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A typology of people–environment relationships in the Digital Age

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ABSTRACT

This paper introduces a new conceptual framework for understanding people–environment transactions as they occur within the *hybrid* and *polyfunctional* settings (settings that incorporate both physical and digital elements) of the Twenty-First century. Four alternative modes of environmental experience with respect to individuals' connectedness to real (R) and virtual (V) settings, the focus of their identity, and satisfaction of socio-emotional needs are presented: *Placeless*, *Place-Based*, *Place-Cyber Based*, and *Cyber--Based*. Focusing on the *Place-Cyber* and *Cyber-Based* environmental orientations, new constructs for characterizing individuals' place-cyber and cyber-orientations are developed and key objective and subjective criteria are identified to distinguish between these two forms of virtual life. New questions for further investigation regarding the psychological and health consequences of alternative modes of virtual life are raised.

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1. Introduction

The thrust of this paper is to introduce a new conceptual framework for people–environment (P–E) relationships in the Digital Age. The proposed framework addresses fundamental questions about the nature of our relationships to each other and to physical places–particularly as *real and virtual components*[1] become inter-mingled within place-based settings[2] owing to the increasing prevalence of the Internet in people's day-to-day lives [3–5]. The advent of the Digital Age raises important new questions such as whether certain forms of digital technology and patterns of Internet use are associated with greater disengagement by individuals from their local place-based settings. If so, are those individuals most immersed in new forms of virtual life less attached and committed to their immediate place-based settings? Do those individuals experience a stronger sense of community in and attachment to their virtual environments? Do these Internet-oriented individuals have a weaker and more fragmented understanding of their place-based environments? What are the psychological and health consequences of individuals' participation in virtual communities?

Recent evidence suggests that individuals and groups vary in the degree to which they are connected or committed to cyber-based and place-based settings [2,6–16]. They also vary in their orientations toward place-based and cyber-based environments. It is essential, therefore, to develop more nuanced conceptions of people's environmental orientations that are commensurate with their experiences during the Internet Era. We offer a typology of environmental orientations that

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[1] The term 'real' is being used to denote settings that have observable geographic boundaries and a temporal patterning of activities (behavioral program) that are coordinated with and attached to the physical milieu of the setting [1]. Even if these 'real' settings have virtual components, they are still located in physical space as contexts for face-to-face encounters among their participants, which sets them apart from virtual behavior settings and virtual communities as defined by Blanchard [2].

[2] The term "setting" or "behavior setting" refers to a geographically delimited place in which specific people perform particular activities on a recurring basis.

contributes to the discourse concerning the implications of virtual forms of interpersonal communication and social interaction, drawing on the notions of "community", "public life"; "space", and "place" in the Digital Age. Before presenting the proposed typology, we: (1) articulate a set of assumptions about P–E relationships in the Digital Age and the rationale underlying each assumption; and (2) provide an overview of past theory and research as a basis for grounding this typology of P–E relationships in the Internet Era and explicating its conceptual and practical significance.

2. Core assumptions underlying the typology of P–E relationships in the Digital Age

First, *individuals have distinguishable orientations toward their environments based on their connectedness and commitment to place-based and virtual settings, the focus of their personal identity, and the satisfaction of their socio-emotional needs*. For instance, some elderly people participate in virtual communities such as *SeniorNet* or *SeniorsCan* to be able to maintain and strengthen their ties to the outside world, overcome feelings of loneliness and isolation, and give and receive social support. Such groups may be deeply connected and committed to certain virtual behavior settings and perhaps less attached to their immediate place-based environments because of restricted mobility and social isolation. Similarly, other types of Internet users, such as some avid online gamers, may have a lower sense of belonging and attachment to their local place-based settings [17]. On the other hand, online communication networks can be used to reinforce sense of community in place-based neighborhoods and organizations [7,18]. It is plausible that individuals and communities who participate in such place-based communities of interest through the Internet have a higher sense of place identity and place attachment [19] that is strengthened by their virtual connections and commitments.

Second, *an individual's particular environmental orientation can be predicted by the socio-physical features of his/her place-based environments, patterns of Internet use, and particular features of the cybernetic environments that s/he frequents*. For example, higher amounts of personalization and decoration in dormitory rooms have been found to be associated with students' greater commitment to a university setting, measured in terms of their staying in or dropping out of college [20]. Similarly, fewer territorial displays, less diverse room decorations, and room decorations that are not associated with local place-based settings have been shown to be associated with lower levels of commitment to campus life and to the region in general [21]. More recently, it has been found that people's physical environments reflect and reinforce their personalities, values, and lifestyles [22,23].

There is also some evidence linking people's living conditions and specific patterns of Internet use. In a survey of 600 young (15–25 year old) Singaporeans, it was found that those individuals who lived in high rise apartment complexes were likely to spend more time socializing on the Internet as compared to those who lived in low-rise homes. In another study, people living in larger homes

with fewer members tended use the Internet more to socialize with their friends and relatives compared to those who lived in smaller, more crowded homes [24]. Thus, certain features of individuals' physical settings appear to reflect the degree of commitment they feel toward their local social and physical environment, their level of involvement in its organizational functioning, and their patterns of interaction and emotional support [25].

Personal dispositions and motivations as well as cultural factors also can influence people's preference for certain virtual and place-based environmental orientations. In a cross-cultural study comparing virtual community use patterns among Japanese and Korean people, Ishii and Ogasahara [12] found a greater degree of overlap between the Koreans' locally-based and virtual social networks as compared to Japanese participants' local and virtual social networks. Membership in locally-based virtual communities was found to be positively correlated with social bonding gratification. Thus, the purposes and gratifications of various forms of Internet use can vary across individuals and socio-cultural milieus.

Third, *there can be a lack of "fit" or "coherence" between individuals' environmental orientations and their socio-physical environments as new technologies enable people to engage in concurrent activities*. For instance, an individual's immersion in an online gaming or chat room environment might interfere with his or her ability to carry out certain role-prescribed behaviors, such as parenting or work within a place-based setting (e.g. in a residence or work place). Similarly, experimental studies examining the disruptive effects of cell phone conversations on memory and attention have found that involvement in a cell phone conversation while driving causes the driver's focus to shift away from the driving environment and results in potentially harmful lapses of attention [26]. Also, in a large-scale survey examining the impacts of information overload in organizations, two-thirds of the managers interviewed reported that information overload from virtual as well as place-based sources had damaged their personal relationships and caused a loss of job satisfaction; and nearly one-third believed that it damaged their health [27]. High levels of perceived overload from online sources also have been found to predict greater stress, poorer health, and less time devoted to contemplation [28]. Thus, the degree of fragmentation or coherence between people's place-based and virtual lives can be predicted by their dominant environmental orientation.

Fourth, *the environmental orientations presented later in the paper are not always found in their pure forms.* They can overlap, mix, and change over time. People are able to adapt to new forms of virtual life. Some socio-demographic and age-developmental groups are more likely to be representative of certain categories of environmental experience. For example, a series of Pew Internet and Life surveys indicates that a large proportion of the American population under thirty shows interest in *immersive* virtual environments that require a high degree of cognitive and emotional investment, such as social networking websites, blogging, and online gaming [29–31]. An ethnographic study examining the integration of the Internet into the everyday lives of domestic users found that patterns and

forms of engagement with virtual environments were heavily influenced by life circumstances such as isolation brought about illness, dysfunctional marriage, single parenthood, retirement, unemployment, dislocation or recurrent change of location, geographically dispersed family and friends, dissatisfaction with current job, and feeling a sense of belonging to a dispersed community of interest—usually a community of suffering [6]. It is reasonable to assume, then, that certain situational, dispositional, and personal life circumstances prompt individuals to shift from one form of Internet use to another.

Fifth, *research on environmental orientations in the Digital Age can provide the basis for identifying and understanding the emergence of new human needs and environmental demands and the societal consequences of adapting to those demands*. For instance, the need for perpetual contact and coordination, and the need to have friends and family continuously accessible changes the ways people interact when meeting face-to-face, the ways people handle or avoid emergencies and crises, and their demand for efficiency and flexibility in personal and professional life [32]. As well, people's propensity to have large and diffuse online social networks and their implications for the meaning of friendship and community in the Internet age [33–35], are all concomitants of one's prevalent environmental orientation. Gaining a more complete understanding of different patterns of P–E relationships would enable us to better comprehend the effects of contemporary pressures on individuals to "multi-task" and handle the deluge of digital information and communication—as well as the impacts of these trends on health and wellbeing, and our capacity for concentration, reflection, and creativity [36–42].

3. Conceptual and practical significance of the typology

The theoretical and practical significance of the proposed typology of P–E relationships in the Digital Age is discussed in relation to three levels of analysis: the *behavior setting* level dealing with the implications of various forms of environmental orientations on people's transactions with their immediate, local socio-physical environments; the *community* level dealing with the impacts of virtual life on individuals' and groups' transactions with larger scale socio-physical settings such as organizations, institutions, and neighborhoods; and the *societal* level dealing with the broader social and cultural consequences of various patterns of environmental experience and Internet use.

3.1. Significance at the behavior setting level

There is no dearth of interest in the psychological and interpersonal impacts of Internet use. The area of *psychosocial studies of Internet use* stresses pathological Internet use, or what some researchers have termed "Internet addiction" [43,44], depression, socio-phobia, and loneliness as predictors and outcomes of certain types of Internet use [45–50], computer mediated communication, and their effects on social behavior and interpersonal relationships [47,51–54].

Yet another area of research is the *organizational dimension of Internet use*. This area focuses on computer-supported collaborative environments and changing organizational norms, codes of conduct, communication patterns, and roles [55–59], as well as the management of virtual teams [60–63] and tele-workers [64]. Whereas research on the social, psychological, and organizational consequences of information and communication technology use is expanding, the *changing ecology of human–environment relations* [65] typified by the widespread use of the Internet and related digital communications has not been adequately explored. As Massey [66] suggests, places need to be defined in relational terms, as "articulated moments in networks of social relations and understandings" rather than as "areas with boundaries around" (p. 66). Electronically-mediated spaces can be considered to have spatial extensions. They are located in specific physical contexts, they engage our bodies in certain limited ways, and they are used and controlled by particular groups of people [67]. They can be more than just interfaces when some digital environments can be "recreated in a virtual way or it can be transformed in a digital manner to produce an experience of immersion" [4].

Virtual spaces, thus, possess several qualities similar to those of physical spaces and places. For instance, they are often used for like purposes and hold similar meanings as physical places do. Also, they provide some people with a sense of belonging and attachment as in the case of online forums and virtual communities. As well, they afford visual and verbal contact through features such as video conferencing. They facilitate recreation and leisure through applications such as online gaming and broadcasting and are imbued with special emotional meaning for some users. Blanchard [2] has defined such virtual communities (Internet-based communication forums) as *virtual behavior settings*—i.e., "naturally-occurring, computer-accessible social spaces in which groups of people participate in ongoing exchanges of communication" (para. 36). Virtual behavior settings on the Internet are therefore distinct *immersive, communicative, and informative environmental forms* that are accessed from micro level or local settings and provide access to global or macro level settings.

Our analysis suggests the value of broadening current conceptions of space, place, and proximity to accommodate changing lifestyles and values. People's experiences of the Internet, however, remain anchored in and influenced by the specific physical locations from which they are accessed via computer, cell phone, or other electronic devices. Place-based settings that have the required electronic infrastructure, such as network connectivity, bandwidth, and cell phone coverage permit access to virtual settings, thereby enabling the inter-mingling of behavioral programs associated with both the place-based host setting and the virtual behavior settings that are accessed from it [68]. Settings that enable participants to concurrently pursue diverse and multiple activities involving both place-based and virtual programs, are *polyfunctional* in nature [68]. It is important to understand how individuals and groups interpret, modify, evaluate, and respond to polyfunctional environments. The proposed conceptual typology of environmental orientations is intended to

provide a more nuanced understanding of people's changing socio-emotional needs during the Internet Era. Questions concerning individuals' spatial awareness, perceived environmental coherence, cognitive abilities and skills, productivity and efficiency, political knowledge, understandings of the world, and mental and physical health, thus, can be explored in novel ways by examining their characteristic patterns of Internet use.

3.2. Significance at the community level

Community level studies of Internet use have concentrated on the issues of social capital formation and maintenance, sense of community and belonging in *virtual communities of interest* and *place-based virtual communities* [2,7,8,10,16,18,45,48,69–77], as well as ethnographic studies of Internet use and assimilation in various cultural milieus [e.g. Refs. [6,9,11,78]] and the Digital Divide [79,80].

In some earlier research, features of the Internet that disconnect it from its socio-physical environments are dismissed [9,78,81]. It is argued that making distinctions between *reality* and *virtuality* assumes that the Internet is opposed to and separated from the real world and that the Internet needs to be conceptualized as a media "continuous with and embedded in other social spaces" [78]. Sociologists and cultural anthropologists have observed that the assumptions linking people to places need to be reconsidered as more and more of the world is culturally displaced, nomadic, and lives in a condition of placelessness through the mobility afforded by globalization and time-space compression through information technologies [66,82]. As technology and mobility enable people to be part of communities that are supralocal, transnational, or even those that are not mapped onto specific geographic locations, strict associations between place, culture, community, and identity are diluted [9,11,83]. The influence of proximal environments on human development and behavior is challenged. Place-based environments such as the home, work place, and neighborhood are contested as legitimate units of analysis as the Internet, mobile telecommunications, and ubiquitous computing become commonplace in the affluent sectors of societies [16,76,77].

Certainly not all individuals and groups consider the Internet to be central to their lives and their identities. A large portion of the world's population does not have access to these information and communication technologies. Even among affluent populations, several groups of people such as the elderly do not have the technical knowledge to use the Internet. And even among Internet users, there is variation in the degree to which virtual environments and social networks are integrated into everyday lives and place-based environments and social networks [6,7,11,12,16]. Thus, *there is a need to explain why some people's identity and conception of reality is so closely tied to way they engage with the Internet, whereas others use the Internet more opportunistically, as an instrumental tool to accomplish certain isolated goals and tasks*. Internet use, for these individuals, is more detached from their core identity concerns and socio-physical environments. *There is also a need to explain the positive and negative outcomes*

associated with these different environmental orientations at the psychological, interpersonal, and societal levels.

Four decades of environmental psychology theory and research has established that people's proximal sociophysical environments, such as homes, work places, recreational settings, and neighborhoods have substantial effects on their cognitive, emotional, social, and physiological conditions. Design characteristics of residential, work, and recreational environments have been shown to constitute an important part of individuals' self-identity [84] and foster social interaction and friendship formation [85]. People's attachment to places and the emotional distress they experience when they are dislocated is also well documented [86,87]. There is a need to explain these findings in the light of Wellman's and others observations about the inevitable weakening of people–place associations due to the advent of digital communication technologies.

3.3. Significance at the societal level

There has been considerable concern about the societal consequences of virtual forms of interpersonal communication and social interaction such as chat rooms and virtual communities, and the privatization of public life. Putnam [88], for instance, voiced concern that the effortlessness of Internet communication might encourage people to spend more time alone, interacting with strangers or forming superficial relationships at the expense of more meaningful face-to-face discussions and companionship with existing friends and family. Further, online communication by avid Internet users may result in under-developed social relationships with their online communication partners, at least in some instances [89]. Even when conversing with close friends and family, impoverished online conversations might displace higher quality, face-to-face conversations [45] as people tend to omit the social niceties that promote and maintain social relationships [90,91]. Gergen [92] contends that online conversations, as in the case of email, become obligatory and pragmatic acts instead of personal expressions. *Horizontal relationships* that emphasize the breadth of contacts are favored over *vertical relationships* that require dedicated attention, effort, time, and commitment [33,92]

Virtual realms are seen as a means for the affluent and technologically skilled to withdraw into privatized enclaves [93]. Widespread use of the Internet and other digital technologies such as cell phones and smartphones has promoted a syndrome of being "always online" among avid users. They remain tethered to multiple electronic devices in all place-based settings including public places. Robins [94] argues that this virtual empowerment encourages a sense of self containment and self sufficiency and creates a desire to avoid social contact. Electronically-mediated social life is thus atomized in the sense that people tend to seek individualized and self contained pleasures. Gergen [95], for example, argues that the expanding realm of *the absent presence* through information and communication technologies is morally corrosive and "undermines the intelligibility of the individual self as an original source of moral action" (para. 6). As the local and proximal cease to

be primary sources of meaning and social control, identities become decontextualized, and blatant violations of moral order such as identity theft, financial fraud, bullying, racism, and hate crimes are hypothesized to increase.

At the same time there are groups of individuals for whom the Internet is a positive force that greatly enhances their lives. For the ill, aged, and socially isolated communities, the Internet can be a crucial source of social and emotional support that they may not receive from their local communities. For the uprooted, such as immigrants to an unfamiliar country, the Internet affords a fundamental connection to their homeland, heritage, family, and friends. For these groups, the Internet enlarges the scope of social supports that are available beyond the local environment. Certain forms of Internet use (e.g. intranets, electronic mailing lists) that supplement local place-based contacts have been found to enhance place-based community ties [7,12,77,96]. The present typology of the environmental orientations examines the cumulative effects of people's immersion in these *floating worlds* [97] on society at large, as well as on individuals' goals, ideals, and commitments to various life domains (e.g. family, work, neighborhood, and civic) that guide their particular environmental orientation.

The conceptual framework outlined below offers an approach to studying people–environment relationships in *hybrid* and *polyfunctional* settings. Four alternative modes of environmental experience with respect to individuals' connectedness to real (R) and virtual (V) settings are presented in Table 1. In this typology, real settings refer to proximal place-based human environments, such as homes, work places, neighborhoods, and other spatially bounded settings. Virtual settings refer to cyber-based behavior settings such as social networking websites like *Facebook*, chat rooms, online gaming portals, virtual communities, blogs, and online video sharing websites such as *YouTube*.

In addition to distinguishing between these forms of environmental experience in terms of an individual's behavioral engagement in real and virtual environments, they are also differentiated with respect to the focus of one's identity and the satisfaction of his or her socio-emotional needs. Table 2 represents these modes of environmental experience in terms of *focus of identity* and *satisfaction of socio-emotional needs*. The following sections describe the determinants and some of the individual, interpersonal, and societal outcomes for each mode of environmental experience. It is proposed that individuals' patterns of Internet and technology use, their level of

commitment to local place-based and virtual settings, and the character of their objective and psychological socio-physical "life space" [98] are indicative of their mode of environmental experience. That is, the objective and subjective nature of people's socio-physical environments, such as their social networks as well as their spatial environments, including their levels of commitment to local environments as reflected in their living/working spaces, is reflective of their environmental orientation.

4. Typology of environmental orientations in the Internet age

4.1. Placeless

Individuals who have low engagement in their proximal place-based settings as well as in virtual behavior settings are termed *Placeless* in this conceptual framework. Their immediate spatial and temporal environment is not a significant source of meaning in their lives and their personal identity. Neither place-based nor virtual environments satisfy the individual's socio-emotional and interpersonal needs. For instance, immigrants to a new country may identify strongly with their home countries, but not with the immediate local environments in which they are currently residing. For this group, remote environments may be a source of socio-emotional fulfillment and meaning. Similarly, poverty stricken, homeless individuals may not feel a sense of attachment to their proximal place-based settings because of the transience of these settings. These individuals can be considered to experience *placelessness* [99].

4.2. Place-based

Place-based individuals are at the other extreme of the continuum reflecting connectedness to immediate place-based settings. They, however, are disconnected from virtual behavior settings. There are two sub-categories of *Place-based* individuals: The *Place-based Purposive* and the *Place-based Constrained*. The *Place-based Purposive* choose to remain disconnected from the Internet and other digital communication technologies either permanently or for extended periods of time, despite having the economic means and the technical skills to attain connectivity. Proximal place-based environments are the primary source of meaning and identity for this sub-category of individuals. According to a 2011 Pew Internet Survey, 22% of Americans say that they do not use the Internet (http://pewinternet.org/Trend-Data/Internet-Adoption.aspx). Although a portion of these respondents (about 34%) used the Internet previously or have an indirect relationship with the Internet through a friend or family member, they report that their interest in the Internet has waned, they have more pressing demands on their time, they find it too confusing and not useful, are unable to handle the amount of information available on the Internet, and/or they worry about crime or the safety of their children [100,101].

The *Place-based Constrained* are those individuals who have had no direct or indirect experience with the Internet. About 14.5% of the American people are *truly disconnected*

Table 1
Modes of environmental experience based on an individual's connectedness to real and virtual settings.

Connection to virtual settings	Connection to real settings	
	LOW	HIGH
LOW	*Placeless*	*Place-Based* a Purposive b Constrained
HIGH	*Cyber-Based* a Social b Solitary	*Place-Cyber Oriented* a Instrumentally-oriented b Identity-oriented

Table 2

Person's environmental orientation based on connectedness to real and virtual settings and focus of identity and satisfaction of socio-emotional needs.

	Person's connections to physical and virtual worlds	Person's orientation to his/her milieu	Focus of identity and satisfaction of socio-emotional needs	Explanation
Modes of Environmental Experience	Disconnected Real, Disconnected Virtual	*Placeless*	(R) (V)	Identity and satisfaction of needs comes neither from real nor virtual settings.
	Connected Real, Disconnected Virtual	*Place-Based* (Spatially Oriented)	R (V)	Identity and satisfaction of needs comes predominantly from real settings and these individuals are disconnected from virtual settings.
	Disconnected Real, Connected Virtual	*Cyber-Based* (Virtually Oriented)	V R	Identity and satisfaction of needs comes predominantly from virtual settings and these individuals are disconnected from real settings.
	Connected Real, Connected Virtual	*Place-Cyber Based*	RV	Identity and satisfaction of needs comes from both real and virtual settings.

[101]. There are clear demographic and social divides in Internet access with older Americans, minority groups, lower socioeconomic status individuals, unemployed persons, groups with lower levels of education, disabled populations, and rural populations more likely to be cut off from virtual environments. People with more social support, affiliative orientation, and perceived control over their environments are more likely to be connected than those who are not [100]. Although the psychological, developmental, interpersonal, and societal impacts of the placeless and place-based modes of environmental experience are not the focus of the present study (because we are interested in those forms of environmental experience that encompass some degree of virtuality), these groups do serve as a useful reference point for comparing the qualities of virtual and place-based environmental experiences in future research on this topic.

4.3. Place-cyber oriented

This group of individuals is connected to both their immediate place-based settings as well as to specific virtual behavior settings of interest. It is useful to think of the place-cyber orientation as a continuum reflecting the degree and type of integration of the Internet into one's place-based life.[3] One end of this continuum, termed *instrumentally-oriented*, reflects a relatively lower level of integration of cyber-based settings into one's place-based life and a mode of life in which the Internet is used to accomplish isolated goals or tasks, such as maintaining

relationships with remotely located friends and family, pursuing hobbies and professions, shopping, getting health information, and overseeing finances [102]. Typical uses of the Internet on any given day might include activities such as sending and receiving email, getting news, checking the weather, watching video clips or listening to audio clips, banking online, instant messaging, getting travel, medical or health information, and purchasing products.

Place-cyber oriented individuals also may participate in *social* and/or *professional* virtual communities or other *organization-sponsored* virtual communities [103] with varying levels of involvement and commitment to those settings. Blanchard [2] distinguishes among activity levels of participants in virtual behavior communities. *Lurkers* visit the virtual community (e.g. an online forum) for purely informational purposes, do not communicate with other members, and do not identify with the setting. Less active members participate occasionally but the setting is not central to their life interests (as it is for the *cyber-based* form of virtual life, described in the next section). Place-cyber oriented individuals prefer less involvement in virtual environments as compared to the cyber-centric form of involvement, in which individuals actively maintain and enforce the virtual setting's behavioral program, view the setting as an important part of their lives, and may know several members of the settings personally.

At the other end of the place-cyber orientation continuum (*identity-oriented*) are individuals for whom the Internet is central to their personal identities. The Internet is an extension of their place-based personae. They show interest in immersive virtual environments that demand a high degree of cognitive and emotional investment such as social networking sites (e.g. *Facebook*) and blogging websites (e.g. *Blogspot*). They are highly "wired", in the sense that they own and carry around several digital devices such as cell phones, smartphones, and laptops to different place-based settings that they frequent. Internet use is most often mobile and perpetual [32].

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[3] It is important to consider here that "place-cyber oriented" individuals differ in the degree to which they committed to their local place-based settings in addition to differences in their connectedness to cyber-based environments. We do not assume that all place-cyber oriented individuals are equally committed to and identify with their local place-based settings. Some individuals are more "place-based" than others even within the "place-cyber oriented" category.

For these individuals, cyber-based settings and social networks largely overlap and complement their place-based settings, social networks, and activities [7,16]. An example of this more integrated form of *place-cyber orientation* is when an individual regularly participates in a place-based virtual community [7] such as an online forum or a blog for a college class or dorm. In these instances, the virtual behavior setting (i.e., the online forum) overlaps with the place-based behavior setting (i.e., the classroom). Such *place-centered* forms of involvement in virtual behavior settings can complement the individual's place-based life. For example, avid users of social networking websites report using their social networking profile and online gaming to strengthen their ties to family and friends whom they often meet face-to-face [31].

Whereas individuals' local place-based and virtual environments complement each other in the case of the *place-cyber environmental orientation*, this orientation may serve other purposes and goals. For example, some forms of online gaming, social networking, and blogging are reported to serve as a surrogate for keeping in touch with friends and family who are geographically remote or unavailable to meet face-to-face [29–31,104,105]. Even though these forms of Internet use do not complement local place-based settings or social networks, they are still rooted in existing interpersonal relationships. Individuals are thus able to maintain their personal communities through these forms of Internet use. These forms of Internet use require considerably more cognitive and emotional investment in terms of maintaining, updating, and checking one's *Facebook* page or blog or investing time and effort in playing an online game compared to less emotionally and cognitively intensive forms of Internet use such as emailing, online banking, and online shopping.

The amount of time spent on such online endeavors varies but is a vital factor in distinguishing between levels of immersiveness in virtual environments. Many bloggers, for instance, report spending 1–2 h a week exclusively on their blogs [30]. Users of social networking websites report making frequent visits everyday to modify and enhance their own profiles as well as to view the profiles of others [31]. Some gamers, for instance, report that they play online games as a brief distraction from school work and in between classes, or while listening to music and interacting with friends [29]. Several cyber-based activities are thus performed within a single place-based setting at the same time. This group of individuals is especially adept at multi-tasking, often at the cost of violating the norms and etiquettes of the place-based setting. For example, over 30% of online gamers report that they have played games during classroom instruction [29]. These patterns of Internet use by *Place-Cyber Oriented* individuals affirm the symbolic value they attach to individuality above and beyond normative expectations about appropriate behavior in place-based settings.

4.4. Cyber-based

This category of virtual life includes individuals who prefer highly immersive virtual environments and spend substantial amounts of time in virtual settings compared to place-cyber based persons. Like the *Place-Cyber Oriented*, the *Cyber-based* may use the Internet for a variety of fragmented activities or tasks. However, the *Cyber-based* find their primary source of meaning and identity in the virtual environments they frequent. Their social networks are primarily cyber-based and often it is the case that they have not met many of their online friends and contacts in person. It is also possible that many of their real-life personal relationships, such as long lasting friendships, romantic relationships, and marriage partnerships have originated online as in the case of some "virtual world" (e.g. *Second Life*) users [9].

Intensive online gamers, for example, report that virtual environments are the "focus of their lives" [43]. Friends and colleagues may perceive them to be detached from real world settings and social roles. Psychologists often have associated this group of individuals with problematic Internet use. For example, excessive use of Massive Multiplayer Online Role Playing Games (MMORPGs) and intensive chatting with unknown persons have been associated with "addictive" Internet use in certain lines of psychological research [43,44]. It is necessary, however, to distinguish between different forms of cyber-based life and understand the psychosocial, community, and health implications of individuals' environmental orientations.

Some cyber-oriented individuals prefer *social* virtual environments such as chat rooms and online gaming. The motivations underlying this particular form of cyber-based orientation may vary. In a qualitative study of Taiwanese adolescents who spent more than 48 h on online gaming per week, Wan and Chiou [43] found that such intensive online gaming compensated for participants' unfulfilled roles in real life, such as their needs for interpersonal relationships, social belonging and recognition, achievement, power, sense of control, self confidence, and temporary distraction from reality. Intensive online gaming helped participants to cope emotionally with loneliness, boredom, anger, and frustration by providing entertainment and leisure in a challenging and exciting environment. The authors suggest that the anonymous and secure gaming environment lowers participants' self awareness and anxieties about public evaluation, thereby enhancing their poor self image and satisfying their need for self-presentation. Other studies have found that online socializing as occurs in chat rooms and other kinds of virtual settings enables anxious individuals to rehearse social behavior that better equips them to handle their face-to-face interactions with others [47,49].

In addition to serving as a coping mechanism for social anxiety, some cyber-based social forms of Internet use such as participation in *virtual communities of interest* [7] can help individuals cope with isolation brought about by illness, dysfunctional marriages, unemployment and retirement, or single parenthood by providing a sense of belonging to a dispersed community [6]. Another interpersonal benefit of the cyber-based orientation is the possibility of serendipitous encounters on the Web that can change people's lives positively including their friendships, professional collaborations, and romantic partnerships [6,9]. Online games such as *World of Warcraft*, according to Nardi and Harris [106], are an innovative space where strangers can become friends and engage in creative

playfulness. They suggest that associations with strangers in the *World of Warcraft*, unlike the real world, can be unplanned, informal, or structured collaborations. Occasional acts of altruism, such as providing informational and social-emotional support to unknown persons in need, also can be beneficial at the societal level. It is possible that socially oriented cyber-based individuals are more open to remote places and people and experience an enhanced sense of virtual community.

Another interesting group of cyber-based users about which little is known are people who hold strong political or religious views and use the Internet predominantly to seek out others who have similar views or seek information supporting their views that would not be available in their immediate socio-physical environments. These individuals may intentionally shut out other perspectives leading to further contraction of their worldviews and increasing their intolerance toward others who believe differently (e.g. religious fundamentalist groups, terrorist organizations). At the same time, some intensive bloggers who focus on particular social and political topics use the Internet to raise public awareness about certain issues, organize protests, and enact positive social change [68].

In contrast to these social forms of cyber-orientation, some individuals use the Internet mostly for *asocial or solitary* purposes. This category of virtual environment users is not interested in the social communication aspect of Internet use. Open-source software developers and hackers exemplify this group of cyber-based users in that such forms of Internet use are not motivated by the social communication aspect of the Web. In many cases these forms of Internet use are intended to provide people with alternatives to software programs developed and sold by large corporations (as in the case of open-source software development), or to attack corporations and individual users by creating and spreading computer viruses and worms for intellectual stimulation, financial benefits (as in the case of some forms of hacking), or the more malevolent goals pursued by cyber criminals.

The *Cyber-based* form of virtual life may afford societal benefits as in the case of open-source software development and certain types of blogging. This mode of virtual life also may enable some individuals to stay connected with friends and family and provide others with a more challenging and exciting environment compared to their immediate physical settings. There can be, however, several other negative consequences of the predominantly cyber-orientation. Certain forms of cyber-orientation can have harmful societal consequences including participation in criminal activities such as computer virus and worm development. It also can result in negative individual and interpersonal consequences. For instance, an exclusively cyber-orientation might further distance individuals from their place-based settings and social networks. It is possible that their disengagement from local place-based settings reduces their sense of place-based identity and community. They may have a diminished understanding of their place-based environments and experience lower sense of attachment to these places resulting in weakened place-based social ties. Lowered sense of attachment to place-based settings may reduce adherence to moral norms (e.g. undermining

individuals' commitment to social responsibility) and foster personal estrangement from immediate socio-physical settings [92,97]. As well, the cyber-based form of virtual life can become a source of environmental strain if people's cyber-based activities conflict with their place-based roles and activities–for example, when employees are involved in chat room or online gaming settings in their work place [50,107]—and also diminish levels of organizational productivity and effectiveness.

Several negative physical and mental health outcomes also may be associated with a predominantly cyber-based environmental orientation. For instance, more time spent on computer and Internet-related activities has been linked to significantly lower levels of physical activity and greater risk of obesity [108,109]. Intensive gaming and other forms of immersive Internet use also have been found to result in poorer health, reduced quality of sleep, and greater interference with real-life relationships and activities [110–112]. Excessive levels of some forms of online activity also have been found to exacerbate of depression, socio-phobia and loneliness [113,114] hyperactivity and attention deficits [115]; and to diminish individuals' social, language, cognitive skills [37,109] and psychological wellbeing [51,116,117].

The focus of the next section of this paper is on *Place-Cyber Oriented* and the *Cyber-Oriented* modes of virtual life in the typology developed. What are the defining features of each of these modes of environmental experience? Can we identify individuals who personify the *Place-Cyber Oriented* and the predominantly *Cyber-Oriented* categories of environmental experience? In Table 3 below, we summarize the major determinants of the *place-cyber* and *cyber-oriented* modes of virtual life along with their associated sub-categories. Key objective and subjective criteria for distinguishing between *Place-Cyber Oriented* individuals and *Cyber-Oriented* individuals are proposed in the following section.

5. Conceptualizing place-connection and cyber-connection

The proposed typology of the qualities of virtual life suggests that each mode of environmental experience is associated with four fundamental dimensions reflecting individuals' *degree of connectedness to virtual and/or physical environments*. One of these dimensions is the *intensity of Internet and digital technology use*, or the extent to which individuals see themselves as being dependent on the Internet and other digital communication technologies; their reported frequency of multi-tasking; and the degree to which they see themselves as absorbed or immersed in virtual environments. Other indicators of the intensity of Internet and digital technology use are the number and diversity of digital devices an individual owns and uses, and the variety of behavior settings in which s/he uses these digital devices. Additionally, the number of hours of Internet use per day, the number of hours of non-Internet but computer and digital communication-related activities, the number of hours spent on non-computer related activities, and the number of communication channels dealt with regularly are additional indicators of this dimension. It is

Table 3
Determinants of the place-cyber and cyber-oriented modes of virtual life.

Mode of virtual life	Determinants
Place-cyber (Instrumentally-oriented)	❖ Internet use is fragmented and used for isolated goals and tasks ❖ Relatively less immersive virtual environments are preferred ❖ Internet use is limited to fewer physical settings and one or two activities at a time ❖ Have a more unsentimental or detached view of virtual environments ❖ Place-based environments are the primary source of meaning and self-identity ❖ Place-based settings, social networks, and activities are largely separate from their cyber-based settings, networks, and activities ❖ Amount of time spent on Internet-related activities can vary among different social and professional groups
Place-cyber (Identity-oriented)	❖ Internet use patterns are central to self-identity and reality ❖ Interest in virtual environments that require a relatively high degree of cognitive and emotional investment ❖ Own and carry around with them a variety of digital communication devices ❖ Cyber-based settings and social networks overlap, complement, and supplement place-based settings and social networks ❖ Driven toward multi-tasking and hyper-efficiency ❖ Relatively large amounts of time invested in virtual environments
Cyber-oriented (Solitary)	❖ Prefer highly immersive virtual environments ❖ Prefer to participate in more asocial or solitary forms of online engagement such as hacking, open-source development, some forms of intensive blogging ❖ Virtual environments are the primary source of meaning and self-identity ❖ Spend large amounts of time in virtual settings ❖ Detached from real world settings and social roles ❖ Can find their physical settings boring and seek higher levels of stimulation
Cyber-oriented (Social)	❖ Prefer highly immersive virtual environments ❖ Prefer to participate in more social forms of online engagement such as chat rooms, certain forms of online gaming, and Second Life ❖ Virtual environments and social networks are the primary source of meaning and self-identity ❖ Spend large amounts of time in virtual behavior settings ❖ Detached from real world settings and social roles ❖ Can find their physical settings boring and seek higher levels of stimulation

assumed that predominantly *cyber-oriented* individuals manifest a higher intensity of Internet and digital technology use as compared to *place-cyber oriented* individuals. That is, cyber-oriented people are expected to report a higher degree of dependence on the Internet and a higher level of self-absorption in virtual environments. They are also likely to report spending more time on the Internet and less time on non-Internet and non-computer related activities as compared to place-cyber oriented individuals. It is plausible, however, that both cyber-based and place-cyber based individuals own and carry around several digital devices and use them in a variety of place-based behavior settings. Other dimensions are therefore required to further differentiate the place-cyber and cyber-based orientations.

A second major indicator of a person's place and/or cyber connectedness is his or her *degree of commitment to place-based and/or cyber-based behavior settings*. Cyber-oriented individuals presumably participate in more virtual communities than place-cyber oriented individuals. They are likely to report a higher degree of commitment to virtual communities as compared to place-cyber oriented individuals in terms of the types of roles they perform in those settings, their feelings of responsibility toward virtual communities, their degree of emotional attachment to virtual behavior settings as compared to local place-based settings, and the extent to which they identify with their virtual behavior settings vis-a-vis local place-based environments. Place-cyber oriented individuals are likely to participate in more place-based communities or place-based virtual communities as compared to cyber-oriented individuals. Place-cyber oriented individuals are also likely to report a higher degree of commitment to their place-based communities (e.g. school, organization, neighborhood) as compared to cyber-oriented individuals in terms of the types of roles performed in those settings, the degree of responsibility felt toward place-based communities, the level of emotional attachment to their local place-based behavior settings as compared to their virtual behavior settings, and the degree to which they identify with place-based behavior settings as compared to virtual environments. Another indicator of individuals' commitment to virtual settings is the number and nature of their screen names and avatars. It is plausible that cyber-oriented individuals have screen names and avatars that are disassociated from their place-based environments and identities (e.g. "Voldemort99"). Place-cyber oriented individuals, on the other hand, are more likely to have screen names and avatars that are associated with their place-based environments or identities (e.g. their own name or ones like "LAgirl2000").

The third indicator of people's connectedness and/or disconnectedness from place-based and virtual settings is their *type of Internet use*. It is likely that cyber-oriented individuals have Internet practices that require more cognitive and emotional investment. Such emotionally and cognitively intensive Internet uses include maintaining

a blog or a video blog related to one's personal experiences and emotions, participation in virtual worlds such as *Second Life* or *CyberCity*, and active participation in virtual communities such as online gaming communities like *World of Warcraft* or *Lineage*. Place-cyber oriented individuals tend to engage in less emotionally and cognitively intensive Internet uses such downloading music, searching for driving directions to places, online banking, text messaging, and status updates on social networking sites. Such uses could, however, be demanding in terms of number of cyber-based communication sources one has to deal with each day (e.g. owing to a large number of emails, attachments, text messages, cell phone calls).

The fourth dimension of individuals' connectedness or disconnectedness to virtual and physical environments is the *nature of their social networks*. It is plausible that predominantly cyber-oriented individuals have more virtually-based friends. That is, it is more likely that cyber-oriented individuals have not met a large portion of their virtually-based friends face-to-face. It is also possible that cyber-oriented individuals have many friendships that have originated online and many of their friends are remotely located. Place-cyber oriented individuals, on the other hand, are likely to have more place-based friends. As noted earlier, it is more likely that place-cyber oriented individuals meet a large portion of their virtually-based friends face-to-face and that many of their online friends are proximally located. Moreover, place-cyber oriented persons are likely to have fewer friendships that originated online as compared to cyber-oriented individuals. Table 4 below summarizes important objective and subjective criteria for assessing the degree of connectedness to virtual and place-based environments in relation to the four major conceptual dimensions described above.

6. Discussion

The major goal of this paper is to present new theoretical ideas and open new avenues of research on people–environment relationships, particularly as new forms of P–E transaction continue to evolve within the polyfunctional and often virtual environments of the early Twenty-First Century. The proposed conceptual framework and constructs are aimed at better understanding the interpersonal, health, and societal implications of the Internet and digital communication technologies for people's day-to-day transactions with their socio-physical environments. Four alternative environmental orientations reflecting individuals' connectedness to and identification with their local, place-based, and virtual environments were identified in the typology of person-environment orientations shown in Tables 1 and 2: *Place-less*, *Place-based*, *Place-Cyber based*, and *Cyber-based*.

The defining features of the *Place-Cyber based* and *Cyber-based* modes of environmental experience were elaborated. The theoretical constructs of *Cyber-Connection* and *Place-Connection* were developed as a basis for locating individuals within these categories of environmental experience. Further, objective and subjective measures to assess the degree of place-connection and cyber-connection were developed.

The theoretical framework, typology, and constructs developed here have the potential to spur new lines of research regarding the complementarities and strains associated with life in the polyfunctional and hybrid environments of the Twenty-First Century. For instance: How and why do people's environmental orientations change over time? What situational, dispositional, and personal life circumstances prompt individuals to shift from one mode of virtual life to another? How can the proposed typology of environmental orientations inform our understanding of the emergence of new human needs and environmental demands? For instance, people's needs for perpetual contact and coordination, efficiency and flexibility in professional and personal life, and their ability to multi-task has fundamentally altered the ways in which they interact when meeting face-to-face, how they define friendship and romance, and their capacity for quiet contemplation, self-reflection, and creativity. All these are potential concomitants of one's predominant mode of virtual life [28,33,68].

Clearly, the major purposes of our theoretical analysis are to offer novel ways of conceptualizing people's relationships with their everyday environments and to prompt new lines of empirical research—rather than to present empirical tests of the assumptions underlying the proposed typology of individuals' environmental orientations. For instance, it is hoped that the proposed conceptualization will spur future investigation of the benefits and strains, as well as the mental and physical health sequelae, of life in the polyfunctional and hybrid environments of the Twenty-First century. Also, it is important that future studies empirically assess the extent to which the four major dimensions of individuals' environmental orientations, specified in the proposed typology, prove to be reliable and valid predictors of their connectedness to place-based and cyber settings, and the psychological and health consequences alternative modes of virtual life.

The present typology of environmental orientations explores the emergence of new environmental preferences and attitudes and the non-traditional uses and meanings of place-based settings. Assuming distinct modes of virtual life exist, there is a need for a customized approach to the planning and design of physical settings, public as well as private. Urban design and urban planning must encompass broader notions of place and proximity. Electronically-mediated interconnections are confronting urban designers and planners with new opportunities and constraints. Novel uses of urban public space as well as private spaces provide urban designers, architects, and planners with opportunities to reconfigure these spaces and places to accommodate new functions and needs. However, an individual's interaction with a virtual setting might conflict with the norms and activities of the host setting. As social conventions continue to evolve around these emerging spaces and functions, urban designers and planners should be mindful of the potential conflicts that such new uses may provoke. Design of public places should be guided by the goal of optimizing rather than compromising the fit between virtual and real settings so that people can participate in both kinds of settings effectively and simultaneously [118].

Table 4
Objective and subjective measures to assess the degree of connectedness to virtual and physical environments.

	Objective measures	Subjective measures
Degree of cyber-connection	*Intensity of Internet use (as compared to place connected)*	*Intensity of Internet use (as compared to place connected)*
	● More digital devices owned ● More technologically sophisticated devices ● More place-based settings in which these are used ● Carry around more digital devices (cell phone, smartphone, laptop, digital camera, PDA) ● Intensity of Internet use	● Higher self-reported dependence on digital devices ● Higher self-reported amount of multi-tasking ● Higher self-reported degree of self-absorption
	● More hours/day on Internet-related uses ● More hours/day on non-Internet-related but computer based activities ● Fewer hours/day on non-computer related activities ● Amount of 'flow' and 'storage' of information	*Indicators of commitment to virtual settings (as compared to place connected)* ● Higher self-reported degree of attachment to virtual settings and commitment to roles in those settings ● Have favorite virtual settings ● Higher self-reported degree of identification with particular virtual settings ● Higher self-reported satisfaction of socio-emotional needs from virtual settings ● Screen names and avatars are place-disconnected (e.g. Voldemort2000) or are cyber-based (e.g. Netwiz, or Netizen)
	● More sources of communication/day (larger number of emails, attachments, IMs, text messages, electronic mailing lists, online news, YouTube, comments on blog, virtual community) ● Larger amount of information stored (more disk space used, more downloads per day) ● More time spent managing 'flows' and 'storage' of information	*Virtual social networks (as compared to place connected)* ● Higher self-reported satisfaction/social support from virtually-based life domains ● Higher self-reported satisfaction from virtually-based relationships
	Type of Internet use (as compared to place connected) ● More immersive features used (e.g. gaming, blogging, virtual support groups, virtual worlds, social networking) ● More intensive use of each feature (more number of hours per day)	
	Indicators of commitment to virtual settings (as compared to place connected) ● More main virtual settings in life ● More memberships in virtual organizations ● More active roles played (e.g. leadership roles) in these settings ● More virtual organizations or virtual social settings frequented ● More screen names ● More avatars ● More decoration and personalization of virtual settings (e.g. pictures and links in personal web pages, Facebook page etc.)	
	Virtual social networks (as compared to place connected) ● More virtual or geographically remote friends ● More geographically remote friends on buddy list ● More friendships generated online	

Table 4 (*continued*)

	Objective measures	Subjective measures
Degree of place-connection	*Intensity of Internet use (as compared to cyber connected)* ● Fewer digital devices owned ● Less sophisticated devices owned ● Electronic device use limited to one or two place-based settings ● Carry around fewer digital devices ● Intensity of Internet use ● Fewer hours/day on Internet-related activities ● Fewer hours/day devoted to non-Internet-related activities ● Fewer hours/day devoted to non-computer related activities ● Amount of 'flow' and 'storage' of information ● Fewer sources of communication/day ● Smaller amount of information stored ● Lesser amount of time spent managing 'flows' and 'storage' of information *Type of Internet use (as compared to cyber connected)* ● Less immersive features used (e.g. emailing, online banking, some forms of online shopping) ● Less intensive use of each feature (fewer number of hours per day) *Indicators of commitment to place-based settings (as compared to cyber connected)* ● More main place-based settings in life ● More memberships in place-based organizations ● More active roles in these place-based organizations ● More place-based organizations or social settings frequented ● More place-based activities (e.g. outdoor sports, volunteering activities) ● More place-based interior and exterior behavioral residues or physical traces (e.g. indicators of use of outdoor environments such as skiing or surfing, indicators of use indoor environments such as socializing with friends in their room) ● Higher degree of personalization of place-based settings *Place-based social networks* ● More local place-based life domains ● More local place-based friends ● More friends who are both virtual and place-based on buddy list ● Fewer friendships generated online	*Intensity of Internet use (as compared to cyber connected)* ● Lower self-reported dependence on digital devices ● Lower self-reported amount of multi-tasking ● Lower self-reported degree of self-absorption *Indicators of commitment to place-based settings (as compared to cyber connected)* ● Higher self-reported degree of involvement in place-based organizations or settings ● Have favorite place-based settings ● Higher self-reported degree of place identification ● Screen names and avatars are place-referent (e.g. Bombayboy79) *Place-based social networks(as compared to cyber connected)* ● Higher self-reported satisfaction /social support from place-based life domains ● Higher self-reported satisfaction from place-based relationships

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