

SOCIAL MEDIA AND THE INFRASTRUCTURING OF SOCIALITY¹

Cristina Alaimo² and Jannis Kallinikos³

ABSTRACT

Social media stage online patterns of social interaction that differ remarkably from ordinary forms of acting, talking and relating. To unravel these differences, we review the literature on micro-sociology and social psychology and derive a shorthand version of socially-embedded forms of interaction. We use that version as a yardstick for reconstructing and assessing the patterns of sociality social media promote. Our analysis shows that social media platforms stage highly stylized forms of social interaction such as liking, following, tagging, etc. that essentially serve the purpose of generating a calculable and machine-readable data footprint out of user platform participation. This online stylization of social interaction and the data it procures are, however, only the first steps of what we call the infrastructuring of social media. Social media use the data footprint that results from the stylization of social interaction to derive larger (and commercially relevant) social entities such as audiences, networks and groups that are constantly fed back to individuals and groups of users as personalized recommendations of one form or another. Social media infrastructure sociality as they provide the backstage operations and technological facilities out of which new habits and modes of social relatedness emerge and diffuse across the social fabric.

Keywords: Infrastructuring, Social Media Platforms, Measurement, Social Interaction, User Models, Aggregation

INTRODUCTION

Social media are by now part of the ordinary fabric of social life and an inescapable companion of the ways people conduct many of their dealings. Initially established as websites for content sharing and connecting with friends (boyd & Ellison, 2007), social media platforms have over their relatively brief life course steadily been expanding and diversifying their operations. Today, they are offering a number of different services such as buying or selling goods, paying bills or sending money, direct messaging, consuming content from several commercial media, collaborating on projects and so on. All of these operations are centrally linked to, expand, or qualify the critical role user involvement and interaction have assumed in the functioning of these platforms from their very establishment onwards.

¹ Thinking Infrastructures

Research in the Sociology of Organizations, Volume 62, 289-306.

² Surrey Business School, University of Surrey

³ London School of Economics

User involvement and interaction on social media are, however, far from spontaneous or naturally occurring. Social media conceive and design user participation in ways that mimic, yet differ rather drastically, from the social encounters of people and the habits and cultural conventions that condition them. Most of these ways are closely associated with the technological environment of social media and the standardized forms of user involvement (e.g. following, liking, tagging) that accommodate social media as economic organizations. An inevitable accompaniment of these shifts is the redefinition or transposition of the fundamental role social interaction assumes in daily situations and the construction of the social order (Berger & Luckmann, 1966; Goffman, 1974; Mead, 1934). It seems to us that such changes acquire particular relevance as social media platforms extend and deepen their influence over the online whereabouts of people. It is therefore reasonable to ask how social media reengineer user involvement and interaction and what sort of implications such reengineering may have for larger social entities such as groups, communities and organizations. While works such as dana boyd's "the social life of networked teens" straightforwardly address the impact of social media on living patterns (boyd 2014), the processes by which social media reweave the fabric of daily interactions into new forms of sociality is not well understood (Couldry & Kallinikos, 2018; Van Djick, 2013).

In this chapter, we argue that social media redefine primary forms of human relatedness, that is, ordinary ways of acting, talking and interacting with one another. They subsequently use these redefined, and largely standardized, models of social interaction as the basis for assembling larger social entities (such as networks of similar users, audiences, or consumer groups) that, by contrast to real-life communities and socially-embedded groups, are derived out of the data generated by user platform participation. We approach these issues by comparing the analytical structure of social interaction with the models of users, action and communication social media stage online. We associate these models with what we call the infrastructuring of sociality. By "infrastructuring of sociality" we mean the design and establishment of fundamental conditions of social interaction (e.g. rules and roles) and the diffusion of software-based facilities and resources through which such conditions are enacted in the online environments social media build (Bowker & Star 1999; Star & Ruhleder, 1996). More specifically, the infrastructuring of sociality occurs through the engineering of distinct and largely rationalized models of users (i.e. what a user is and does) and the setting-up of a few, highly-standardized interactions such as following, sharing, tagging, uploading.

The data procured by such stylized interactions constitute the resources of subsequent social media computations, whereby several scores and measures are used to make visible patterns within the data thus generated. For instance, movie ratings patterns or music listening behavioral patterns are clustered to detect similarity in the preferences of millions of users. Such clustering or aggregation of interaction data into specific classes therefore assumes a social relevance. Through the use of these semi-automated models of similarity building, pattern-making and classifying, new groups and collectives are inferred. It is worth pointing out that such groups are constructed on the basis of machine learning linked to the analysis of the masses of data procured by the artificially designed models and interactions of users. Often assembled on demand, such transient groups reflect not the intrinsic attributes of users and their social environments but rather the permutations of data generated by the standardized options social media offer online. The very large data pools procured by platform user interactions allow social media to observe and, importantly, predict patterns of interaction through statistically-based models and other techniques such as neural networks that command the learning of algorithms. It is the obtained predictability of user behavior on a large scale that produces economic value. A loop is thus established, whereby knowledge of platform participation so formulated is fed back to the design and modelling of interactions and user profiles which further provide data for the next cycle of tuning and adaptation of user models and profiles and so on and on.

We deal with these issues in some detail in the rest of this paper. In the next section, we briefly reconstruct a shorthand version of embedded forms of interaction as these have been analyzed primarily in social psychology and micro-sociology. We use that version for assessing and comparing interaction in socially-embedded settings with the models of user involvement and interaction social media engineer. We further analyze and deepen our understanding of social media by exposing the way social media get rid of the ‘problem’ of context and its constraining boundaries by stylizing and standardizing the modes of action underpinning the user models they rely upon. In the section that follows, we link these operations with the derivation of larger social processes and entities which social media construct and update almost daily such as similar users, user networks, advertising audiences, similar or popular items, the making of categories, weekly or monthly trends and the like. In a final section, we summarize our ideas and place them in a broader context that allows us to assess their implications for the structuring of sociality.

THE RELEVANCE OF SOCIAL INTERACTION: ACTIONS, SCRIPTS AND FORMS OF SOCIALITY

We consider the events produced by socially-embedded interactions as the basic stuff of social life (Abbott, 2001; Mead, 1934). The social exchanges that underlie such interactions constantly construct, reassert and validate particular social roles and behavioral expectations and, in so doing, contribute to shaping the pursuits and identity of individuals and groups. Individuals construct their own identity from interactions with others. They organize their life in terms of the relations they are able to build with others and understand social contexts in terms of the roles they acquire by interacting within certain communities, in groups and in more complex institutionalized settings (Goffman, 1974; Mead, 1934; Meyer & Jepperson, 2000). Roles and role taking, in this respect, are essential passages for the construction of individual identity and for the interpretation of social context (Abdelnour, Hasselbladh, & Kallinikos, 2017; Barley & Tolbert, 1997). For instance, an individual understands the complex institutional setting of academia differently depending on whether s/he assumes the role of student or teacher. Yet, the role or roles an individual assumes are collective and their meaning shared. In the complex and variegated landscape of social encounters, personal opinions or subjective stances of individuals are not enough to navigate and understand social contexts and to respond to others in appropriate ways (Goffman, 1974). Quite the opposite, individuals orient their behavior collectively. They do so by using frames, elementary schemata or scripts which provide the cognitive grids for integrating and interpreting social experiences (Fiske, 1992; Simmel, 2011).

Individuals thus draw on common models, structures or resources (language is one of them) as they interact with one another. These find expression in scripts or schemata that guide action and serve the aim of facilitating social interaction (Goffman, 1974; Mead, 1934). A script or schema is a relational model (or structure), a basic interpretive grid which allows to categorize the lived experience of social encounters of different contexts of life in known types (Berger & Luckmann, 1966). Scripts or schemata are identified and consequently applied by individuals by reading the context of the interaction or the behavior of others. There are certain aspects of the interaction people attend to or certain attributes of people that are visible or meaningful that make these models identifiable (Fiske, 1992). For instance, individuals may be clued by a specific setting such as a school or by a social event like a wedding or conversely, they may read explicit kind of behavior in others like a request for help or a tone of command (Goffman, 1974). All these clues or context markers may be associated with scripts that help an individual

read the situation and enact the roles that fit the expectations and rules that underlie that situation. Indeed, even if the situation or setting is unknown or the behavior of others is implicit, individuals may still draw on elementary relational models or scripts or on a combination of them. According to Fiske (1992), people rarely use only one script, but they construct personal relationships, roles, groups, institutions and society by combining two or more models, using different models in different phases of the interaction or nesting different models in hierarchical wrap-ups⁴.

On the one hand, scripts or models make two individuals able to understand each other or to anticipate the behavior of others because they give individuals common frames of reference within which they are able to read and interpret their social experiences (Mead, 1934). Scripts assemble and organize the scattered interactive experiences of people into coherent social relationships. On the other hand, scripts act at the collective level by furnishing many individuals the same coordinates of codified behavior or expected reaction (Barley & Tolbert, 1997; Weick, 1979, 1995). In so doing, they reproduce group characteristics, role expectations, community boundaries and specific forms of sociality. Fig. 1 below schematically illustrates the role of scripts as middle range structures connecting single individual actions to specific forms of sociality.

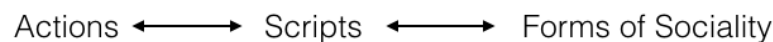


Fig. 1: The relations between actions and forms of sociality are mediated by scripts, which work as cognitive models or schemata of interaction.

To simplify and clarify: single actions such as a handshake or marking an exam constitute the building events of social interactions. Individuals interact by applying certain generic scripts. Scripts are guidelines that give individuals clues on how to behave in specific circumstances, facilitating interaction. For instance, a simple introductory handshake may be accompanied by a “how do you do” and an exam marking may rely on several standardized behaviors. By applying scripts, individuals link situated interactions to established expectations, rules and roles and contribute to shaping particular forms of sociality (encounters or institutions like academia). It is the script that embeds the identity of certain roles, cultural or social norms such as

⁴ Fiske (1992) for instance, postulates that all the scripts can be eventually traced back to four elementary models that orient all possible modes of interaction organizing sociality, they are: communal sharing, authority making, equality matching and market pricing.

greeting a stranger with courtesy, ideal types and so on. Scripts inherit their social make-up from existing forms of sociality which essentially structure scripts with rules, roles, cultural norms and behavior expectations. Groups, communities and institutions as organized forms of sociality are held together by histories, processes and the recurrent behavior of individuals when interact with others. Such an ensemble of organizing forces together with the perceived attitudes of others (what Mead calls the “generalized other”) in turn shape, orient and organize single instances of interaction between two individuals by furnishing the basic codes or scripts of interaction (Mead, 1934).

One way of thinking about how behavioral scripts modulate interaction is to consider them as cognitive schemata or models. Like interpretive schemata in the linguistic or semiotic field, scripts are abstract enough to accommodate individual interpretations and adjustments but shared collectively so as to guarantee common meaning and communication between individuals across contexts and time (Eco, 2000). The analogy is of particular importance because it points to the fact that scripts are flexibly involved in social encounters. That is, scripts rarely entirely dissolve the ambiguity of social interaction –for instance they allow for the possibility of misinterpreting social relations or contexts– but rather facilitate or predilect a certain way of interpreting and behaving. They are, furthermore, constantly evolving as they absorb and codify the contingencies that mark the variety of interactive encounters over time and respond to larger social changes. The complexity and variety of social interactions are thus mediated by the abstraction and generalization of scripts but not simplified or reduced, leading to the establishment of complex forms of sociality such as communities, institutions, collective identities and so on.

THE INFRASTRUCTURING OF SOCIAL MEDIA

These fundamental ideas of social interaction must be upheld when considering how social media stage social interaction online and the impact such staging may have on individuals, groups and communities. Social media platforms reproduce the relations between actions, scripts and forms of sociality we briefly analyzed above under their own strict logic of functional efficiency and the business objectives such efficiency is called upon to accommodate. Social media platforms are directly concerned with the engineering and instrumentalization of social interactions. These serve the purpose of producing the content and data that sustain social media as economic entities. Social media environments are accordingly designed to support and direct the activity of users. While a large and heterogeneous user base is the *conditio sine*

qua non for a viable social media platform, the terms on the basis of which users are involved in social media platforms are heavily shaped by the meticulous design of user involvement and the data such an involvement is meant to procure.

Differently from other digital platforms such as Amazon or Uber, whose evaluative infrastructures facilitate transactions and economic exchanges (Kornberger, Pflueger, & Mouritsen, 2017), social media exist as platforms thanks to the interactions they help set up and, in a sense, infrastructure. In some fundamental ways, social media extend the infrastructuring of platforms beyond immediate transaction and economic exchanges. As platforms, social media are socially engineered online spaces that design distinct and standardized forms of user interaction and platform participation. While variously emulating daily social habits and patterns of interaction and communication, these standardized forms along which user engagement takes place (e.g. connecting, posting, following) only vaguely recall the social exchanges characteristic of traditional life contexts (Bowker, 2005; Goffman, 1974; Simmel, 2011). The technological conditions that permeate the environments of social media allow only highly stylized forms of user engagement that, in most essential respects, are avatar-like. Let us elaborate.

The design of online interactions is closely linked to the specific user models each platform engineers as a means of procuring the data that support its business operations. The term user model is here intended in its more restricted meaning of specific designs of user roles. Each role entails a pre-programmed set of actions such as reviewing and rating, talking and sharing, browsing and buying. In the designed or artificially produced environment of social media, user models take the place of social scripts. They offer standardized models of users that allow to systemically operationalize social interaction by abstracting away the contingencies and idiosyncrasies (and associated risks) of individual user interpretations. This is the inevitable outcome of transposing social relationships to technologically mediated encounters that operate on a massive scale. The functions such technological user models perform are analogous to the role scripts play in traditional, real-life situations, in so far as such models enable online interaction and the structuring of scattered individual contributions to organized forms of sociality. In contrast, however, to the social nature of scripts, such models are mathematically or computational derived to accommodate the requirements of the technological systems in which they are embedded and the objectives of social media as business organizations. Fig. 2 illustrates this relationship.



Fig. 2: The relations between actions and forms of sociality online are mediated by “user models” which effectively substitute a relational model of interaction (script) with a computational model of interaction (user model).

At the centerstage of social media platform design lies a specific conception of users that varies depending on the circumstances each platform confronts. User modelling is the process of building up and implementing a cognitive and machine-actionable version of what humans qua platform users can do. This engineered version of user both describes and prescribes at the same time. When a system implements a specific model of user (e.g. a model of traveler in the case of TripAdvisor or job seeker in the case of LinkedIn), it does not just represent the characteristics of real users ‘out there’ but it actually designs and builds them, even though such deliberate design may draw on one or another real attribute of users or social domains. The connection between user models and actions (Fig. 2) on social media is instrumented by the design of a specific set of actions such as following, liking, rating, etc. that serve the purpose of procuring the right type of data in appropriate (that is, computable) formats. The connection between actions and user models is constituted by the data produced by user actions.

The data footprint of these engineered forms of user platform participation is deployed by social media platforms to re-construct a digital cartography of the social relations which users develop with one another on platforms. It is on the basis of these purposefully standardized activities carried out on social media and the data they produce that a user can be characterized as a user, as a particular type of user, and further grouped and classified in clusters of similar users or lookalike audiences that become the targets of market strategies and commercialization, e.g. segments of one type or another. It is furthermore through these data that social media platforms can constantly tweak, adjust and redesign their operations to maintain and further develop their data-based services (e.g. personalization services) and to foster the level of user engagement that is essential to their economic pursuits. In this respect, the standardized forms of user platform activity constitute a fundamental precondition to the functioning of social media platforms and the economic objectives they serve.

The system that designs and runs on the model of user and the user interactions it occasions develops over time and adapts to user responses through machine learning techniques. These and other forms of optimization steadily calibrate the user model to the actions of its users, as

these actions are expressed by the standardized options the user model affords. Eventually, system learning and optimization produce an even more sophisticated and all-encompassing user model that draws not solely on the inspection of user actions over time but, crucially, on the association and comparison of groups of users. A set of measures and scores, regularly utilized by social media such as similarity, popularity or engagement, intervene in the assemblage of users in clusters. In so doing, they enable the connection of single interactions to collective representations of user behavior, effectively mediating the passage from the user model to new forms of sociality (Fig. 2).

Social media thus infrastructure sociality by intervening and, ultimately, reweaving the connections between action, scripts and forms of sociality. The structuring capacity of each of the stages of social interaction we analyzed in the preceding section and their individual adaptation and flexibility (action, scripts, sociality) are now centralized into a software, accessed only by the platform and reprogrammed as the platform sees fit. It is in this sense, we claim, that the structured and structuring nature of these sites and the ways they shape user site participation to serve their economic objectives have largely remained un-scrutinized. There is no way, we maintain, to obtain an adequate understanding of social media without confronting in some details the data practices and techniques by means of which new forms of sociality emerge out of the micro-ordering of trivial daily pursuits of masses of users, as these are conceived and instrumented by social media. In the next section we turn our attention to these issues.

THE ENCODING OF SOCIAL INTERACTION

Social media technology interferes with the socially embedded interactions through which individuals connect to established forms of sociality. As earlier indicated, social media set up an engineered version of interaction which acts as functional substitute of traditional, socially-embedded forms of interaction. A fundamental passage of this re-engineering of the social is the design of platform interaction as this is dictated by the user model analyzed in the preceding section. This requires some explanation.

Social media organize user platform participation along standardized activity types such as sharing, tagging, liking or following. We refer to the outcome of such organization as encoding (Alaimo & Kallinikos, 2016, 2017) to convey the technological codification and stylization of social activities into particular clusters or classes of action – for instance, the encoding of approval, agreement or engagement into Facebook likes (Gerlitz & Helmond, 2013). Essentially,

on social media basic things or entities such as users, comments, photos, posts are all classified as data *objects* and every activity connecting two objects as *action*. Encoding activities such as sharing, tagging, liking etc. provides the logical and data connections between two objects that can be further computed. By constantly recording and processing the data resulting from this elementary grammar of user platform interaction, the system is able to compute information on user behavior.

Figure 3 schematically captures the logic of encoding on the basis of which online participation is structured. Encoding partakes in the infrastructuring of the social. It provides the grid that orders platform participation into standardized activity types that, recorded as social data, become further involved in all subsequent operations on the basis of which user experience is computed and related to the experience of other users (Alaimo & Kallinikos, 2016, 2017).



Fig. 3: Examples of standardized patterns of interaction designed by social media

Failing to recognize the importance of encoding risks overlooking the powerful imprint of social media upon daily interaction and communication habits and the ways social media stage relationships online and reweave the fabric of the micro-order. But it also fails to unravel how this technological translation of the micro-orders of daily life is an obligatory passage point for the derivation of larger social entities such as user networks, consumer groups or advertising audiences, and processes such as category making, social influence and decision making which we analyze in the next section.

Encoding, seen as the precondition for the assignment of occurrences to classes (Desrosières, 1998), forms the basis for enlisting, recording and categorizing user activities as data (Bowker & Star, 1999). Put it differently, encoding provides the fundamental design principle through which the front-end or interface of the platform and its standardized actions are linked to the functional requirements of the back-end and the insatiable hunger of the latter for data that are

possible to crunch by automated techniques. By these means, user platform participation is rendered into what is commonly referred to as *social data*. Although directly connected to the content generated by users (so called user-generated content or UGC), social data is a distinct inscription format that enables user activities to be recorded as structured, machine readable data. Let us elaborate.

User generated content is often seen as emblematic of social media. The term refers to the creation and subsequent posting or uploading of content such as video, text-based comments, photos, etc. User platform participation evolves, in fact, around user generated content and the communicative exchanges this entails. It is important, however, to distinguish between the content, say, of the uploading or posting (what users generate as content, usually unstructured data) and the very act of uploading or posting that content (social data, structured data). The difference is subtle but crucial. The activities of, say, posting, uploading or tagging content are distinct from the content they convey in the same ways that buying of a product is different from the product itself. Such activities have significant value of their own, as they are taken by the platform owners as indicators of the preferences and choices of users. Critically, the performance of such activities leaves a countable data footprint made of discrete clicks (e.g. number and frequency of posts, tags or likes) and other user machine readable data such as location or time of performed activities. In essence, the distinction between, say, of an activity such as posting and the content that is generated by it amounts to dissociating the activity from its purpose and the meaningful context where it occurs. This is an observation that, we claim, carries far-reaching implications. Referred to as social or behavioral, such data contrast with the unstructured or semi-structured nature of user generated content, and provide social media with a datafied, permutable and infinitely actionable version of social interaction online.

These observations should indicate that the activity types of platform participation (e.g. liking, following, tagging) represent a drastic reduction of the complexity and ambiguity of the patterns of everyday interaction and the unspoken habits, conventions and rules underlying it. Such reduction, we claim, is *conditio sine qua non* for rendering platform activity computable. It procures out of daily user interaction social data that are discrete, countable, pliable and, thus, possible to aggregate and compute in a variety of ways to dissect platform participation. The outcome of these operations serves the commercialization strategies (e.g. audience mediation, data management tools, data analytics) of social media as business organizations. Viewed

in this light, social media establish online a drastically simplified and technologized, data-rendered version of the informal nature of daily social interaction and communication. Such a version of interaction essentially breaks the connection between the daily patterns of action and the socially embedded nature of scripts that, as earlier analyzed, link individuals to their social environments and allow organizing scattered situations into coherent forms of meaning and sociality.

The equivalent of the function of scripts is now carried out by one or another type of user model whose design remains essentially obscure to users. As claimed earlier, the data footprint of these engineered forms of user platform participation is deployed by social media platforms to derive a digital cartography of the social relations which users develop with one another on platforms. Yet, users are most of the times unaware of these operations and the data results they produce. User platform participation disaggregates the process of interpretation, clue gathering, meaning making and value attribution which were orchestrated by scripts and inscribes the resulting individual components into technological features such as searching, tagging, rating, etc. This has several implications. On the one hand, single users get caught in the idiosyncratic exercise of infinitely reproducible social actions which have little context, as they are effectively disconnected from the formation and reproduction of the informal, culturally embedded fabric of life and communities. On the other hand, platforms control the connection between actions and communities by designing platform participation, attributing determined value to the data produced by interaction and aggregating those data into clusters. Platforms update, modify, adapt user models and further group and classify users in clusters of similar users or lookalike audiences on the basis of data produced by the standardized activities carried out on social media. By constantly tweaking, adjusting and redesigning these technical models of users and groups, platforms are able to update their operations and further develop their data-based services (e.g. personalization services) with the ultimate goal of fostering user engagement –the measurable version of social interaction that is essential to their economic pursuits. In this respect, the standardized forms of user platform activity, what we here call encoding, constitute a fundamental precondition to the functioning of social media platforms and the economic objectives they serve.

To the degree that these forms diffuse throughout the social fabric, it is reasonable to assume that they impact upon and refigure longstanding patterns of interaction and communication

(boyd, 2014; Hayles, 2012). The elementary matrix of objects and actions social media platforms construct detaches social interaction from the social nature of scripts and the attendant forms of sociality while retaining, for the purpose of data generation and computing, a barren, skeletal form of that interaction as a link between two objects (Kittler, 1996). The distinction between social data (e.g. posting) and user generated content (the post as content) we made earlier in this paper is indicative of this. The computable act of posting is more important than its purpose and context (what is posted and why).

Dismal as these implications may seem, it is important to realize that in the flat ‘ontology’ of machines, there is no difference of users from objects and of one context from another. The meaningful and temporal dimensions of actions collapse. All actions have the same value (a data mark) and have no temporal origins or historicity. For the purpose of data processing, users are no more than objects and every context is no more than a data generating occasion. The datafied versions of daily habits that are produced this way are subsequently inserted into the institutional fabric of markets and corporations into which they acquire an entirely different meaning as tools and means of revenue making (Alaimo & Kallinikos, 2017; Ekbia & Nardi, 2017; Kornberger, Pflueger, & Mouritsen, 2017; Profitt, Ekbia, & McDowell, 2015; Van Dijck, 2013). The datification of the social makes possible to reach individuals as targets of data-driven personalized services. At the same time, the datified version of sociality moves toward further standardization with the implementation of automated technological features and communicative exchanges that seek to handle the massive nature of interactions they tend to produce. The recent proliferation of chat bots on Facebook and across the Web – robots designed to provide automated ‘chats’ to users – is just an example of such developments.

Such claims may well conjure up a dehumanized portrait of social media produced by a narrow technologically and economically informed reading of a much more open, evolutionary process of the forms and media of human interaction and communication (Vygotsky, 1978). Little wonder, people can do a great deal of things on platforms that were previously either impossible or very expensive (see e.g. boyd, 2014; Donath & boyd 2004; Ellison & boyd 2013). They can also frequently tweak, work around and resist the alliance of technological machinery with the digital economy in which this far-reaching standardization of social interaction is embedded. In some important respects, and similar to the entire history of media from writing onwards

(Kittler, 1996; Ong, 1982), social media expand the communicative ability of people and enable human pursuits that looked only as wishful tales a few decades ago. It would be futile to contest this.

Yet, it is important, at the same time, not to lose sight of the invisible restructuring and infrastructuring of human communication and interaction brought about the deep entanglement of human purposes and technological artefacts (Bowker, 2005; Kallinikos, 2012; Kallinikos, Hasselbladh and Marton 2013), and the diffusion of social media platforms (Ekbja & Nardi, 2017; Van Dijck, 2013). The extended ability of humans to communicate and interact on the online environments of social media is offset by the narrower paths along which such ability is possible to enact. On social media, only certain things can be done and again only in certain ways that accommodate the distinctive technological nature of online environments social media engineer and the nature of social media as, by and large, profit-seeking business organizations (Alaimo & Kallinikos, 2017; Ekbja & Nardi, 2017; Hayles, 2012).

No one has captured this more succinctly than Van Dijck in her poignant claim that before they make the web social, social media platforms render sociality technical (Van Dijck, 2013, p. 12). We have in the preceding attempted to expose key presuppositions of this technical transformation of social relations by describing the design of the online environments of social media and the standardized communication and interaction patterns they generate. The infrastructuring of social interaction that is brought about by the far-reaching standardization of the online environments in which people as social media users interact with one another requires taking a broader historical view of media, communication and social interaction (Beniger, 1987; Bolter & Gruzin, 2000; Manovich, 2001; McLuhan, 1964). While we cannot enter such a debate in this context, it is important to recognize that the trends we associate with social media are part and parcel of a broader historical evolution of the forms of mediating communication and social interaction (Kittler, 1996; Ong, 1982).

FORMS OF SOCIALITY ORGANIZED BY MEASURES AND ALGORITHMS

Thanks to the operations of designing user models and platform interaction the ways we have analyzed, social media are able to cast data on user engagement in a broad social matrix of comparisons and affinities. By computing a range of scores out of these aggregate data pools and matrices, users can variously be related to one another on the basis of preferences attributed to them by reading patterns in their activities such as liking, tagging or following.

User models substitute scripts, remediating the relationship between user interaction and forms of sociality. On social media the connection between user models and forms of sociality is reworked by means of computation. A fundamental operation for the computability of large masses of social data is assembling the data into clusters. As earlier indicated, for the flat ontology of digital machines, there is no essential difference between an individual user profile and a group of user profiles as both are defined and stored as the clusters of data produced by their platform interaction. Individual users and groups of users are defined as clusters or aggregates of data-clicks produced by the encoding of user platform participation and social data.

Aggregation is a core operation, a fundamental passage in the chain of data computations of social media. In the first passage of these operations we call encoding, individual users are disaggregated into actions which produce single data points. After having been cleansed and stored, such data are aggregated into entities and form the basis for further processing and analysis. Aggregation may take various forms but all these forms maintain the core function of assembling scattered data into entities, such as sets, matrices, or clusters that can enter into mathematical, statistical or other kind of quantified relations to other entities. The standardized and unambiguous nature of social data fits well this computational model of sociality-making which is deployed to define users, user networks and groups in the same way, namely, as aggregation of data (e.g. clicks, likes, tags, etc.). Aggregation creates entities (users, groups of users, etc.) that have no equivalent in the traditional, socially-embedded social interactions. Such entities nonetheless acquire a fundamental functional reality insofar as they afford the computability, commensuration and fungibility of widely different things. By means of aggregation, the differences between an individual and a collective are transposed into numeric relations, since everything defined as aggregation of data (a set, a cluster, a matrix) can enter into some computable relation, without regard for the volume of data (Desrosières, 1998; Hacking, 1990; Porter, 1995). Thanks to these operations, the items of user interaction (e.g. posts, videos, photos or tunes) and users themselves can be included into sophisticated models of prediction, whereby the most popular, the trendiest or the most relevant user or item are continuously computed, tested and optimized (Alaimo & Kallinikos, 2017; Gerlitz & Helmond, 2013).

Cast in this light, aggregation becomes the precondition for obtaining the commensurability of items, things and users and their fungibility which are essential requirements for the operations of social media. The very dis-embedding of social interaction from context and the break of

its links to forms of sociality that have been mediated by scripts (cognitive structures embedding rules, roles and cultural norms) call for alternative modes of value attribution (Kornberger, Pflueger, & Mouritsen, 2017). Short of a real context or embedded social ties, social media platforms have no other means to map social interactions but through the quantitative derivation of user platform participation as described above. The quantitative reduction of platform participation obtains social relevance in the form of data scores that describe social (e.g. similar users, popular or trending items) or personal attributes of users. Constantly fed back to users such data scores connect forms of sociality, computed from data aggregates, to user models and actions.

It would be worth pointing out in this context that what is called personalization on social media amounts to inferences about an individual user behavior that derive from the comparison of her/his data with other user data. Personalization works either explicitly or implicitly, it may suggest further interaction or simply make some things more visible than others (Alaimo & Kallinikos, 2019). The personalized modulation of platform user interfaces and functionalities with their constant, often implicit, suggestion of how to behave take the place of social and structural forces, such as for instance the imitation-differentiation model, social influence and even coercion which have always been part and parcel of the social fabric (Simmel, 1957). Yet, what is advanced as personal recommendations are the outputs of matrices of similarities and differences between users on the basis of the data footprint of their online actions. A process which reaches much further in the realm of abstraction and decontextualization thus drastically breaking out from situated forms of interaction and their social embedment (Alaimo & Kallinikos, 2019). A complex machinery of devices, rules, infrastructures, business objectives, mathematical, statistical and computational techniques is called upon every time the chain of data operations is triggered, producing information, personal recommendations and anything else of value in the digital economy of social media.

Social media platforms therefore institute online engagement and sociality as a space of data permutations. A range of data products are progressively emerging out of this infrastructuring of sociality such as e-scores, reputation indexes, and lookalike audiences to name but a few. Some of these scores or profiles are produced by social media themselves or specialized third parties with whom social media collaborate. E-scores, for instance, are compiled out of the data footprint of user platform engagement and are assumed to reasonably predict an individual's ability to pay back her/his loan (e.g. a sort of credit score) by calculating connections to other

users, browsing habits, items tagged and the like (O’Neil, 2016). By these means, a new breed of numerically derived distinctions is inflicted upon facets of social life that have managed until recently to retain a reasonable distance from the calculative operations of markets and corporations. A whole new valuation industry emerges out of user models and platform interactions as they are currently engineered by social media (Kornberger, Pflueger, & Mouritsen, 2017; O’Neil, 2016). E-scores are only a specific application of what more generally can be described as scores of individual trustworthiness that can and have been used in other contexts of social life such as hiring or education. Admittedly in their beginning, e-scores are indicative of the direction along which social media develop and characteristic of the ways they conceive, engineer and measure user platform participation and engagement.

The opacity and biases of measures and scores that social media produce would make them entertaining curiosities were they not seriously involved in our lives (Eubanks, 2018; Noble, 2018). As indicated several times, these measures and scores acquire particular importance by virtue of being systematically fed back to users as *alter descriptions* of the sheer and innocent marks (data) of engagement from which they originally emanate. A dynamic regime of user-platform interaction is established, whereby the metrics and distinctions of a potent computing machinery and its economic links are carried over to users in the forms, for instance, of user recommendations, other data feeds or targeted advertising that are bound to cause further user actions. A recursive loop of interactions is thereby set in place, whereby new user data are used by social media to deduce new metrics that cause further user reactions and so on and on. A similar mechanism has been poignantly analyzed by Hacking (1986, 1999) as one which “makes up people”. The process is roughly the following: an institution produces and diffuses a distinction (an idea) that is subsequently taken up by the subjects it is meant to describe, in the sense of being enacted as a real-life pattern by these subjects in the relevant contexts in which they are living. Anorexic young women, women refugees or child TV viewers are typical examples Hacking likes to refer to (see also Douglas, 1986; Espeland & Sauder, 2007).

The processes of “making up people” that Hacking (1986, 1999) describes are closely linked to the complex matrix of power/knowledge in which institutions are embedded (Foucault, 1977, 1980). Even though many of these processes are culturally diffused and often taken for granted (Douglas, 1986; Sismondo, 1993), the workings of institutions are strongly associated to their authority and legitimacy and, crucially, their ability to enforce, if needed, the distinctions they produce. In this sense, social media are different from institutions. They are not

power holders in such a traditional sense. Social media are no doubt important players in the context of the digital economy and the action incentives it offers. Measures and scores are, however, linked to distinctions that fed back to users mostly as advices for acting in a life such as ours, saturated by contingencies of all kinds. The power is by and large not yielded coercively. The distinction is offered as a recommendation and an incentive to act in ways that suit the user (see also Kallinikos et al., 2013).

There is obviously a large grey area in which the difference between the authoritative or coercive power of institutions and the laissez-faire practices we attribute to social media is less pronounced⁵. E-scores are a case in point in which this “take it or leave it” option is not available. True as this may be, the difference we propose does have the merit of disclosing how social media are linked to the spirit of the age. Social media are not disciplinary institutions, even though some of their operations linked to e-scores and e-reputation may have grave consequences for individuals and groups (see e.g. Eubanks, 2018; Noble, 2018). Social media produce distinctions out of the mapping of contingencies that mark user platform participation recorded as data the way we have sought to describe in this paper. Theirs are distinctions derived from ephemeral user preferences, trivial rather than serious concerns, quick reactions to the transient events of daily living, all of which establish a context which is quite different from that of power/knowledge characteristic of traditional institutions described by Hacking (1986, 1999) and Foucault (1977, 1980) from which Hacking is strongly influenced. Social media operate in a quite different fashion according to the frivolous and transient context of hypermodernity and commodious capitalism (Bauman, 2000; Lipovetsky, 2005) which they recast as online platform living and reorder as just an activity of revenue making.

CONCLUDING THOUGHTS

In this chapter, we have painted a portrait of social media as complex socio-technical entities that contribute to the making of new patterns of online interaction and communication and promote new forms of sociality. They do so by the far-reaching standardization of user platform participation and, further, by the production of groups and categories that derive from the application of scores and metrics to the data footprint generated by user participation. Social media, we claimed, infrastructure sociality. Although we have not entered the details of how social media operate as business organizations, we have assumed that the nature of data practices we

⁵ Yuval Milo, Personal communication.

ascribe to them are heavily influenced by the context of the digital, data economy in which social media platforms are important players.

Data fashioning and production is a delicate engineering accomplishment (boyd & Crawford, 2012; Gitelman, 2013). We have, accordingly, dedicated some space to analyzing the premises upon which user platform participation is underlain by the instrumentation of interaction or communication as a technical link between two data objects, namely a user and another user or a user and some predefined item. It is an essential attribute of the environments social media stage online to dissociate the action users perform from the meaningful contexts in which these actions occur, and treat them as just digital inscriptions, data tokens possible to cross-reference or syndicate, aggregate and combine with other data tokens.

Placed against this backdrop, the technical models of interaction and sociality linked to social media diffuse modes of acting and relating that differ substantially from the primary forms of relatedness and the social foundations of the micro-ordering of the social world (Berger & Luckmann, 1966; Mead, 1934). Even though the impact of the operations of social media upon the infrastructuring of sociality is ultimately an empirical question, it is reasonable to expect on the basis of the analysis we have performed here, that the diffusion of these operations throughout the social fabric is bound to have far-reaching implications. “The formation of groups or dyadic relationships and the formation of selves tend to be complementary aspects of the same process” as Fiske (1992, p. 707) has cogently noted. Crucially, scripts or cognitive relational models have always been used in combination, allowing individuals to shift between different roles even during a single social interaction (Fiske, 1992; Goffman, 1977; Mead, 1934). The complex orchestration of role taking and identity building facilitated by the combinability of several scripts has been mirrored by the coexistence of different modes and forms of sociality in the same context. The ways in which individuals organize their selves is the way they organize their communities or institutions.

By contrast, the user models that underpin the data operations of social media have none of these qualities. User models are engineered rationalizations of interactions, identical for all users and every context. They are furthermore black-boxed from users and operate in obtuse ways that reflect the confluence of several technological forces and the institutional context of digital economy. After all, user models are engineered with the purpose of producing the data that sustain social media as economic organizations. The diffusion of such user models and the

stylized design of interactions they are associated with, together with the measurement operations they propagate, reinforce automation at a large scale. Different forms of automation such as personalized suggestions or social bots or assistants are and will become increasingly necessary yet they will inevitably reinforce and ramify some of the trends that the online staging of social life has already produced. There is no doubt that the social implications of this technologizing of social interaction, to paraphrase Walter Ong, needs further work and, critically, empirical research in social fields (see e.g. Alaimo & Kallinikos, 2017) in which the distinctions, models, metrics and scores of social media are applied.

References:

- Abbott, A. (2001). *Time matters: On theory and method*. Chicago: University of Chicago Press.
- Abdelnour, S., Hasselbladh, H., & Kallinikos, J. (2017). Agency and institutions in organization studies. *Organization Studies*, 38(12), 1775-1792.
- Alaimo, C. & Kallinikos, J. (2016). Encoding the everyday: The infrastructural apparatus of social data. In *Big Data is not a Monolith: Policies, Practices, and Problems*, eds. Sugimoto, C., Ekbia, H. and Mattioli M. Cambridge MA: MIT Press, 77-90.
- Alaimo, C. & Kallinikos, J. (2017). Computing the everyday: Social media as data platforms. *The Information Society*, 32/4: 175-191.
- Alaimo, C. & Kallinikos, J. (2019) "Recommender Systems", in *The Oxford Handbook of Media, Technology and Organization Studies*, eds. Beyes, T., Holt, R. and Pias, C. Oxford: Oxford University Press.
- Barley, S. R. & Tolbert, P. S. (1997). Institutionalization and structuration: Studying the links between action and institution. *Organization studies*, 18(1), 93-117.
- Bauman, Z. (2000). *Liquid modernity*. Cambridge: Polity.
- Beniger, J. R. (1987). Personalization of mass media and the growth of pseudo-community. *Communication Research*, 14(3): 352-371.
- Bolter, J. D., Grusin, R., & Grusin, R. A. (2000). *Remediation: Understanding new media*. Cambridge, MA: MIT Press.
- Boyd, D.M. and Ellison, N.B., (2007). Social network sites: Definition, history, and scholarship. *Journal of computer-mediated Communication*, 13(1): 210-230.
- boyd, D. (2014). *It's complicated: The social lives of networked teens*. New Haven: Yale University Press.
- Boyd, D., & Crawford, K. (2012). Critical questions for big data: Provocations for a cultural, technological, and scholarly phenomenon. *Information, communication & society*, 15(5), 662-679.
- Berger, P. & Luckmann, T. (1966). *The social construction of reality*. London: Penguin
- Bowker, G. & Star, S.L. (1999). *Sorting things out: Classification and its consequences*. Cambridge, MA: The MIT press.
- Bowker, G. (2005) Memory practices in the sciences. Cambridge, MA: The MIT press.
- Couldry, N. & Kallinikos, J. (2018), Ontology, in *The Sage handbook of social media*, eds. Burgess, J., Marwick, A. and Poell, T. London: Sage. 146-159.

- Desrosières, A. (1998). *The politics of large numbers: A history of statistical reasoning*: Cambridge, Ma: Harvard University Press.
- Donath, J., & Boyd, D. (2004). Public displays of connection. *BT Technology Journal*, 22(4), 71-82.
- Douglas, M. (1986). *How institutions think*. Syracuse: Syracuse University Press.
- Eco, U. (2000). *Kant and the platypus: Essays on language and cognition*. London: Random House
- Ekbia, H. R., & Nardi, B. A. (2017). *Heteromation, and Other Stories of Computing and Capitalism*. Cambridge, MA: MIT Press.
- Ellison, N. B., & boyd, D. M. (2013). Sociality through social network sites. In *The Oxford Handbook of Internet Studies*. Oxford: Oxford University Press.
- Espeland, W. N. & Sauder, M. (2007). Rankings and reactivity: How public measures recreate social worlds. *American Journal of Sociology*, 113(1), 1-40.
- Eubanks, V. (2018). *Automating inequality. How high-tech tools profile, police, and punish the poor*. London: St. Martin's Press-Macmillan.
- Fiske, A. P. (1992). The four elementary forms of sociality: framework for a unified theory of social relations. *Psychological review*, 99(4), 689-723.
- Foucault, M. (1977). *Discipline and Punish: The birth of the prison*. London: Penguin.
- Foucault, M. (1980). *Power/Knowledge*. New York: Pantheon, edited by Colin Gordon.
- Gerlitz, C. & Helmond, A. (2013). The like economy: Social buttons and the data-intensive web. *New Media & Society*, 1-18.
- Gitelman, L. (ed.) (2013). *Raw data is an oxymoron*. Cambridge, MA: MIT Press.
- Goffman, E. (1974). *Frame analysis*. New York: Harper.
- Hacking, I. (1986). Macking up people, in *Reconstructing Individualism: Autonomy, Individuality, and the Self in Western Thought*, eds. Heller, T. C. & Brooke-Rose, C. Stanford: Stanford University Press, pp. 222-236.
- Hacking, I. (1990). *The taming of chance*: Cambridge: Cambridge University Press.
- Hacking, I. (1999). *The social construction of what?* Cambridge, MA: Harvard University Press.
- Hayles, N. K. (2012). *How we think: Digital media and contemporary technogenesis*. Chicago: University of Chicago Press.
- Kallinikos, J. (2012). Form, function and matter: Crossing the border of materiality, in Leonardi, P., Nardi, B. and Kallinikos, J. (eds.), *Materiality and Organizing: Social Interaction in a Technological World*. Oxford: Oxford University Press, pp. 67-87.
- Kallinikos, J., Hasselbladh, H., & Marton, A. (2013). Governing social practice. *Theory and Society*, 42(4), 395-421.
- Kittler, F. (1996). The history of communication media. *CTheory.net*. <http://www.ctheory.net/articles.aspx?id=45>
- Kornberger, M., Pflueger, D., & Mouritsen, J. (2017). Evaluative infrastructures: Accounting for platform organization. *Accounting, Organizations and Society*, (60), 79-95.
- Lipovetsky, G. (2005). *Hypermodern times*. Cambridge: Polity.
- Manovich, L. (2001). *The language of new media*. Cambridge, MA: MIT press.
- McLuhan, M. (1994). *Understanding media: The extensions of man*. Cambridge, MA: MIT press.
- Mead, G. H. (1934). *Mind, self and society* (Vol. 111). Chicago: University of Chicago Press.

- Meyer, J. W., & Jepperson, R. L. (2000). The 'actors' of modern society: The cultural construction of social agency. *Sociological theory*, 18(1), 100-120.
- Noble, S. U. (2018) *Algorithms of oppression: how search engines reinforce racism*. NY: NYU Press.
- O'Neil, C. (2016). *Weapons of math destruction: How big data increases inequality and threatens democracy*. New York: Crown Publishing Group.
- Ong, W. J. (2013). *Orality and literacy*. London: Routledge.
- Porter, T. M. (1995). *Trust in numbers: The pursuit of objectivity in science and public life*: Princeton: Princeton University Press.
- Proffitt, J. M., Ekbia, H. R. & McDowell, S. D. (2015). Introduction to the special forum on monetization of user-generated content—Marx revisited. *The Information Society*, 31(1), 1-4.
- Simmel, G. (1957). Fashion. *The American Journal of Sociology*, 62 (6), 541-558.
- Simmel, G., (2011). *Georg Simmel on individuality and social forms*. Chicago: University of Chicago Press.
- Sismondo, S. (1993). Some social constructions. *Social Studies of Science*, 23(3), 515-553.
- Star, S. L., & Ruhleder, K. (1996). Steps toward an ecology of infrastructure: Design and access for large information spaces. *Information systems research*, 7(1), 111-134.
- van Dijck, J. (2013). *The culture of connectivity: A critical history of social media*: Oxford: Oxford University Press.
- Vygotsky, L. S. (1980). *Mind in society: The development of higher psychological processes*. Cambridge, MA: Harvard University Press.
- Weick, K. E. (1979). *The social psychology of organizing* (2nd ed.). New York: Random House.
- Weick, K. E. (1995). *Sensemaking in organizations*. London: Sage.