facebook-google-and-twitter-were-supposed-save-politics-good-information-drove-out

[3] United Nations 1998 *UNESCO Declaration on the Human Genome and Human Rights*. At Article 2

future. Dignity based protection of medical patients and in biology settings may serve as dignity based privacy beacons in the age of big data. Dignity has become the legal-ethical foundation of new reproductive and genetic technologies, medicine and genetic ethics research on humans, life and health sciences, ethics around cloning, medical integrity, bioethics, but also against war cruelty, criminal punishment, imprisonment, terrorism, weapons, abortion, sex work and defamation. The core idea of dignity is prevalent in cultures of the world and has been extended onto animals and the environment.

3. Information sharing and privacy

The wish for communication is inherent in human beings as a distinct feature of humanity. Leaving a written legacy that can inform many generations to come is a humane-unique advancement of society. At the same time, however, privacy is a core human value. People choose what information to share with whom and like to protect some parts of their selves in secrecy. Protecting people's privacy is a codified virtue around the world to uphold the individual's dignity. Yet to this day, no utility theory exists to describe the conflict arising from the individual preference to communicate and the value of privacy.

3.1 The humane preference for communication

The act of conveying intended meanings from one entity or group to another through the use of mutually understood signs and semiotic rules is the act of communication. Communication is a key feature of humans, animals and even plants (Witzany, 2012). Steps inherent to all human communication are the formation of communicative motivation and reason, message composition as further internal or technical elaboration on what exactly to express, message encoding, transmission of the encoded message as a sequence of signals using a specific channel or medium, noise sources influencing the quality of signals propagating from the sender to one or more receivers, reception of signals and reassembling of the encoded message from a sequence of received signals, decoding of the reassembled encoded message and interpretation or sense making of the presumed original message (Shannon, 1948). Information sharing implying giving up privacy is at the core of communication. Communication can be verbal and non-verbal. Comprising very many different domains ranging from business, politics, interpersonal, social to mass media; communication is a humane-imbued wish and center core of every functioning society.

In society, language is used to exchange ideas and embody theories of reality. Language is the driver of social progress (Orwell, 1949). Linguists find discourse and information sharing inseparable from socio-economic societal advancement (Fowler, Hodge, Kress & Trew, 1979). Language and communication modes are implicit determinations of social strata (Orwell, 1949). Different institutions and media sources have different varieties of language and information sharing styles. Access to information is related to social status and market power. Social visibility is a powerful and cheap incentive to make people contribute more to public goods and charities and be less likely to lie, cheat, pollute or be insensitive and antisocial (Ali & Benabou, 2016). Information receipt is an implicit determinant to classify and rank people to assert institutional or personal status in society (Fowler *et al*., 1979). Mass communication echoes in economic cycles in the creation of booms and busts (Puaschunder, work in progress). Media is also a hallmark of propaganda and political control (Besley & Prat, 2006; Prat & Strömberg, 2013). At the same time, privacy is a human virtue around the world.

3.2 Privacy as a human virtue

Privacy is the ability of an individual or group to seclude themselves, or information about themselves, and thereby share information about themselves selectively. The right to privacy grants the ability to choose which information about parts of the self can be accessed by others and to control the extent, manner and timing of the use of those parts we choose to disclose. Privacy comprises of the right to be let alone, the option to limit the access others have to one's personal information and secrecy as the option to conceal any information about oneself (Solove, 2008).

The degree of privacy varies in autonomy levels throughout individualistic and collectivism cultures. While the boundaries and contents protected and what is considered as private differ widely among cultures and individuals, the common sense in the world is that some parts of the self should be protected as private.

Privacy has a valued feature of being something inherently special or sensitive to a person, which can create value and specialty if shared with only a selected person or group. The domain of privacy partially overlaps with security, confidentiality and secrecy, which are codified and legally protected throughout the world, mainly in privacy laws but also in natural laws of virtues of integrity and dignity. Privacy is seen as a collective core human value and fundamental human right, which is upheld in constitutions around the world [4] (Johnson, 2009; Warren & Brandeis, 1890).

In personal relations, privacy can be voluntarily sacrificed, normally in exchange for reciprocity and perceived benefits. Sharing private information can breed trust and bestow meaningfulness to social relations. Giving up privacy holds risks of uncertainty and losses, which are undescribed in economics and in particular the behavioral economics literature on intertemporal decision-making (Gaudeul & Giannetti, 2017). People tend to be more willing to voluntarily sacrifice privacy if the data gatherer is seen to be transparent as to what information is gathered and how the information will be used (Oulasvirta, Suomalainen, Hamari, Lampinen & Karvonen, 2014). Privacy as a prerequisite for the development of a sense of self-identity is a core of humanness (Altman, 1975). Privacy is often protected to avoid discrimination, manipulation, exploitation, embarrassment and risks of reputational losses, for instance, in the domains of body parts, home and property, general information of private financial situations, medical records, political affiliation, religious denomination, thoughts, feelings and identity.

[4] E.g., Asian-Pacific Economic Cooperation, Australia, Brazil, Canada, China, European Union, Italy, Japan, Korea, Organisation for Economic Co-operation and Development, South Africa, United Kingdom, United Nations, United States, Universal Declaration of Human Rights – to name a few.

Technological shocks have a history of challenging privacy standards (Warren & Brandeis, 1890). The age of instant messaging and big data, however, has leveraged the idea of privacy to another dimension. The concept of information privacy has become more significant as more systems controlling big data appear in the digital age. With advances in big data, face recognition, automated licence-plate readers and other tracking technologies, the upholding privacy and anonymity has become increasingly expensive and the cost is more opaque than ever before (Ali & Benabou, 2016).

3.3 Privacy in the digital big data era

The amount of big data stored each second has reached an all time high in the digital era. Internet privacy is the ability to determine what information one reveals or withholds about oneself over the internet, who has access to personal information and for what purpose one's information may be used. Privacy laws in many countries have started to adapt to changes in technology in order to cope with unprecedented constant information surveillance possibilities, big data storage opportunities and computational power peaks. For instance, Microsoft reports that 75 percent of U.S. recruiters and human-resource professionals use online data about candidates, often using information provided by search engines, social-network sites, photo and video sharing tools, personal web appearances like websites and blogs, as well as Twitter.

Social media tools have become large-scale factories with unpaid labor (Puaschunder, 2017). For instance, Facebook accounts for the largest social-network site with nearly 1,490 million members, who upload over 4.75 billion pieces of content about their lives and that of others daily. The accuracy of this information also appears questionable, with about 83.09 million accounts assumed to be fake. Aside from directly observable information, social media sites can also easily track browsing logs and patterns, search queries or secondary information giving inferences about sexual orientation, political and religious views, race, substance use, intelligence and overall personality, mental status, individual views and preferences (Kosinski, Bachrach, Stillwell, Kohli & Graepel, in press; Kosinski, Stillwell & Graepel, 2013). As for the unprecedented possibilities to collect data, store big data and aggregate information that can be compared to big data Gestalt over time and society, privacy has leveraged into one of the most fragile areas of concern in the electronic age, demanding for legal protection, regulatory control and e-ethics (Flaherty, 1989). Today, the existing global privacy rights framework in the digital age has been criticized to be incoherent, inefficient and in need for revision. Global privacy protection shields are demanded to be established. Yet to this day there is no economic framework on information sharing and privacy control. While – for instance – Posner (1981) criticizes privacy for concealing information, which reduces market efficiency; Lessig (2006) advocates for regulated online privacy. As of now we lack a behavioral decision making frame to explain the privacy paradox of the individual predicament between the humane-imbued preference to communicate and information share versus value of privacy. We have no behavioral economics description of inconsistencies and moderator variables in the decision between online information sharing behavior and retroactive preference reversal preferences in the eye of privacy concerns in the digital big data era.

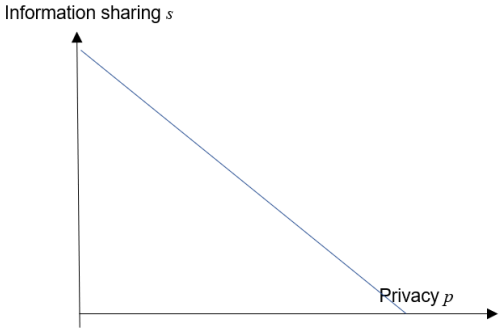
4. A utility theory of information sharing and privacy

Building on classical utility theory, individuals are constantly evaluating competing choice options. Individuals weight alternative options based on their expected utility derived. Indifference curves would then connect points on a graph representing different quantities of two goods, between which an individual is indifferent.

In the case of the privacy paradox of information sharing preferences and privacy values, a person would weights whether or not to share information *s* or choose the information to remain private *p*. The respective indifference curves would outline how much of information sharing *s* and privacy *p* can be enabled to end with the same utility given the budget of overall information held by the decision maker.

Graph 3 represents the respective indifference curves for information sharing *s* and privacy *p*. That is, the individual has no preference for one combination or bundle of information sharing or privacy over a different combination of the same curve. All points on the curve hold the same utility for the individual. The indifference curve is therefore the locus of various points of different combinations of privacy and information sharing providing equal utility to her or him. Indifference curves are thereby seen to represent potentially observable behavioral patterns for individuals over information bundles. The indifference curve for information sharing *s* and privacy *p* is subject to communication and information constraints, hence all information budgets and communication opportunities. There is only a finite amount of information and there may be environmental conditions determining if people can exchange and share information. As exhibited in graph 3, the indifference curve for information sharing *s* and privacy *p* is a straight line given the assumption that information sharing or privacy are substitutes.

Graph 3: Indifference curve (blue line) for information sharing *s* and privacy *p* given the total information and communication constraint



While in classical economics, an individual was believed to always being able to rank any consumption bundles by order of preference (Jevons, 1871) [5]; the indifference curve for information sharing *s* and privacy *p* subject to

[5] http://www.econlib.org/library/YPDBooks/Jevons/jvnPE.html

communication and information constraints may feature a hyper- hyperbolic element or temporal dimension. The information share moment may thereby be a reference point. At the moment of the information sharing decision, it may not be foreseeable what the future implication of the information sharing is.

In general, the costs and benefits of communication are assumed as linear subtraction of positive benefits of communication b_c minus the negative consequences of communication c_c. The nature of the problem is intertemporal as information sharers cannot foresee the future implications of their information sharing divided by variance σ (Prat, 2017).

$$\frac{b_c - c_c}{\sigma} \qquad \text{(Equation 4.1)}$$

However, the digital social media era has heralded a hyper-hyperbolic discounting fallibility. Individuals have lost oversight of the consequences of their individual information sharing given big data hoarding capabilities, which also allow drawing inferences about the individual in relation to others.

In the digital big data era, information share online may hold unforeseen risks of privacy merchants or social media capitalists that commercialize information reaping hidden benefits from the information provided (Etzioni, 2012; Puaschunder, 2017; The Economist, November 4, 2017) [6]. The subjective additive utility of information shared tranche by tranche may underestimate the big data holder's advantage to reap benefits from information shared given unprecedented data storage and big data computation power advantages of the big data era. Unprecedented computational power and storage opportunities have created the possibility to hoard information over time and put it in context with the rest of the population in order to draw inferences about the information sharer (The New York Times, November 14, 2017) [7]. The digital age and era of instant information sharing have therefore heralded problems of individuals who give in their basic humane need for information communication to become vulnerable over time. The big data information holder may thereby benefit from the history of information and the relation of the individual's information in comparison to the general population to an unknown degree given missing e-literacy and transparency. Comparison to the general public may lead to an implicit underrepresentation and hence discrimination of vulnerable groups. For instance, certain groups that may not be represented online will therefore likely face an under-advocacy of their rights and needs.

While regular hyperbolic discounting captures a game theoretical predicament of the self now versus the self later, the information offering more of a Gestalt in the eyes of the big data holder, leverages hyperbolic discounting to a game theory against uncertainty on the end of the big data holder. The hyper-hyperbolic discounting fallibility therefore may describe that at the moment of information sharing, the individual has hardly any grasp what is implied in the giving up of privacy. The individual only focuses on the current moment trade-off between information sharing and privacy upholding, but hardly has any insights what the compiled information over time holds for big data moguls. As for holding computational and storage advantages, the social media big data moguls can form a *Gestalt* which is more than the sheer sum of the individual information shared, also in comparison to the general populace's data. The shared information can also be resold to companies (Etzioni, 2012; The New York Times, November 14, 2017) [8]. In relation to other people's information, the big data moguls can make predictions about their choices and behaviors [9]. Information can also be used for governance purposes, for instance tax compliance and border control mechanisms (Puaschunder, 2017). Some governments have recently used big data to check the accuracy of tax reports but also to detect people's political views when crossing borders (Puaschunder, 2017). Lastly, the use of big data inferences also implies hidden persuasion means – nudging can be turned against innocent information sharers who have no long-term and computational advantage to foresee the impact of the information share (The Economist, November 4, 2017; Puaschunder, 2017) [10].

While behavioral economics hyperbolic discounting theory introduces the idea of time-inconsistency of preferences between an individual now and the same individual in the future; hyper-hyperbolic discounting underlines that in the case of information sharing preferences this fallibility is exacerbated since individuals lose control over their data and big data moguls can reap surplus value from the social media consumer-workers' information sharing and derive information complied over time and in relation to the general norm to draw inferences about the innocent information sharer. With the modern digital era, all these features open an information sharer versus information reaper divide in the big data age (Puaschunder, 2017).

From the social media big data capitalist view, the information gain of one more person sharing information is exponentially rising. Hence, the marginal utility derived from one more person providing information is increasing exponentially and disproportionally to the marginally declining costs arising from one more person being added to the already existing social media platform. Communication costs and benefits are assumed to not be additive and separable.

6. Conclusion and future prospects

The article presented a first theoretical introduction of a utility theory of information sharing and privacy. Potential limitations are that some communication may not be integrated in the framework, such as nonverbal communication or emotional responses. In general

[6] https://www.economist.com/news/leaders/21730871-facebook-google-and-twitter-were-supposed-save-politics-good-information-drove-out

[7] https://www.nytimes.com/2017/11/14/business/dealbook/taxing-companies-for-using-our-personal-data.html?rref=collection%2Fsectioncollection%2Fbusiness&action=click&contentCollection=business&region=stream&module=stream_unit&version=latest&contentPlacement=8&pgtype=sectionfront

[8] https://www.nytimes.com/2017/11/14/business/dealbook/taxing-companies-for-using-our-personal-data.html?rref=collection%2Fsectioncollection%2Fbusiness&action=click&contentCollection=business&region=stream&module=stream_unit&version=latest&contentPlacement=8&pgtype=sectionfront

[9] https://www.nytimes.com/2017/11/14/business/dealbook/taxing-companies-for-using-our-personal-data.html?rref=collection%2Fsectioncollection%2Fbusiness&action=click&contentCollection=business&region=stream&module=stream_unit&version=latest&contentPlacement=8&pgtype=sectionfront

[10] https://www.economist.com/news/leaders/21730871-facebook-google-and-twitter-were-supposed-save-politics-good-information-drove-out

information exchange is very heterogeneous and vast international differences are assumed to exist. In addition, in what time online communication and under what circumstances decisions regarding communication and privacy are made, remains a completely undiscussed topic.

As a next research step, a stringent hypotheses testing of the presented problem is recommended. For instance, future research projects featuring a multi-methodological approach will help gain invaluable information about the actual performance and behavior regarding information sharing and privacy upholding. Interaction of individuals on social media should be scrutinized in order to derive real-world relevant economic insights for legal and policy making purposes alongside advancing an upcoming scientific field.

Following empirical investigations should employ a critical survey of the intersection of analytic and behavioral perspectives to decision making in information sharing. Literature discussion featuring a critical analysis how to improve e-literacy should be coupled with e-education and enhancement of e-ethicality. Research should be directed towards a critical analysis of the application of behavioral economics on hyper-hyperbolic discounting in the digital age. In the behavioral economics domain, both approaches, studying the negative implications of information sharing and decision making to uphold privacy but also finding ways how to train new media users wiser decisions should be explored. Interdisciplinary viewpoints and multi-method research approaches should be covered in the heterodox economics readings but also in a variety of independent individual research projects. Research support and guidance should be targeted at nurturing interdisciplinary research interests on privacy and information sharing in the fields of behavioral economics and public affairs.

More concretely, future studies should define the value that data has to individuals and data sovereignty in the international context. When people share information, they should be informed to consider what the benefit and value from information sharing is for them and what the benefit for social media industrialists-capitalists is. The sovereignty of data and the human dignity of privacy should become debated as civic virtual virtue in the 21st century. Individuals should be informed that sharing data is a personal security risk, if considered to be asked for social media information upon entry of a country.

Future studies should describe what companies and institutions constitute the complex system that helps establishing the nudgital society and the influence that social media has. The implicit underlying social structure of the nudgital society based on a complicated information gathering machinery should become subject to scrutiny and how, in particular, the nudgital class division is supported by a comprehensive social network data processing method. How social media advertising space can be used to specialize on targeted propaganda and misleading information to nudge the populace in an unfavorable way should be unraveled. The role of politicians' use of various channels and instruments to manipulate the populace with targeted communication should be scrutinized.

In the recent US election the profit and value of detailed market information has been found to have gained unprecedented impetus. Future research should also draw a line between the results of the 2016 US presidential election, and the study of heuristics to elucidate that heuristics played a key role in Trump's election as they made people less likely to vote logically. This would be key as it would help explain how people chose to vote, and why they do not always make the most logical choice when voting. This line of research could help to more accurately promote future elections' candidates, how to better predict election outcomes and how to improve democracy.

In addition, nudging through means of visual merchandising, marketing and advertising should be captured in order to uphold ethical standards in social media. Nudging's role in selling products, maximizing profits but also creating political trends should be uncovered. While there is knowledge on the visual merchandising in stores and window displays, little appears to be known how online appearances can nudge people into making certain choices. In particular, the familiarity heuristic, anchoring and the availability heuristic may play a role in implicitly guide people's choices and discreetly persuade consumers and the populace. Not to mention advancements of online shopping integrity and e-commerce ethics, the prospective insights gained will aid uphold moral standards in economic market places and hopefully improve democratic outcomes of voting choices.

Contemporary studies could also address if the age of instant messaging has led to a loss of knowledge in information sharing. Future research should also investigate how search engines can be manipulated to make favorable sources more relevant and how artificial intelligence and social networks can become dangerous data manipulation means. The role of data processing companies may be studied in relation to the idea of data monopoly advantages – hence situations in which data processing companies may utilize data flows for their own purposes to support sponsored causes or their own ideals. Due to the specific time period of the digital age not extrapolations to past time periods is possible but the results appear useful in determining future behaviors.

The current research in this area lacks empirical evidence, demanding for further investigations on how nudges can directly impact individual's choices and new media can become a governance manipulation tool. What social instruments are employed on social media and what prospects data processing has in the light of privacy infringement lawsuits should be uncovered. How social media is utilized to create more favorable social personas for political candidates should be explored. How internet online presences allow to gain as much attraction as possible for the presence of political candidates is another question of concern. Another area of concern is how selective representations influence the voting population and what institutions and online providers are enabling repetitiveness and selectivity. How gathered individual information is used to parse data to manipulate social internet behavior and subsequent action is another topic to be investigated. Future research goals will include determining what this means for the future political landscape and how internet users should react to political appearances online. Information should be gathered how we choose what media to watch and if political views play a role in media selection and retention. Does distrust in the media further political polarization and partisanship, needs to be clarified. Future studies should also look into the relationship between individual's political ideologies and how they use and interact on social media, especially with a focus on the concept of fake news and alternative facts. Where do these trends come from and who

is more susceptible to these negative impacts of the digital society? Has social media become a tool to further polarize political camps, is needed to be asked. All these endeavors will help outlining the existence of social media's influence in governance and data processing to aid political campaigning in order to derive inferences about democracy and political ethicality in the digital age.

How social media tools nudge people to not give everything at once but put it together in a novel way that it creates surplus, should be analyzed. In small bits and pieces individuals give up their privacy tranche be tranche. Small amounts of time are spent time for time. People, especially young people, may have a miscalibration about the value of information released about them. Based on hyperbolic discounting myopia, they may underestimate the total future consequences of their share of privacy.

The time spent on social media should become closer subject to scrutiny and the impact on opportunity costs onto the labor market. For instance, countries that ban social media, such as China, or restrict internet, like slowing it down or censoring certain media, could become valuable sources of variance to compare to. Network theories for e-blasting information should become another area of interest to be studied in relation to hyper-hyperbolic discounting fallibilities. Emotional reactions and emotional externalities of communication could be another area of behavioral economics research in the privacy and information sharing predicament domain. The role of attention should be addressed as another moderator variable that is quite unstudied in the digital media era (Prat, in speech, November 2017). Thereby interesting new questions arise, such as how to measure attention – is it the time allocation or the emotional arousal information bestows individuals with (Wouter & Prat, forthcoming)?

The preliminary results may be generalized for other user-generated web contents such as blogs, wikis, discussion forums, posts, chats, tweets, podcastings, pins, digital images, videos, audio files, advertisements but also search engine data gathered or electronic devices (e.g., wearable technologies, mobile devices, Internet of Things). Certain features of the nudgital society may also hold for tracking data, including GPS, geolocation data, traffic and other transport sensor data and CCTV images or even satellite and aerial imagery. All preliminary results should be taken into consideration for future studies in different countries to examine other cultural influences and their effects on social class and heuristics.

Innovative means should be found to restore trust in media information and overcome obstacles such as the availability heuristic leading to disproportionate competitive advantages of media controlling parties. As remedies, consumer education should target at educating social media users about their rights and responsibilities on how to guard their own and other's privacy. E-ethicality trainings could target at strengthening the moral impetus of big data and artificial ethicality in the digital age. Moral trade-offs between privacy infringements and security should also become subject to scrutiny.

Promoting governance through algorism offers novel contributions to the broader data science and policy discussion. Future studies should also be concerned with data governance and collection as well as data storage and curation in the access and distribution of online databases and data streams of instant communication. The human decision-making and behavior of data sharing in regards to ownership should become subject to scrutiny in psychology. Ownership in the wake of voluntary personal information sharing and data provenance and expiration in the private and public sectors has to be legally justified (Donahue & Zeckhauser, 2011). In the future, institutional forms and regulatory tools for data governance should be legally clarified. Open, commercial, personal and proprietary sources of information that gets amalgamated for administrative purposes should be studied and their role in shaping the democracy. In the future we also need a clearer understanding of the human interaction with data and their social networks and clustering for communication results. The guarantee of safety of the information and the guarantee of the replacement or service, should a social media fail its function to uphold privacy law as intended, is another area of blatant future research demand. Novel qualitative and quantitative mixed methods featuring secondary data analysis, web mining and predictive models should be tested for holding for the outlined features of the new economy alongside advancing randomized controlled trials, sentiment analysis and smart contract technologies. Ethical considerations of machine learning and biologically inspired models should be considered in theory and practice. Mobile applications of user communities should be scrutinized.

As for consumer-worker conditions, unionization of the social media workers could help uphold legal rights and ethical imperatives of privacy, security and personal data protection. Data and algorithms should be studied by legal experts on licensing and ownership in the use of personal and proprietary data. Transparency, accountability and participation in data processing should also become freed from social discrimination. Fairness-awareness programs in data mining and machine learning coupled with privacy-enhancing technologies should be introduced in security studies of the public sector. Public rights of free speech online in the dialogue based on trust should be emphasized in future educational programs. Policy implications of the presented ideas range from security to human rights and law to civic empowerment. Citizen empowerment should feature community efforts to protect data and information sharing to be free of ethical downfalls. Social media use education should be ingrained in standard curricula and children should be raised with an honest awareness of their act of engagement on social media in the nudgital society of the digital century.

Future research may also delve into moderator variables of the utility derived from information sharing and privacy. For instance, extraversion and introversion could be moderating the overall pleasure derived from communication or silence. Future research may also address prescriptive recommendations how to educate individuals about the risks and dangers of information sharing in the digital age. Attention must also be paid to how to uphold accuracy in times of fake news and self-created social information. Certain societal segments that are not represented strongly online should somehow be integrated into big data in order to democratize the information, which is considered as big data 'norm,' or standard by which the social media user is measured on. At the same time, psychologically guide studies could unravel a predictive approach and validate the outlined ideas' validity by testing the proposed theoretical assumptions in laboratory and field study settings. In particular, the proposed nomenclature's validity could be

studied and the percentage of information sharing types captured in the population. The moderator variable age could be phased in as it appears to be conundrum why younger people, who have more to lose given a longer time ahead to live are in particular prone to use new social media and lavishly share their lives in e-blasts to public. Regarding direct implications, a tax may be used to offset problems of the costs and risks of social media privacy infringements in the big data era [11]. Drawing from utility usually measured by the willingness to pay different amounts of money for different options, laboratory experiments may operationalize the value of privacy by measuring how much money people would be willing to pay for repurchasing their data or having a social media account that can only be viewed but no personal data can be resold or put in context to others. These attempts could also serve as a guideline for policy regulations and free market solutions. Social media could offer services of having accounts that are private in that sense that no surplus value can be reaped by reselling information or big data storage and computation can occur. This may serve as an indicator of revealed preferences of social media privacy. The privacy paradox may be scrutinized in behavioral economics laboratory and field experiments. Potential individual influencing factors such as gender, age, trust and personality differences may be tested for in order to retrieve information on how to educate the social media user and regulate the social media provider. Regarding regulation, splitting social media power cartels may be one solution to decrease the big data social media user disadvantage. Taxation for information sharing may create another incentive to slow down unreflected information share. The tax revenues could be used to offset some of the societal costs of privacy infringement. In addition, fines for privacy infringement could help to uphold e-ethics in the digital age. From the economics perspective, interesting moderator variables for future studies is the distinction between active and passive communication. Further, model robustness checks could follow and learning effects depicted. Access to information what happens with data and how big data is used appears crucial for learning people a well-calibration of their relation to their information. Communication costs and benefits are assumed to not be additive and separable, leaving an interesting field for future studies in this domain. The communication patterns could be classified in different types of communication in the future, e.g., certain node specificities detected, such as communication within a family, with friends and in hierarchical situations like at work. The absolute and relative influence of information sharers could become part of a network description approach as well. Impact factor measurements could be based on status, search engine rank and connections to capture global influence. Complexity of information would need to be controlled based on information processing times and time allocation preferences to information, hence attention. Communication costs should in the future to be separated in economic models in fixed and variable communication costs and a potential separation between fixed communication costs for social media providers and a variable communication costs for social media users be depicted (Prat, 2017).

Overall, the presented piece can also serve as a first step towards advocating for education about information sharing in order to curb harmful information sharing discounting fallibility. From legal and governance perspectives, the outlined ideas may stimulate the e-privacy infringement regulations discourse in the pursuit of the greater goals of democratization of information, equality of communication surplus and upheld humane dignity and e-ethics in the big data era.

[11] https://www.nytimes.com/2017/11/14/business/dealbook/taxing-companies-for-using-our-personal-data.html?rref=collection%2Fsectioncollection%2Fbusiness&action=click&contentCollection=business&region=stream&module=stream_unit&version=latest&contentPlacement=8&pgtype=sectionfront

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