SMARTPHONES AND TEMPORALITIES IN EVERYDAY LIFE: A RESEARCH AGENDA[1]

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This paper situates time/space at the center of a research agenda from a psycho-social perspective. Crucially, smartphones are not just objects of enquiry but also are tools for research. This article also examines some important sociological works in time and space relationships, especially about communication and information technology (ICT) as well as empirical research on smartphone usage. Particularly relevant is Csikszentmihalyi's theory of flow, as it has been adapted to information technology research. The proposed research agenda could help us understand how the users make judgements and actual decisions while using smartphone communication mobile application programs (apps), and the role of time perception (as it is related to the flow experience) in this process. In addition, we are interested in how the users negotiate social space. In the long-term we are seeking clues about how these judgements impact new configurations in the intersection of the offline/online in everyday life situations. The need for more empirical work from a psycho-social perspective will be argued as well as the necessity to incorporate quantitative as well as qualitative methodological approaches. Finally, a brief discussion evaluating research on smartphone use and its social impact is presented.

It seems that time flies when you are having fun interacting with social media content, particularly when you are using a mobile device such as a smartphone or tablet. Researches claims that memory, interests and personal motivations seem to be important factors for this disparity. The purpose of this paper is to situate time/space at the center of a research agenda from a psycho-social perspective while discussing conceptual aspects of a research proposal that uses a new "SP Research App" for monitoring the device usage of specific apps (mobile application programs), and delivers a short surveys to the user each time a monitored app is used. This means that smartphones are not only an object of enquiry but also a tool for research. A longer survey, and in-depth interviews aimed to qualitative analysis, are also part of the data gathering strategy. In the following pages I'll frame the conceptual background for this proposal: sociological perspectives in time and space relationships related to communication and information technology (ICT) as well as empirical research on smartphone usage. The need for more

empirical work from a psycho-social perspective will be argued as well as the necessity for incorporating quantitative as well as qualitative methodological approaches. Finally, a brief discussion about research on smartphones usage and its social impact is offered.

Smartphones, more than almost all other devices, have had an incredible penetration rate in society. As statistics already reveal, people expend more time than they think using their smartphones. At least for the U.S., following the *Pew Report 2015* (Anderson, 2015), 68% of adults in the United States have a smartphone. This study reports that smartphone ownership is nearing the saturation point in certain age groups. For example, 86% of those having a smartphone are in the age group of 18-29. Among those aged 30-49, 83% report having a smartphone, and it is 87% of those living in households reports earnings over $75,000. At the same time, surveys suggest that the adoption of other digital devices has slowed and even declined in recent years. Even in countries with a profound financial crisis, the smartphone market seems to be in good shape. For example, in Puerto Rico a country immersed in a debt and financial crisis, (with over $79 billion of outstanding government debt) *Telecommunications Reports for Puerto Rico and the Caribbean* reports that Puerto Rico is among the most advanced telecom markets in Latin America, with one of the highest rates of teledensity, mobile penetration, and internet users per capita (quoted in Dutta, Geiger & Lanvin, 2015).

The incorporation of cell phones as a communication and interaction tool has been well studied during this 21st Century, but the specificities of smartphones' interaction with the proliferation of social media, games, banking and a variety of Apps are still requiring further research. Important transformations of time/space correlation have been well analyzed in David Harvey´s book *The Condition of Postmodernity*. The destabilization of Fordism brought us a new system of political and social order based on flexibility. This new mode of accumulation demands flexibility with respect to labor processes, markets, forms of production and differentiated patterns of consumption (Harvey, 1987). Flexible production–that puts an emphasis on innovation processes and the exploration of new markets–has been supported by the developments of digital technologies in a variety of fields: robotics, tele-informatics, genetic engineering, visual technologies, and all-around emerging technologies producing, a *cyborg society* (Gray, Mentor & Figueroa Sarriera, 1995). This is a society that is constantly produced and reproduced in a complex matrix of digital information and communication technologies. This phenomenon translates into the accelerated compression of the space/time matrix (Harvey, 1987).

Sociological highlights on time/space

The Time/space relationships in everyday modern life have been pointed out by Henri Lefebvre's seminal theoretical approach (1958/2008, 1961/2008, 1974/1991, 1992/2013). Recent theorists, such as Castells et al. (2006), Urry (2000), and Virilio (1977/2006, 2009) have tried to think about the time/space relationship in the context of new technologies. Castells' concepts of "flow" and "timeless time" in the digital networked society, Urry's ideas about instantaneous and simultaneous time and Virilio's reflections on speed and ephemerality are important

theoretical clues for thinking about and analyzing contemporary culture. Despite their differences, these works agree on the necessity of locating time in the center of contemporary social thought.

Because we cannot address adequately time without space, Lefebvre (1974/1991) distinguished two basic frames regarding social space: subjective aspects and objective aspects. "Social space is made up of a relatively dense fabric of networks and channels" (p. 231). Note that for Lefebvre communication channels are vital forces in the construction of everyday life. As for social time, it is important to distinguish between cyclic time scales and linear time scales and their relativeness, as he has emphasized. The cyclic time scales have their foundations in nature they are connected to vital rhythms. The linear time scales are connected to knowledge, reason and techniques and are related to processes of economic and technological growth. The interactions between cyclic rhythms and linear (continuous or discontinuous) time scales in everyday life would be the object of a sociological analysis, called by Lefebvre, *rhytmanalysis* (Lefebvre, 1992/2013). Lefebvre also pointed out the existence of a multiplicity of social time scales, which could also be called temporalities, as they are engaged with social space dimensions. "(Social) space is not a thing among other things, nor a product among other products: rather, it subsumes things produced, and encompasses their interrelationships in their coexistence and simultaneity–their (relative) order and/or (relative) disorder." (Lefebvre, 1974/1991, p. 73.)

From my perspective, Castells et al. (2006) tried to accommodate Lefebvre's influential work on the contemporary information and communication technology conundrum by combining the "space of flow" and "timeless time" as two intertwined process constructing everyday life. To summarize, both concepts refer to the possibility of simultaneity of social practices without territorial contiguity, as well as the coexistence of the complex grid of synchronous and asynchronous communication. As it is well known, Castells is one of the most prominent social theoreticians of new digital technology. Notwithstanding this, Wajcman (2008) has drawn attention to the need to connect social theory with detailed empirical studies.

Wajcman's concern is mostly sociological, focusing on important areas where mobile technology is changing everyday life. As examples of these areas she mentions: the blurring of work and family life and the role of individual agency in this process. "As people further adopt and incorporate ICT's into their everyday lives, it may be that the spatial, organization and even psychological border between time and home and time at work loses its salience" (p. 69). Her call is to add more empirical research addressing important questions, such as whether mobile technologies have the potential to increase control over timing instead of surrender to the harried and accelerated paths of contemporary lifestyles. Using the so-called micro-coordination of everyday life (Ling, 2004) as a case study, Wajcman proposes the possibility that mobile devices could be allowing emerging techniques for managing time smoothing the feelings of time pressure or time scarcity. She calls for more research on the detailed practices of time planning as well as detailed study of the strategies that ICT's afford.

From a psycho-social point of view, Wajcman's argument for empirical research is also relevant, especially regarding the study of smartphone's usage. Smartphones have a distinctive characteristic:

mobility combined with a multiplicity of interaction forms within a rich multimedia environment. Nevertheless, most of the information technology research related to psychology and social impact has been done within the field of Computer Mediated Communication (CMC). In the next section the reader will find some examples directly related to this field. A few compilations have made an effort to combined computers, internet and cell phones (Kraut, Brynin & Kilesler, 2006), but this is not the norm. On the other hand, recent ground breaking cell phone research (Ling, 2004; Ling & Peders, 2005; Agar, 2003; Nyíri, 2005; Katz & Aakus,2002; Hamill & Lasen, 2005; Goggin & Hjorth, 2007, Ito, Okabe & Matsuda, 2005, among others) has mostly been based on cell phones generations before the smartphones' rapid penetration into everyday life. Taking this into consideration our research is aimed to expand the spectrum of new knowledge regarding smartphones usage in everyday life. Finally, as is common in psychology, a great emphasis in research has been exploring addictive behavior and cell phones. Research reports point to a consensus about the existence of cell-phone addiction, although the criteria and definitions used in these studies varies (De-Sola, Rodríguez & Rubio, 2016).

A research agenda from a psycho-social perspective

Multimedia environments have many graphical interfaces demanding engaging experience from the user. While addressing the "addictive" aspect of this engagement is very common, I prefer to explore its social and constructive dimension. A useful concept for this endeavor is the theory of "flow" from Csikszentmihalyi (1990). Dimensions of flow include intense concentration, a sense of being in control, a loss of self-consciousness, and a transformation of time. In the context of information technology (IT) Trevino and Webster (1992) describe four dimensions of the flow experience: 1) a control dimension, capturing the individual´s perception that she exercises control over the interaction with the technology, 2) attention focus, 3) a curiosity dimension, suggesting that during a flow experience there is a heightened arousal of sensory and cognitive curiosity, and 4) an intrinsic interest dimension, where individual's interaction with the technology extends beyond mere instrumentality to become pleasurable and enjoyable as an end in itself. In subsequent research, some problems regarding definition and operational differentiation of these dimensions emerged and this list of four dimensions has been reduced in some cases, and in others a more complex model has been presented (as discussed in Agarwal & Karahannal, 2000). These variations in methodologies are a consequence of focusing on individual performance.

In our proposed research agenda, a combination of objective measures and individual judgements is preferred over individual performance as such. This study will design the "SP App for research" (SPRAp) [2] – following the established practice in health and clinical

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[2] This Smartphone Research App (SPRAp))will be designed for Android because of the existing Apple´s restrictions to allow access needed to monitor the device. In addition recent marketing research about information technologies usage in Puerto Rico reveals that Android is the principal smartphone platform (Estudios Técnicos, 2016), and it appears as a global trend (Terry, 2017).

studies that uses apps for tracking individual behavior patterns and delivering reminders- which transform the smartphones into tools for gathering data. The objective measure of time will be given by the research monitoring capabilities of the App, that would record the specific amount of time of use of social media, chats, sms and email by each participant. The principal interest of this research is centered on the subjective judgment of time, in order to compare it with "actual" or "real" (mechanical) time (given by the monitoring capabilities of the App). Thus, our SPRAp will also trigger a short survey immediately after a communication app is used in order to identify user's perception of time expended. The above-mentioned dimensions of flow—control, attention focus, curiosity and interest—could give us the conceptual background for a second survey at the end of the monitored period (for instance, a week). In-depth interviews will examine the individual's judgments exploring the interplay between the subjective perspective and its context. This could be done with a mixed methods research design (Hernández, Fernández & Baptista, 2014; Creswell, 2014), given that we could statistically contrast objective time measurements with perceived time as reported by the user (temporality), along with the rest of the dimensions explored through the second survey and the in-depth interviews. The demographical data of the users could be gathered in the configuration phase after the SPRAp is installed.

From a communication studies field point of view, Kaun and Stiernstedt (2014) also used the concept of flow in connection to "social media time". These authors are more interested in linking the analysis of affordances of social media time with experiences. They asked how users navigate, make sense of, and problematize the possibilities and constraints concerning the structuration of time within the platform. They conceptualize the answers by showing the relation between the platform and three different notions of time: archive (memory contents as they are organized in the platform), flow (temporal experiences of immediacy, ephemerality) and narrative. To explore these questions empirically, the researchers analyzed the platform affordance of Facebook in the context of one fan page, "DT64 ___ *Das Jugendradio der* DDR", and an East German youth radio station. They mentioned the work of Henri Bergson (1910/2001) which opened the possibility of thinking about time as "duration". In contrast to modern scientific measurements of time, the concept of "duration" is a more plural sense of temporality.

Bergson's proposal, as well as Kaun and Stiernstedt's work, give us the opportunity to relate time (modern fixed time, that is clock time and its correlated tasks in everyday life social demands) and temporality (a more subjective judgement of time usage and duration). One aspect that has been of interest in social research is the changing relationship of time and space through media technology. Kaun and Stiernstedt also wanted to grasp the character of temporality fostered through technology by analyzing Facebook's affordance. In doing so they considered not only the structuration of time through the logics of the platform but the users' perception and negotiation of these suggested temporal layers as well, even though this last aspect is not elaborated in their article.

In the proposed research we are not studying any platform affordance but concepts used by these authors such as "media memories" (people's memories associated with media content and practices related

to a specific medium) and judgements about settings configurations (news feeds, e.g.) are meaningful guiding social behavior as smartphone use is connected to Csikszentmihalyi's notion of flow. As mentioned above, a survey to be delivered by the end of the monitored period will try to explore about the users' personal meaning of this content exchanges as well as temporal/spatial negotiations in everyday life while interacting with specific apps. A rather similar approach has been implemented by Bayer et al. (2017) studying emotional and social outcomes of Facebook use. They test temporal (shorter vs longer time spans) and spatial (at home vs away from home) by triggering smartphone surveys in response to users' naturalistic Facebook posting. In our case, both surveys (first and short survey triggered immediately after a communication app is used asking about time expended, and the second survey guided by the above four dimensions of flow: control, attention focus, curiosity and interest), will be helpful for in-depth interviews design. It also intent to encompass a larger amount of communication apps .

There are a lot of apps running in smartphones and of course, many deserve attention as each one produces specific social relations. So why focus on communication apps such as social media, emails, sms and chat? According to Böhmer et al. (2011) mobile phones are still used mostly for communication (text and voice) and some apps have somewhat intense spikes in relative usage (such as social apps). Another interesting finding in this research, coming from information technology (IT) field, is that when people actively use their devices they spend less time with each app. In addition, short sessions with only one app are much more frequent than longer sessions with two or more apps. The author claims that the first app within a session is very likely to be an app for communication (social media, chats, emails, etc.) instead of another kind of app, like stock exchange updates, banking reports, news, games and others.

The importance of Böhmer et al's (2011) research is that it describes a large-scale deployment-based research study that logged detailed application usage information from over 4,100 users of Android smartphone devices, which is a very large sample. Another contribution is the method of data collection. All the data was gathered by *AppSensor* that is a part of a large-scale deployment of an implicit feedback-based mobile app recommender system called *appazaar*. They use a technical approach to gather a huge amount of data, as *apazaar* is designed to capture information about an enormous number of apps available to the users. The authors explained: "Based on the user´s current and past locations and app usage, the system recommends apps that might be of interest to the user. Within the *appazaar app* we deployed *Appsensor*, that does the job vital to this research of measuring which apps are used in which contexts" (para.1). The context- in this particular study is related to the chains of app use: the usage behavior in terms of the *zero or more application* used before an application is opened and the *zero or more-application* used afterwards. The authors admit, as one of the limitations of their study, the fact that *AppSensor* is not capable of tracking some contextual information such as multitasking (e.g. background music while chatting in Messenger App). Our proposed research plans to add important contextual information—not only from the device's context but alto from the social context as well—to do a more comprehensive use analysis of the monitored apps, considering that

interviews could provide some clues about the way the individuals organized time/space relationship in the online/offline intersection.

Social impact

Time/space relationships are central in our societies where a wide array of technological platforms compete for our attention. Given this scenario, two intertwined contemporary social topics are implicated in our research: the relation between leisure and work in innovation, and the challenges of new learning environments.

Lin (2009) raises one of the most controversial question nowadays: what are the factors implied in innovation? Some important research related to attention processes suggests that so-called "distractors" could have an important role in innovation process. "Distractors" could expose the individual to new information and experiences that could be pleasurable as well as instrumental for new discovering and innovation. Davidson (2012) offers important ideas regarding the role of "distractions" in our everyday life. The author explains how without distracting experiences we cannot perceive difference in our action schemes in everyday life situations, we are not aware that we are paying attention. Only when we deviate to something different from what is expected do "blind points" emerged. Another close research area is the relation of leisure/work and mobile technology. This has been already linked to the destabilization of such attention/distraction frontiers (e.g. Dery, Kolb & MacCormick, 2014). The rapid spread of rich multimedia environments and telepresence in learning environments has captured research interest in a variety of fields. New learning environments are reconfigured as a consequence of mobile digital technology. There is still a lot of research to be done to study its consequences as well as to redesign mobile learning collaborative environments.

Another very important area of social impact is related to the destabilization of the apparent dichotomy between transportation and communication. Cellphones, social networks, SMS, MMS, and chat rooms enable communication between different geopolitical and cultural groups and facilitate the re-signifying of diaspora communities and the individual's and group's experience of exile (Figueroa Sarriera & González Hilario, 2017). Research in information technology in everyday use also makes more evident the blurring of boundaries between public and private spheres and the shifts in societal, community, and familial spaces of communication and identity in the context of contemporary migratory processes (Georgiou & Ponte, 2013).

For instance, Komito (2011) claims that migrants' usage of social media in Ireland supports bonding capital and transnational communities in new ways. Interview data from 65 Polish and Filipino non-nationals in Ireland provides evidence on the way social media enables a "passive monitoring" (p. 11) of friends and acquaintances. This passive monitoring allows interesting ways of reunification of people who in fact are dispersed in different geopolitical territories. Two basic consequences of this continued "presence" in the migrants' home culture were evident: the process of integration into the host society is slowed yet at the same time migrants easily move from one society to another.

Fortunati, Pertierra and Vincent (2012) published a very interesting collection of works on migration patterns and the role of ICTs

and new media based on case studies from a wide range of countries. One of the most remarkable finding is that gender identity transformations occurred in part due to the use of new ICTs in cases in which females play the role of homemaker, as with new mobile communications devices they can continue to have a presence in their places of origin, taking part in family affairs in both the new homeland and the old. Thus they continue functioning as actors in the production of cultural hybridity in the context of a global society. This cultural hybridity, of course, puts into focus how natives and migrants negotiate cultural diversity and agency in ways not possible before the proliferation of cell phones.

This destabilization of the apparent dichotomy of transportation and communication has important implications for social struggles as they are experienced in everyday life. For instance, in the context of U.S. migratory and security police after 9/11, mobile communication plays an important role smoothing forms of social exclusion. The individual that cannot cross the border as an immigrant or take a flight to the metropolis (this last in the case of a colonial territory such as Puerto Rico) should stay in the local context where precariousness and uncertainty could be momentarily vanished away by a communication channels that afford affection and family ties, as well as the vicarious experience of a probably and a relatively better life (Figueroa Sarriera, 2017).

Closing remarks and apertures

Making the social construction of everyday life an object of study implies considering mobile information and communication technologies as a central mediation/production tool of every user's life-experiences and their ongoing negotiations around social meaning. In other words, community formation and social relationships in general are very closely linked to communication technologies as forms of consumption/production. At the center of this research agenda time/space perceptions and negotiations acquire great relevance from a wide variety of angles combining social theory and philosophy.

The literature review suggests important methodological challenges regarding how we deal with common concepts such as everyday time and social space in the context of digital communication technologies. Through the discussion of the available theoretical background, a research agenda is proposed that addresses some of the most important methodological challenges. First, we need to put together quantitative and qualitative methods in a way that could enhance the production of critical new thinking and knowledge. Second, in doing so we should incorporate digital friendly-use technologies as cell phones, tablets, and even a wide variety of accessible visual technologies as tools for research, not only as an object of enquiry (e.g. Reavy, 2011). Finally, the construction of a robust conceptual framework should be accomplished from an interdisciplinary perspective. This last challenge implies not only incorporating knowledge coming from the usual fields that have already embraced critical discourse analysis but also to open up the possibility of constructing new knowledge in collaboration with technical and experimental fields.

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