DYNAMICS IN INTERACTIONS WITH DIGITAL TECHNOLOGY: A DEPTH PSYCHOLOGICAL/THEORETICAL EXPLORATION OF THE EVOLUTIONARY-BIOLOGICAL, SYMBOLIC, AND EMOTIONAL PSYCHE IN THE DIGITAL AGE

A dissertation submitted

by

ARY ZIV

to

PACIFICA GRADUATE INSTITUTE

In partial fulfillment of
the requirements for the
degree of

DOCTOR OF PHILOSOPHY

in

CLINICAL PSYCHOLOGY

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MARCH 17, 2014

Abstract

Dynamics in Interactions with Digital Technology:
A Depth Psychological/Theoretical Exploration of the Evolutionary-Biological, Symbolic, and Emotional Psyche in the Digital Age

by

Ary Ziv

The intention of this exploratory research is to shed light on the psychological impact of interactions with digital technology, which is increasingly pervasive in our culture. This dissertation asks what psychological phenomena are generated by human interactions with digital technology, in general, and with complex recommendation systems, in particular. Nondigital technology is contrasted with digital technology, which achieves new levels of interactivity through its artificial and virtual capabilities. It is proposed that the degree of increased interactivity made possible by digital technology crosses a threshold impacting the psyche in new ways.

A theoretical framework for understanding human-digital technology interactions is introduced and developed. The psyche is conceptualized as evolutionarily and biologically based, functioning symbolically and emotionally both consciously and unconsciously. Ramifications of this conceptualization are explored in the context of interactions with digital/algorithmic technology, using recommendation systems as illustrations.

The theoretical investigation concludes that psyche-digital technology interactions are new phenomena. Psychic processes—by nature evolutionarily and biologically symbolic and largely unconscious—interact with nonbiological digital/algorithmic technology. Because of the incongruence of value systems between biological phenomena and digital/algorithmic logic, unconscious psychic processes resulting from interactions between *the biological feeling psyche*

and nonbiological digital technology are likely to significantly impact both psychic development of individuals, in the short term, and quite possibly the human species at large, in the long term.

The method of exploratory research is interpretive and theoretically oriented, while employing a depth psychological lens. Contemporary depth psychology is described as an integrative field that is receptive to insights from all other fields; it considers unconscious phenomena as vital to human psychological makeup. This study brings together depth psychological and neurobiological theory; and is grounded in the work of depth psychologist Erich Neumann, who describes biological-evolutionary-symbolic unconscious and conscious dynamics of the psyche.

As background, social psychology's discoveries of unconscious social behaviors triggered by interacting with new media are highlighted as fundamental in interactions with computing technology. From a depth psychological point of view, conscious and unconscious relationships to and with technology are explored historically as precursors to interactions with digital technology.

Keywords: human-computer interactions, depth psychology, big data, recommendation systems, digital technology, emotions, affect, feeling, neurobiology, Carl Jung, Erich Neumann

Acknowledgments

I would like to thank all who have helped, inspired, and supported me in my efforts. Specifically, thank you to:

Paul Gabrinetti, PhD, the chair of my committee, who enabled me to forge a path of exploration that followed my curiosity and desire to learn more about interactions between psyche and digital technology.

Lisa Sloan, PhD, my internal reader, who gave me the perfect quantity and quality of feedback, thoughts, and encouragement.

Robin Robertson, PhD, my external reader, whose generosity in sharing his thoughts and ideas, along with his expertise in technology, mathematics, and depth psychology served as both vital inspiration and grounding in my developing and articulating my ideas.

Robert Romanyshyn, PhD, whose unique and innovative ideas about the psyche, technology, and depth psychological research have enriched my thinking and approach.

Dan Hocoy, PhD, whose open-minded support and guidance helped me in getting started developing these ideas.

Francine Matas and Diane Huerta, who were both incredibly helpful in navigating through bureaucratic/administrative processes and challenges.

Jeanine Roose, PhD, who, as mentor and supervisor, helped me deepen my understanding of relatedness between people and within the context of treatment; and, therefore, further helped me appreciate emotionality that may arise from interactive technology.

My friends and academic colleagues with whom I have logged many discussion hours about psyche and technology and approaches to research, in particular: Fariba Mansouri, PhD, Brenda Beardsley, MFT, Nicholas Betty, PhD, and Melissa Gondek, PhD.

My colleagues from my clinical internship, Kristen Kirchner, PhD, Biljana Bujko, PhD, Patricia Taylor, PhD(c), and John Valenzuela, PhD(c), who were so very supportive and, through dedication to relatedness with and care for their patients, helped me become more aware of the emerging impact of relationships with technology in the clinical setting.

My mentor and dear friend, Marion Badrian, who introduced me to depth psychology in the first place, helped me form many of my ideas and perspectives related to the psyche, and never ceases to be a source of inspiration, wisdom, and depth.

My family for their loving support and engaged interest in the topic: my parents who have appreciated this work and process almost as much as me; and my brother, Ido, who has provided me with gems of support throughout the long process, a refreshing voice with encouraging thoughts during the long journey.

My friends Sarah Adler and Andrew Todd, who were not only kind enough to drop me off at graduate school, but also nice enough to be there after a "very long day."

All my friends (too many to mention individually here) who have heard much from me about the psyche and technology for years now and were always willing to hear more and contribute to the discussion. Thank you, all.

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The style used throughout this dissertation is in accordance with the *Publication Manual of the American Psychological Association* (6th Edition, 2009), and *Pacifica Graduate Institute's Dissertation Handbook* (2013-2014).

Chapter 1
Introduction

Interactive Digital Technology and Topic of Research

Colossal changes.

We are currently living within a storm of a digital revolution, and only history will tell its full impact on the human species as a whole and individuals in particular. Digital information technologies have already begun to transform both our physical and psychological realities. Indeed, we may be just at the very beginning of significantly breaking "old physical world" rules, while altering the workings of our psychologies and the meaning of relationships. At the same time, these colossal changes may represent only tips of the icebergs of digital innovations' future impact on everyday lives and experiences. Already these are revolutionizing, restructuring, and re-standardizing our lives. Examples include instantaneous paperless bureaucracy, libraries, and tools that allow us to do almost any type of activity in digital form, anywhere, anytime; digital communication systems like email, text, and sophisticated social networking technology that, moment by moment, continue to change how we connect and relate to each other; increasingly personalized and customized Internet search and recommendation systems providing new lenses through which we see the world and ourselves; artificial intelligence and "big data" technology that both visibly and invisibly interact with our behaviors, emotions, and thoughts; multitudes of types of companion robots and personal "smart" phones and devices that track, measure, and communicate; and, infinite "virtual" worlds into which we can enter, functioning like psychic transporters and transformers.

The development of language, estimated to have occurred 50,000 years ago, may have been the most important advance in technology of all (Aitchison, 1996;

Markowitsch & Welzer, 2010) and possibly linked with neural anatomical changes and functionality (Lieberman, 2000). Since then technological advancement, scientific discoveries, and expansions of knowledge have shaped human evolution and civilization. Religious phenomena, too—from codified religions to cultural currents and frameworks—have served as historical agents of structure and change for societies and individuals. These have interplayed with technological advancements in dynamic and complex ways—sometimes synergistically and cooperatively; at other times, through conflict and competition (Harrison, 1998; Levere, 2001; Sambursky, 1974; von Franz, 1992b).

Predigital technology.

Predigital technology transformed the landscape of reality along with human experience and consciousness as humans continued to evolve side by side with scientific discovery and advancement, while new technologies served as vehicles through which humans, in turn, engaged with their existing world and themselves in significantly new and different ways (Berger, 1974; Besser, 1988; Romanyshyn, 1989; Van den Berg, 1971). These developments radically transformed the human world, changing relationships between people and their physical environments, and helping shape culture, society, and psychology. A subset of such trans-mutational technologies includes: technologies of motion that transformed physical travel and enabled geographical and cultural exploration (Casson, 1994; Urry, 2004); the 15th-century printing press that revolutionized the sharing of thought between people and time (Eisenstein, 1979; McLuhan, 2011); the Copernican revolution that changed our macrocosmic perspective; the discovery of the microscopic world (Gest, 2004); discovery and invention of

electricity that only relatively recently has allowed us a new and highly complex relationship with night, darkness, and energy (Jones, 1991; Simon, 2004; Stross, 2007); and theories and discoveries of relativity, quantum, and atomic energy (Mehra & Rechenberg, 2001; Van den Berg, 1971). Hence, in the Western world, the development of technology unfolded hand-in-hand with the extraordinary developments of knowledge, culture, religion, and philosophy to form our civilization and ourselves within it.

Digital technology.

This research revolves around exploring the premise that the current digital revolution *differs qualitatively* from previous nondigital technological transformations of reality. As the following exploration suggests, this is so precisely and specifically due to the crossing of a threshold of interactivity manifested by today's digital technology. Although it can be argued that some predigital innovations functioned interactively, these seem to pale in comparison to the interactivity between user and digital technology (Rafaeli & Ariel, 2007; Turkle, 2004, 2005, 2011). As will be explored in subsequent chapters, digital interactive technology triggers unconscious social and relational patterns of perception and behavior (Nass & Moon, 2000). Hints of the ramifications of engaging with interactive digital technology can be seen in the torrent of diverse, sometimes contradictory yet often mammoth psychic-cultural-social consequences already considered, observed, and studied. These include addiction to the Internet and digital interactivity, newly included as an appendix in the *Diagnostic and Statistical Manual of Mental Disorders 5th Edition (DSM-V)* (American Psychiatric Association, 2013; D. D. Greenfield & Greenfield, 1999; Widyanto & Griffiths, 2011; Young & Abreu, 2011); altered brain states while engaging with interactive and informational interfaces (Small,

Moody, Siddarth, & Bookheimer, 2009); attention-distracting effects (Jackson, 2008); changes in empathic capabilities (Turkle, 2011); effects on social structure and dynamics related to emotional states (Hampton & Wellman, 2003), psychological traits (Ryan & Xenos, 2011), and motivation (Ross, Orr, Sisic, Arseneault, Simmering, & Orr, 2009); a shift in how we think, process information, and understand narrative content (Carr, 2010); and changes to core economic structures in which new and altered value of data ownership are far from understood (Lanier, 2013).

Note on the use of the words "digital" and "algorithmic" throughout the dissertation.

The words *digital* and *algorithmic* convey two different concepts; however, here, they are meant as combined. *Algorithmic* relates to mathematical computations, whereas *digital* refers to the computerized electronic medium of algorithmic activity and expression.

Note on "digital" and "algorithmic" combined

As will be theorized in this dissertation, the combination of digital and algorithmic enables computerized *interactivity* that crosses the threshold of becoming deeply, psychically impactful. Therefore, in many places, *digital/algorithmic* is used when not too cumbersome. In other places, where the word *algorithmic* is used, it is intended to refer to algorithms made interactive through digitalization.

Dissertation's area of exploration.

This dissertation attempts to attain insights on psychological, relational, and feeling-oriented experiences of interacting with digital technology. Specifically, human experiences with digital recommendation systems will be investigated through a depth

psychological perspective supported by neuro-emotional theory. Recommendation systems are designed to function by providing users with suggestions to consider and then take some kind of action, at least ostensibly intended to help positively increase users' lives in one way or another (Knijnenburg, Willemsen, Gantner, Soncu, & Newell, 2012; Swearingen & Sinha, 2001). Although from different eras and varying scientific background, both Jung (1921/1976) and Damasio (2010) definitively place the function of feeling as the psychic-biological process of determining value. Therefore, from this perspective, decision making in the service of bettering one's life in some way essentially involves the process of evaluation through feeling. Hence, feeling-oriented processes can be understood as determining and forecasting value of something or some action, guided by constructs of good and bad, increasing or decreasing human-oriented positivity in specific ways (Damasio, 2010; C. G. Jung, 1921/1976; von Franz & Hillman, 1998). Therefore, in considering the realm of digital recommendation systems and human interactions and interfaces, it can be understood as taking place where algorithmic values and human feelings meet. From a psychic-techno perspective, they interact, relate, and form "relationships." This dissertation attempts to investigate these phenomena more deeply. However, before such an exploration begins, the nature of digital technology as it relates to the psyche will be considered in the rest of this chapter and in the next.

Information Technology as Medium of Consciousness

Unseen extensions of ourselves.

Theorizing in the 1960s during the still early days of electronic media, Marshall McLuhan (2001) views all technology as "extensions" (p. 7) of ourselves. McLuhan conceptualizes a dynamic structure and relationship between previous media/technology

and a new medium/technology that becomes prominent. He sees new technologies replacing older technologies with new paradigms that change human experience itself. He differentiates between a given medium's perceived value and the invisible quality of the medium, which actually shapes both the human potential and limitations created through engagement with it. Thus, paradoxically, McLuhan puts forth that as influential and life-changing any new medium is on our experience, its direct effects may initially be the least visible to us. McLuhan, therefore, warns that it is vital for us to make concerted efforts to become conscious of and comprehend the effects of media and technology through which we engage the world. In powerfully psychic-poetic and prophetic language, he explains that "any medium has the power of imposing its own assumption on the unwary" (p. 16) inducing a "subliminal state of Narcissus trance . . . [a] spell [that] can occur immediately upon contact as in the first bars of a melody" (p. 15).

Based on his observation of electronic media dominated by television, long before today's digital age, McLuhan predicts the development of newer media as an extension of ourselves in "the form of information, moving toward the technological extension of consciousness" (2001, p. 57). He points out that, compared to earlier innovations, the quality and effects of this informational technology is massive and overarching, as every aspect of the individual and the world can be captured, shaped, and viewed through its properties. Decades before the tsunami of the digital information revolution, McLuhan understood even then that "we are now in a position . . . to transfer the entire show to the memory of a computer" (p. 59) and that "under electric technology the entire business of man becomes learning and knowing" (p. 58). McLuhan explains that, since information is the material of consciousness as well as the form of our dominant technology/medium,

we are more vulnerable than ever to becoming incapable of discerning between our own perspectives and that of our technology. McLuhan seems to speak of our losing ourselves in our own electronic, informational technology. McLuhan's predigital warnings of the commencement of an era, in which information technology ubiquitously colors our human experience, quite probably without our awareness, foreshadows our current challenges of living submerged within the digital medium.

Digitalization of information.

Information can be seen as a fundamental structure of physics (Gleick, 2011; Zurek, 1989) and is the raw material of the nervous system as precursor to experienced meaning (Peterfreund & Franceschini, 1973), consciousness, and human functioning on every psychic-social-biological level (Koch, 2009; Solomon & Siegel, 2003). However, the dominant technological medium of our era today is that of a combination of information *and* digitalization. The digitization of information—that is, utilizing binary markers in the form of computers and their algorithms, programs, and data—is a transformation of information itself (Goldman, 2009). Computerized, binary-based technology's immense and seemingly never-ending accelerating capacity to represent aspects of the physical world and create virtual new realities transforms information (Kline, 2011; McCarthy, 1965). Through the new properties of information in its digital form, objects are becoming interactive on a level previously unknown before (Turkle, Taggart, Kidd, & Dasté, 2006; Wing, 2008).

Robertson (2009) points out that the capability of computers has, for the first time, allowed for mathematical formulas and processes to include continuous informational feedback into systems. This achievement has created computerized models

that capture previously undiscovered nonlinear patterns within nature. Robertson describes that, as opposed to simple cause and effect pairing, nonlinear, highly complex, and unpredictable patterns are increasingly understood as foundations of physical world phenomena and neurobiological-psychological dynamics and function. With computerized complex processing, we can now model and simulate physical phenomena, in order to study it in new ways.

Therefore, digital information technology is a medium through which we extend our bodies, abilities, and culture. It is also, itself, action/interaction-oriented to an extent that people are psychically and biologically impacted by it through deeply complex dynamics.

Interactive Digital Information's Psychological Impact

Thinking machines.

This new and constantly evolving interaction between humans and digital information technology may indeed represent never before experienced psychological dynamics. Alan Turing (1950), among the undisputed fathers of the concept of the modern computer, proposed a criterion for answering if and when "'Can machines think?'" (p. 433). This early and, at the time, futuristic evaluation, later referred to as the "Turing Test," can be seen as a definitive landmark in the history of computer innovation and interactivity (Pinar Saygin, Cicekli, & Akman, 2000). The theoretical criterion is met when computer behavior in an interaction with a person is experienced by the person in such a way that he or she concludes that this interaction is not necessarily between him or her and a computer, but possibly with another human. In other words, a threshold is crossed when the machine can be perceived as behaving like a human being. Not only

does the more than half a century old Turing Test establish a significant aspect of computer interaction with humans as an imitation of human-to-human encounter, but since its inception, has been arguably one of the major goals of computer innovation and a push for artificial intelligence (Sloman, 2004; Whitby, 1996).

New interactions.

In her 1984 ground-breaking ethnographic and phenomenological study on the psychology of early computer usage, Sherry Turkle (2005) reveals the computer as an "evocative object" (p. 20) and as both a "constructive as well as projective medium" (p. 21). She states that "computational objects, poised between the world of the animate and inanimate, are experienced as both part of the self and of the external world" (p. 5). Twenty years later, with the insight of a psychologist who had witnessed and studied the evolution of human-computer interactions, Turkle (2011) sees and worries about the changes in our ability for psychological relatedness between others and ourselves as a consequence of emotionally interacting with digital programs. Substituting the experience of human-to-human emotional relationships with those between humans and computerized, socially aware technology calls into question the essence of what it means to be human and calls for more study on the ramifications of this new phenomenon and types of relationships. Turkle unveils the possibility of human-computer relationships impacting and altering the very foundations of our psychologies, including critically limiting our capacity for empathy.

Through our use of information technology, new types of psychological experiences and relationships have emerged: those objectively between a person and an inanimate object/logic/data; and, at the same time, subjectively, neurobiologically, and

emotionally *as though* between two social beings (Nass, Steuer, & Tauber, 1994). Such psychological relationships between us and our "unalive" but interactive and psychologically impactful technology, indeed, may be changing the boundaries of our human experiences and definitions of relationships. The impact of these new relationships between us and technology may be so significant as to alter basic neurobiological functioning that provides structure and definition to our psyches. For instance, neurobiologist Vittorio Gallese questions how mirror-neurons—theorized to be responsible for perceiving movements and sensing emotions and feelings of others—may ontogenetically develop and function differently as a result of individuals increasingly interacting with technology rather than just with people (Metzinger, 2009). In other words, our neurobiology, which has evolved for millions of years as a person-to-person perceptive and communicative system, suddenly becomes socially interactive with unalive objects. Thus, our psychic-social-biological processes that serve to provide us with a sense of empathy and community may be, for the first time in history, receiving direct and actionable input from unalive partners. Can this disturb our delicate person-to-person relational orientation? Are we beginning to engage in relationships that unknowingly but significantly diverge from human-to-human dynamics? May we, therefore, be on the verge of altering our human-to-human feeling-based perceptions and communication? Here Turkle's and Gallese's concerns converge: by receiving and providing empathy to and from emotionally attuned technology, we may be losing psychological skills and neurobiological faculties that enable us to cope with the much more difficult and emotionally complex, if not conflicting, dynamics of empathy between people.

David Levy (2007) suggests the likelihood of future human experience of emotional love toward digitally based objects:

> Because of the high level of use we make of them and the interactive nature of that use, computers have the potential to hold a special meaning for us, to strengthen the attachment we feel for them. Combine these with the potential to extend ourselves by virtue of our possessions and it is not difficult to imagine that the computer—controlled, interactive, used, and possessed—could create in us the level of attachment necessary to engender a kind of love. (p. 30)

The mere possibility that emotions as powerful, pervasive, and mysterious as love may play a central part in our engagement with interactive digital information technology suggests, at the very least, that such experiences are psychologically and neurobiologically not fully under our purposeful control nor always within our awareness.

Research and development and commercial applications.

Much psychological research related to the impact of technology has been influenced by interest in how we interact with *media technologies as though they are people* (Nass et al., 1994; Reeves & Nass, 1998) as well as studies looking into "the phenomena of presence" related to how people experience themselves within digitally virtual worlds (Bulu, 2012; Lee & Nass, 2003; Mennecke, Triplett, Hassall, Conde, & Heer, 2011). In addition, engineering and product design researchers are looking at how we engage with digital technology through various affective and emotional responses (Bickmore & Picard, 2004; Lopatovska & Arapakis, 2011; Peter & Beale, 2008; Zimmerman, 2009). Today, scientists, entrepreneurs, as well as established companies, are actively pursuing innovations and implementations of socially interactive and psychologically impactful technology that spans the gambit of functionality, design,

usage, and purpose. Several specific examples include robotic interactive baby dolls and various robotic pets that emotionally soothe and keep the elderly company through "robot-assisted therapy (RAT)" (Cañamero & Aylett, 2008, p. 180); emotionally attuned (Terzis, Moridis, & Economides, 2013) and reactive mechanical/computerized faces engaged in dialogue (Park, Song, Koo, Kim, & Kwon, 2010); robotic combat assistants (Garreau, 2007); computerized automated sex dolls (Levy, 2007); SmartHomes that assist in a multitude of life's logistics through measurement, feedback, recommendations, and action on behalf of residents (Cook, Youngblood, E.O., Gopalratnam, Rao, Litvin, & Khawaja, 2003); devices, data, and algorithms that measure and report fine details and associated patterns of an individual's everyday activities and habits, part of the Quantified Self movement (Wiederhold, 2012); and, prolific, if not yet ubiquitous, search engines, recommendation systems, games, marketing programs, and personalized websites that may know more about our psychological profiles than we do ourselves (Eirinaki & Vazirgiannis, 2003; Pariser, 2011).

It is clear that human-robotic/digital cooperation has become mainstream. We interact with robotic technology on day-to-day, perhaps minute-by-minute bases. Turkle (2011) sums up her understanding of today's state of human-technology relationships, based on many psychological and ethnographical studies which she herself has conducted or has further explored. She sees "our time as the 'robotic moment'" (p. 9) explaining that

> it refers to our state of emotional—and I would say philosophical—readiness. I find people willing to seriously consider robots not only as pets but as potential friends, confidants, and even romantic partners. We don't seem to care what these artificial intelligences "know" or "understand" of the human moments we might "share" with them. *At the robotic moment, the performance of connection seems connection enough.*

> *We are poised to attach to the inanimate without prejudice.* The phrase "technological promiscuity" comes to mind. (p. 9) (italics added)

That such a strange state of affairs about human emotionality is evidenced by so much empirical research emphasizes the new human-digital reality that may be difficult to comprehend, while standing against what we intuitively know as emotional and feeling-based relationships. Indeed, ubiquitous emotionally relevant human-digital technology interactions can be seen in our everyday use of Internet/software functionality and hardware such as computers, handheld devices, and robotic products.

Furthermore, although out of sight, powerful and sophisticated "behind the scenes" data and logic processing are often intricately linked to the "face" of each digitally based entity. These include machine learning, database analytics, and predictive logic (Chen, Chiang, & Storey, 2012). We may, in the foreseeable future, experience nearly everything, everywhere, in some kind of inter-"personal" interactive dynamic with digital technology. In fact, one approach to integrating technology into the lives of people revolves around what has been termed ambient or ubiquitous computing in which the goal is to "weave themselves [i.e. computer technologies] into the fabric of everyday life until they are indistinguishable from it" (Weiser, 1991, p. 94). Such technology is invisible enough that it is seamlessly interactive and responsive, although it does not register itself as active to the user (Payne & Macdonald, 2004). For example, thermostat technology for living spaces that "knows" the individual human's nuanced and changing preferences and adjusts dynamically; achieving comfort for the human without the human having to think of it nor having to be aware of its existence (Gao & Kamin, 2009, November 3). Closely related is the philosophy and technological endeavors around the idea of "The Internet of Things" (Ashton, 2009) in which practically every meaningful

object in the physical world will have a connected online digital representation and some kind of digital/data-oriented interactive functionality (Gershenfelo, Krikorian, & Cohen, 2004). Already our engagement, consciously or otherwise, with digital information technology represents an ever-expanding portion of our daily lives. In this way, psyche-digital technology integration has already become a predominant fabric of our culture; and, in McLuhan fashion, largely invisibly so.

Interactive Technology as a New Unconscious Experience

New types of relationships.

It has now been over 60 years of staggering advancement of computer capability since Turing's provocative theoretical criteria for the possibility for *human-to-humanlike* interactions between humans and machines. In society today, our interactions with digital technology of all types are nearly everywhere. And, as mentioned above, at every moment of contact, consciously or unconsciously, through both subjective experience and objective behavior and consequences, we are in interactive relationships with algorithmic logic and machines. It is the premise, concern of, and inspiration for this study that when engaged with interactive digital technology, we experience new types of relationships, relatedness, and selves, previously unknown to humankind. More specifically, such a new type of "interpersonal" interactions—that is, "inter-digital/algorithmic/machine-personal") —may require us to redefine psychological concepts of self, other, and conscious-unconscious dynamics. As suggested above, the new psychic-digital human experiences may be so radically different from previous nondigital ones that they may shake the foundational bedrock of psychological theories. Moreover, it may be that through techno-psychic-cultural-neurobiological changes, the psyche itself becomes

something new. Indeed, this may turn out to be new unchartered territory, like looking at ourselves evolving in real time, studying and theorizing about the psyche as it changes and morphs, its foundations reformatting, re-*programming*, before our eyes. Turkle (2004) identifies and begins to tackle these issues. She challenges depth and psychodynamic psychologies to find new constructs for human-computer interactive phenomena; and stresses that such endeavors will result in expansions, corrections, improvement of existing psychological theories and understanding at large.

Depth psychological perspectives.

Attachment theory (Bowlby, 1983; Levy, 2007), child development models (Piaget, 2007; Turkle, 2011), psychoanalytic concepts (Scalzone & Tamburrini, 2012; Suler, 1998), cognitive and social psychology (Reeves & Nass, 1998), emotions and affect (Bickmore & Picard, 2004), and neurobiology (Small et al., 2009), along with other fields and subfields, have been applied to these new types of human-to-interactive technology relationships. Yet we are still in the very early stages of understanding the ramifications for psychology. This is particularly so for depth psychology, as it is often inappropriately relegated to the sidelines in today's empirical, evidence-based psychological emphasis (McWilliams, 2011; Shedler, 2010). Quite the contrary, this exploratory research attempts to contribute in showing that depth psychology has much to offer in shedding insight on human-digital technology interactions.

Indeed, early and foundational depth psychological thinking was quite interested in the phenomena of psyche and its relationships to social-technological advancements. Freud's (1930/2005) "Civilization and Its Discontent," for example, can be seen as consideration of civilization itself as a type of technology that integrates with and alters

psychic structures and dynamics. Also, in his 1919 essay, Freud (1919/2001) expounds on "'uncanny'" (p. 219) experiences, elucidating and expanding on Jentsch's (1906) understanding of experiences with mechanical dolls. Well into the digital age, the construct of "uncanny" (Mori, 1970, p. 34) experiences in human-to-nonhuman dynamics, has been theorized further and applied in robotics and artificial human design (Scalzone & Tamburrini, 2012). Another example is Jung's (1967/1970a; 1944/1980b) and Von Franz's (1980a, 1992b) work on psychological phenomena of prescientific alchemy, which can be seen as an emerging technology of those times. They, and subsequent others (Robertson, 2009), see in Alchemy a model of deep psychological engagement taking place between subjective and objective experiences and between conscious and unconscious relationships. These are viewed as manifestations of the dynamic interdependence between psychological experiences and physical phenomena; with associated currents of religious/spiritual influences, scientific discovery, and psychological transformation (von Franz, 1992b). In this way, a psychic-cultural-religious-scientific example can be seen in Alchemy as a precursor to science and as a parallel to today's interactions and relationships with technology.

Expanding depth psychological theories.

As mentioned above, Turkle (2004) points to the need of depth psychology both to contribute more to the understanding of human-computer interactions and to become more open to revising theory and notions accordingly. Such an endeavor in the field may turn out to be earth shattering. Among other insightful depth psychological perspectives, Turkle references the utility of Kohutian selfobjects as a theoretical psychoanalytical construct potentially helpful in exploring relationships with our digital

"evocative objects" (p. 18). Indeed, in the contexts of Turkle's (2011) notion of "'robotic moment'" (p. 9) referred to above, what would become of a Kohutian selfobject if attained, instead of from a relationship with another human, from a relationship with "smart" interactive technology that is robotic or merely interactive enough to be experienced as alive or as another self that is "alive enough" (Turkle, 2011, p. 35)? What strange other phenomena can be discovered and further understood by depth psychology looking directly at relationships with interacting digital entities? What theoretical frameworks can be challenged by further human-digital psychological integration? For instance, how would Object Relations view infants' perception of good/bad objects through demands of and attacks on, say, an interactive software-based caregiver? How would Bionian projective identification be understood vis-à-vis interactive digital technology? How could various degrees of programmed attunement change the two-entity/psyche dynamic? How could algorithmically constructed "beta element" (Bion, 1984, p. 26) receptors and transformers and subsequent "alpha element" (Bion, 1984, p. 22) generators be seen through this theoretical lens? How would attachment theory's primary caregiver relationships be characterized if between infant and attuned machine? How would "transitional objects" (Winnicott, 2005, p. 1) that are digitally/robotically interactively customized still retain a "good enough" (p. 13) quality in order to promote "transitional phenomena" (p. 5) of "play" (p. 7), the experiential space between subjective and objective realities. What would reality testing (A. Freud, 1936/2011) become if reality included the virtual, that is, alternate, digitally constructed realities? How will "Eros" (S. Freud, 1930/2005, p. 114) and the "death instinct" (p. 114) interplay in a digital world that is as resistant-free as light and timeless as information? From a

Jungian perspective, how would the psyche function through projection and "introjection" (C. G. Jung, 1954/1980a, p. 25) of unconscious content into and from matter that concretely behaves as alive. And, perhaps the most clearly strange and seemingly contradicting phenomena, within the theory of intersubjectivity, how would experiences in relationships with digital technology function if intertwining the subjective of the human with the illusion of another subjectivity in technology?

None of these questions, contemplations, and concerns are farfetched. Quite the contrary, all of them require our utmost attention, consideration, and regard. The human-digital interaction is *interactive*, per se, and therefore dynamically psychological. It is only limited by rules of information (Gleick, 2011), the development of software logic, and invention of hardware capabilities (Goldin, Smolka, & Wegner, 2006). Indeed, we have entered and "self-created" a new psychic reality where all rules of interrelatedness have been broken and are reforming. On both collective and individual levels, these require *new* understanding, possibly repair, and hopefully further psychic growth.

Technology's Own Unconscious-Like Phenomena

Unpredictable artifacts.

So far, the significance of digital technology's interactive quality has been introduced as an open door to a new era of human technological capability and psychological phenomena. As touched upon above, the inclusion of digital information technology into our cultures and psychologies creates a vast new realm of content, conscious experiences, *and* unconscious phenomenon. But here, again, the strangeness of this psychological world must be emphasized: we are interacting with artifacts, human-made objects that are formed by their logical design; yet, also have the potential

to be unpredictable in their behavior and interactivity (Woolley & Stanley, 2011). Before the digital age, literary imagination envisioned social-psychological-technological complexity. Such is the case with the Czech playwright Karel Čapek (2010), who uses the word *robot* for the first time (Markel, 2011) in his 1921-premeried play *R.U.R. (Rossum's Universal Robots)*. Here manufactured human-like entities "want" more and dangerously become other than what they had been designed to be. Similarly, Mary Shelley's (1999) "Frankenstein; or, The Modern Prometheus" and, still earlier, the Jewish legend of the Golem (Scholem & Alter, 1995) also forecast strange confrontations between the human psyche and the animated non-life that it created. In these literary explorations, technology comes to a type of life expressed in contradictions of identity and affiliation, conflict, and polarity. *It is as though the technologies themselves have an unconscious aspect to them.* In this way, "smart" interactive technology may have aspects that, in effect, can be characterized as "unconscious"-like behavior that becomes enacted: logical, but at the same time unpredictable; possibly out of scope of its functionality design; and acting/interacting in unforeseen ways.

Computer learning, algorithm response strategies, and consequent interactions function within highly complex environments and are significantly variable and unpredictable (Bovet & Crescenzi, 1994; Leeuwen & Wiedermann, 2001; Wing, 2008). Search engines, for example—currently one of the most important gateways of interaction between people and information—function based on algorithms so complex that no one person knows the full scope of their logic nor the potential outcome of their processes (Pariser, 2011). Furthermore, artificial intelligence, interactive algorithms, and interfaces vary significantly from one another with possible corresponding differences in

functionality, interactivity (Russell & Norvig, 2010), and context-specificity (Dreyfus, 1972). Therefore, it is plausible that as we interact with one artificial intelligence strategy, but explicitly or implicitly expect behavior of another, we may experience actions of our technologies as psychologically "out of place," *as though* unconsciously motivated.

Shadow and unknown elements.

Bugs, unpredictable input, and unexpected logical pathways in programs can influence digital/algorithm actions and learning which can manifest in unanticipated computer behavior and output (Arora & Barak, 2009). This may be thought of as something akin to unconscious phenomena on the part of technology itself. Indeed, Norman Minsky, an early leader in artificial intelligence, expresses such a phenomenon when describing a program that functions erroneously, undetected for a time, as "a sort of demon inside the machine" (Bernstein, 1982, p. 96; Turkle, 2005, p. 229). Analogously, Jung (1953/1972) describes an unconscious part of each person that is lurking and secretively active: "It is a frightening thought that man also has a shadow side to him, consisting not just of little weaknesses and foibles, but of a positively demonic dynamism. The individual seldom knows anything of this" (p. 30). Minsky's description of an unknown active and contrary aspect of a computer program seems to share qualities of what Jung points to as unconscious aspects of the psyche.

Relevant to digital technology's unconscious-like phenomena is Robertson's (2009) consideration of computers' ability to function, through continuous informational feedback, in ways that begin to incorporate complex, nonlinear, unpredictable patterns and dynamics found in nature. He makes the compelling comparison between

computerized feedback-oriented mathematical processes and conscious-unconscious dynamics of the psyche. According to Robertson, neither function through simple cause and effect logic nor are they ever fully predicable. In his book, *Indra's Net: Alchemy and Chaos Theory as Models of Transformation,* he analyzes the similarities between concepts in alchemical literature and history, conscious-unconscious psychological processes, and discoveries of cybernetics and chaos theory beginning in the second half of the 20th century. Based on his deeply insightful comparisons, a conclusion can be extrapolated that both complex computing processes and those of the mind display very similar nonlinear dynamic and unpredictable patterns through time. These include functioning and evolving through polarity (bifurcation), a possibility of systemic transformation influenced by small untraceable factors, and a fundamental structure made of parts (fractals) that resemble the whole.

From another perceptive, Arnold Smith (2008), a career artificial intelligence scientist, emphasizes that the unconscious as a phenomenon presents a core problematic issue for the entire AI endeavor, stating that "we don't know enough about consciousness (and unconsciousness!) to know how to give it to an artifact that we have created" (p. 70).

Furthermore, through machine learning approaches, digital algorithms may have their own developing frameworks of rules and evolving logic and knowledge (Fogel, 2006). It is also possible that through complexity, some machine learning may be the result of unpredicted and unknown cause and effect dynamics. Hence, complex computer models and systems include unknowable algorithmic unfolding that can lead to unpredictable logic and behavior but are not errors (Robertson, 2009). They are outside of the realm of human consciousness and, therefore, resemble Jung's (1952/1981i)

description of synchronistic phenomena which correspond to nonlinear physical and psychological dynamics described by Robertson (2009). From these deep insights about nature, the psyche, and complex systems, although we cannot deliberately manufacture a computer unconscious, it can be concluded that, along with explicit logic and behavior, unconscious-like phenomenon can become intertwined and manifest within digital interactive logic and behavior.

From these observations, the field of depth psychology has the potential to contribute significantly to further understanding conscious/conscious-like and unconscious/unconscious-like dynamics originating from *both* the human and technology sides of interactions. Indeed, several depth psychological thinkers have engaged in work about the implications of our psyche's relationship with technology and some regarding digital technology specifically. For example, Geigerich (2007) writes about the Internet's content as symbolically without meaning from the view point of the soul. Also, Robert Romanyshyn (1989) explores his notion of "technology as symptom and dream," the title of his book. Through his deeply attuned and insightful understanding about how our psyche has been intertwined with technology, he describes a vector of human consciousness that has been technology-driven and characterized by an impulse to distance ourselves from embodied phenomena. Robin Robertson (2009) shows that computers, through their capabilities of measurable feedback have enabled viewing patterns in nature that include unconscious dynamics, parallel to the spiritually transformative processes expressed by adepts of alchemy and further explored scientifically and psychologically. Glen Slater (2006), too, expounds on the depths and potential ramifications of psyche-computer technology integration.

Strange new selves/others.

During the time period of early use, adoption, and advancement of personal computers in the late 1970s and early ’80s, Turkle (2005) psychologically and ethnographically investigates how we experience these unalive but newly animated technology. She describes a phenomenon as “The Second Self” (Turkle, 2005), the title of her book, in which she explores the quality of perceptions of computerized technology as well as how these change our own perceptions of ourselves. More than twenty years later, Turkle (2011) entitles her book about the evolving relationship with technology “Alone Together,” provoking us into conceptualizing a paradox in the quality of our relationships with personally interactive technology versus other people. She conveys worrisome human experiences of feeling more “together” (p. 1) and connected with entities made of socially interactive technology; and, at the same time, being more “alone” (p. 1) becoming less related to other people. Therefore, the strangeness of these other-selves may be conceptualized as types of “pseudo selves” acting as “pseudo others.” And, as has been hinted above, these entities are becoming increasingly ubiquitous, interacting with us in virtually everything we do. We are evolving with them as they become interwoven into our conscious experiences and unconscious psychological-biological-cognitive-behavioral processes.

Focus of Dissertation and Relevance to Clinical Psychology

This dissertation attempts to explore aspects of this strange “otherness” of digital technology in which humans consciously and unconsciously engage emotionally and socially, through relational feeling. Using depth psychologically oriented interpretive research, described in Chapter 3, one of the goals of this study is to investigate the

relationally and psychically strange "techno-digital-pseudo-self-other" quality of digital interactive technology.

Clinical relevance.

The impact of digital technology on clinical psychology cannot be overstated. As mentioned above, we are already seeing psychological, often pathological (Widyanto & Griffiths, 2011), consequences of our digitalized world and behavior. Qualities of addiction to Internet use is a clear indication of the psychic-biological potency of digital media. Digital technology directly contributes to life-coping issues patients may be experiencing, for example, as stress reducing facilitators, productivity tools, as well as stressors themselves (Amichai-Hamburger & Barak, 2009; O'Driscoll, Biron, & Cooper, 2009; Rodman & Fry, 2009). However, the focus of this study is learning more about aspects of the psychological "nature" and impact of interactive digital technology. This must be better understood by clinical psychologists, in order to contextualize clinical issues within patients' digitally immersed lives.

The social-psychological-neurobiological point of view of the complexity of people and their psychologically clinical issues and illness is rising in prominence (Solomon & Siegel, 2003). Through scientifically studied theoretical models such as attachment and interpersonal neurobiology, relatedness and interpersonal relationships are seen as making-up *the* landscape upon which all psychic-neurobiological processes take place (Ainsworth, 1989; Field, 1985; D. J. Siegel, 2003). Therefore, relationships and relatedness seem to be at the epicenter of all therapeutic psychology. As pointed to above, human-digital technology interactions represent strange new psychological relationships and dynamics that may be emerging and affecting our psychological well-

being (Amichai-Hamburger, 2009). As has been alluded to, interactivity with digital technology may very well be altering relationships and relatedness society-wide, significantly impacting every individual.

Clinical psychology *must* become deeply and intimately knowledgeable about these new relationships between human and digital/algorithmic interactive entities. Specifically, these newly emerging and significant psychological relationships with technology must be taken into account when therapeutically working with patients. Digital technology will increasingly be utilized to explicitly engage in emotional and even therapeutic interactions, some already put into play (Barak, Hen, Boniel-Nissim, & Shapira, 2008; Hartman, 2011; Levy, 2007; Libin & Libin, 2002; Lingiardi, 2008; Newman, Szkodny, Llera, & Przeworski, 2011). In such a world, therapists must begin to appreciate and understand that their own interactions and relationships with their patients will be affected by this new technology and the relationships their patients experience with them. Furthermore, these new relationships may directly change how people will access psychotherapeutic care and how therapeutic relationships form overall (Gillispie, 2011; Hartman, 2011; Newman et al., 2011).

A techno-cultural hint from the 1960s comes in the form of a computer program called ELIZA, developed by MIT Professor Joseph Weizenbaum (1967) to be "capable of conversing in natural language" (p. 474). Through language manipulation scripts, key words, and contextual computation, the program was able to interact with users through real language conversations using text. Weizenbaum developed multiple versions of this program, of which one was called DOCTOR and programmed "to respond roughly as would certain psychotherapists (Rogerians)" (p. 475). This was done through an

algorithmic framework based on "the psychiatric interview" (p. 475). Remarkably, although the program itself lacked any direct emotionally based logic, short interactions between people and the program were often experienced personally and emotionally, owing to "the success with which the program maintains the *illusion* of understanding" (p. 478) (emphasis added). Hence, in the context of our digital age, the future seems wide open to new ways patients will expect therapeutic interactions and relationships, whether from human or machine.

Therefore, it is the subjective, emotionally experienced, consciously *and* unconsciously processed, relational dynamics between us and these interactive technologies that is so significantly clinically relevant. As Turkle (2004) suggests, it is imperative that psychological theories better understand the new reality of these psychologically interactive "evocative objects" (p. 20). Therefore, without increased sensitivity of and expansive insight into the intra- and interrelational qualities of interactions with digital technology, clinical psychology will lose ability to harness its most valuable resource, that of relationships. Indeed, the properties of relationship as we know them are transforming in the "new psychological-digital world" that is increasingly composed of part human, part digital informational logic.

Next chapters of dissertation.

Indeed, the effort of better understanding how the nature of relationships may be newly altered by digital technology may play a significant part in staying clinically and therapeutically relevant. This is especially so as these strange entities, made of digital technology, become increasingly, directly and, by design, interactive with human feelings. As mentioned above, such is the case with recommendation systems, the focus

of this study. Through exploring psychic-algorithmic interactions and dynamics and illustrating psychologically relevant aspects of interactions with digital recommendation systems, this study attempts to contribute in scratching the surface of this glacial but rapidly moving transformation in human psychology. Hopefully it will serve as additional insight to psychology regarding the current and still very nascent phases of the digitally intertwined human being. The next chapter attempts to: outline findings from social psychology about the nature of interactions with new media/digital technology; describe some ways depth psychology has addressed psyche-technology experiences; suggest contributory relevance of depth psychology in further exploring relationships with technology; and, propose a synergistic potential between depth and social psychologies in pursuit of further understanding human-digital relationships. The third chapter describes and outlines the philosophical approach behind this research exploring the strangeness of psychic-algorithmic dynamics and feeling-based interactions with recommendation systems. These are looked at theoretically, in order to achieve the overall goal of contributing to psychological insight about our human-digital era. Chapter 4 explores the psyche through a depth psychological perspective with neurobiological theoretical support to develop a theoretical lens through which to view psychic-algorithmic interactions and dynamics. Chapter 5 further explores psyche-algorithmic dynamics, employing depth psychological principles related to emotions, feelings, symbolic meaning, and conscious ideas. This is done using examples associated with digital algorithmic technologies, which can be psychologically understood as recommendation systems.

Chapter 2
Literature Review

Introduction

This chapter is to serve as additional background for the investigation of psychological aspects of interacting with recommendation systems. The purpose of this chapter is to situate this experience within the larger context of human-to-computer interactions and employ theoretical constructs primarily from two fields of psychological understanding: social psychology and depth psychology. Interactions with recommendation systems will only be touched upon specifically in the closing of this chapter; however, recommendation systems will serve as illustration of developed concepts in the final chapter before the closing remarks. In the current chapter, interactions with digital media will be looked at from a social psychology perspective through social rules, mostly unconsciously activated, as though interactive technology were, themselves, "social actors" (Nass et al., 1994, p. 75). Within the depth psychological framework, constructs and theories will be introduced and suggested as relevant to understanding interpersonal and archetypal phenomena involved in interactions with digital technology.

A View into Human-Technology Interactions

Human computer interactions and experiences.

Today, use of computer technologies has become ever more sophisticated, advanced, and pervasively interlinked with human activity. According to Brad Myers (1998), research and innovation related to human computer interactions began in the early 1960s, when computer interfaces were first implemented graphically. The early

days of developing computers, and especially artificial intelligence in the 1960s and 70s, included the then newly developing field of cognitive psychology as paradigms for understanding the functionality of computers and their programs (Bernstein, 1982; Turkle, 2005). At the time, the psychoanalysis and the artificial intelligence communities viewed each other "with suspicion, if not contempt" (Turkle, 2004, p. 17). Beginning in the 1970s and 80s, interaction between individuals and computers began to play a significant role in society at large, at the level of the individual, first by "hackers" (Turkle, 2005, p. 23), who were early personal computer hobbyists. Sherry Turkle (2005) researched the interactive and experiential quality of using these new inventions and revealed psychological and ethnographical aspects as central to the phenomena.

In describing the inception of Human-Computer Interaction (HCI) as a field, John Carroll (2009) indicates that with the advent of personal computers, initial direct usage, other than early computer engineering, began in the 1980s and was conceptualized through cognitive science theories "incorporate[ing] cognitive psychology, artificial intelligence, linguistics, cognitive anthropology, and the philosophy of mind" (para 2.1). According to Carroll, the field of HCI today has evolved from this "reciprocal relation between cognitive science and cognitive engineering" (para 2.3) to "ambitiously incorporat[ing] a diverse science foundation, notably Activity Theory, distributed cognition, and ethnomethodology, and a culturally embedded conception of human activity, including the activities of design and technology development" (para 2.3); organized round "a mutual relation between science and practice that is unprecedented" (para 2.3). HCI is a complex interdisciplinary field that has tended to be driven by technology design and engineering. In recent years, however, some trends are shifting

towards more user-centric and user experience-focused attention (Zimmerman, 2009) as well as emotionally aware perspectives (Signoretti, Feitosa, Campos, Canuto, Xavier-Junior, & Fialho, 2011).

Social psychological constructs.

As interaction between humans and computers became more mainstream, social psychological constructs served as a major paradigm for studying the use of computers (Bailenson, 2002; Krämer, Bente, Eschenburg, & Troitzsch, 2009; Nass & Moon, 2000). Study and innovation continues in stride on both sides of the human-digital technology interaction, including Internet technology use, new media experiences, relationships with robots, digital agents, and avatars (von der Putten, Kramer, Gratch, & Kang, 2010). Today, as the digital revolution continues to advance at lightning pace, the study of human emotion and neurobiological phenomena is increasingly incorporated (Lopatovska & Arapakis, 2011). Thus, in exploring human-technology interactions, social psychology makes significant contributions, often intersecting with cognitive science and psychic-biological fields focused on emotions and neuroscience.

Depth psychology.

Depth psychology has had minimal, if not contentious, impact in early understanding of computing and human-to-computer experience (Turkle, 2004). Today, too, it is far from influential in experimental studies currently dominating the field. However, as we become increasingly immersed in our utilization of and identification with digitally based technology, insights and theories from depth psychology are important, if not critical (Turkle, 2004). Observing a need that will become increasingly

pressing, Turkle argues that "novel and evocative computational objects demand a depth psychology of our relationships with them. The computer culture needs psychoanalytic understandings to adequately confront our evolving relationships with a new world of objects" (p. 17).

As mentioned in the previous chapter, Turkle makes the case that psychoanalytic thinking has the potential to contribute to our understanding of emotionally laden and relatedness-oriented human-digital experiences. She sees today's interactive technology as "*extensions of self*"(p. 18) as well as "relational artifacts" (p. 19), "computational objects [that] are increasingly *intimate machines*" (p. 18). At the same time, she challenges psychoanalytically oriented thought to further incorporate these new human-technology experiences into improved theory and better understanding of contemporary human psychology. Pockets of depth psychologically oriented initiatives, indeed, seem to be more open to expanding their traditional territory and to be more scientifically inclusive and integrative with other disciplines. Examples include Interpersonal Neurobiology (D. J. Siegel, 2003) and the Hermeneutic Alchemical approach to research (Romanyshyn, 2007), among others (Lewis, Amini, & Lannon, 2007; Robertson, 2009).

On the technology side, interactive technology has reached levels of sophistication and advancement that has interwoven digital interactivity into our psyches in complex, conscious and unconscious ways, in both grand and subtle fashions (Gros, 2008; Slater, 2006). Depth psychological consideration of human-computer interactions are beginning to be explored, albeit, for the most part, outside of both computing and psychological academic research arenas (Giegerich, 2007; Gros, 2008; Slater, 2006). Interestingly, in commercial product design, depth psychological terminology is being

employed for developing user interfaces, including the Jungian terms of persona and archetypes (Goodwin, 2005). Hence, an underlining argument of this current chapter is that social psychological constructs can be enhanced by depth psychology concepts in investigating the nature of human-computer interactions.

Overview of following sections of chapter.

The following section of this chapter looks at the development of theoretical concepts pointing to human-computer interactions as social phenomena, seen through social psychology-oriented approaches. The next section looks specifically at aspects related to the field of persuasive computing technology, stemming from social psychology. The third section suggests how social psychology ideas may translate into depth psychological concepts related to human-digital interactions. The fourth section points to several concepts from depth psychology and suggests how these can enrich the investigation of human-computer interaction and relationships. The final section introduces the importance of recommendation systems as illustrative of psychically oriented emotion and feeling-based human algorithmic interactions.

Social Psychological Discovery of New Media Properties

Inherently social and often unconscious phenomena.

Researchers such as Krämer, Bente, Eschenburg, and Troitzsch (2009) and Nass and Yen (2010) explicitly point out the dual purpose of studying human-computer interactions: social psychology research provides insights about usage and impact of new media technology; and, inversely, behavior with and impact by new media helps further develop social psychology theories. In their watershed article, Nass, Steuer, and Tauber

(1994) define interactions with computers as social in nature. Conducting five experiments and recognizing the significance of their conclusions, the authors state that understanding these interactions as *social* can promote "numerous and unprecedented hypotheses, unexpected implications for design, new approaches to usability testing, and direct methods for verification" (p. 72). They conclude that a user interacting with computers is engaged in an interaction that is an expression of a fundamental social modality of behavior and experience. They stress that the social quality of the interaction need not be a consequence of "conscious beliefs that computers are human or human-like . . . nor [that there is] psychological or social dysfunctions . . . nor a belief that subjects are interacting with [the] programmer" (p. 72). *In other words, social interaction occurs implicitly.* However, a debate ensued and continues today on whether human-computer interaction is fundamentally social or just appears as social (Krämer et al., 2009). Nass, Steuer, and Tauber (1994) maintain that the interaction from the human perspective is social in an "automatic and unconscious" (p. 77) way. Kiesler and Sproull (1997), however, contend that this phenomenon is behavior that only appears social and the human actor does not actually conceptualize the computer agent as human or human-like.

Parise, Kiesler, Sproull, and Waters (1996) uncover social-oriented responses for users interacting with computer social agents. They conclude that humans were able to cooperate with computer human-like agents in tasks that require social interaction, but only if the human exhibited "respect" (p. 406) for the agent as opposed to finding it "lovable" (p. 406) or being impacted by its "charm" (p. 406). The authors attributed part of the success of distinguishing between these characteristics of computerized social

agents to the technological advancement that allowed for achieving high degree of human-likeness of the agent.

Based on empirical social psychological experimentation, Nass and Moon (2000) further developed the concept of human-computer interaction as *inherently social* and named this type of interaction "*ethopoeia*" (p. 94), indicating the immediate and "direct response " (p. 94) to a human, while knowing that it is not a human. They suggest computer users "mindlessly apply" (p. 81) a social framework to their interaction with computers, even as they do not consider their technological interactive partner anthropomorphically. This was demonstrated experimentally by computer users who "overuse[ed] human social categories" (p. 82) such as gender and ethnic attributes to conceptualize their computers; "overlearned social behaviors" (p. 82) like interacting with their computers politely; and, engaged in "overly simplistic" (p. 83) interactions based on social rules and notions of human relationships. In addition, they found that interactions with programs which displayed traits such as dominance and submissiveness followed "'similarity-attraction'" (p. 92) patterns as would be seen between people, given the user's personality trait configuration.

Rickenberg and Reeves (2000) conclude that the interactive experience with animated digital collaborative agents can be influenced by the human actor's internal or external control orientations, consistent with reactions in similar situations between people, "in real life" (p. 49). They show that users felt increased anxiety when the agent exhibited a monitoring function while the user performed online work, compared to agents which did not directly respond to user's actions. When the users experienced the agent as monitoring, user's performance accuracy decreased as well as user's likeability

of the website they were working on. Consistent with control orientation, anxiety was higher for more external users. Therefore, arousal, in this case as anxiety, is shown to be a direct part of the human-agent interaction, while at the same time, traits of the users show that these play out in the interaction similar to those in relationships between people.

In 2000, Dehn and Van Mulken (2000) review existing studies related to agents which were animated and, although the effects were anecdotally expected to be significant and positively correlated, the authors suggest that, empirically, overall aspects of user attitude were not strongly impacted, and aspects of behavior and outcome tended not to be impacted at all. In particular, they review studies relating to attitudes and perception of users toward interactive agents, including believability; likeability/social evaluation; activity/agency; engagement/entertainment value; degree of comfort; smoothness of interaction; utility; and user attention. The authors recommend that further research improve on problematic methodology of existing studies and narrow the scope of investigation to contexts, characteristics, and functions of animated agents as opposed to looking at their impact globally. Since 2000, many studies have been conducted related to the social aspects of interactions between humans and computers and digital agents and avatars in various forms, looking at many traits, perceptions, and attitudes of the humans involved and characteristics of programmed technologies (Krämer et al., 2009). At the core of many of these studies were users' experiences of social presence of the technology-based other (Lee & Nass, 2004).

Ten years after Nass and Moon (2000) developed their concept of Ethopoeia, describing the social nature of human-computer interactions as "mindless" (p. 81) social

behavior determined by social cues, this concept remains valid as a foundational explanation of the phenomenon. Von der Putten, Kramer, Gratch, and Kang (2010) conducted experiments that refuted an alternative theory, the Threshold Model of Social Influence, which explains that social aspects of any interaction can occur only as a result of a human-to-human interaction and, consequently, between human and digital technology due solely to a belief that the digital agent is a representation of an actual live person. They show that, as predicted by the concept of Ethopoeia, humans acted socially and perceived social presence in the digital agent when the *situation* between them and the agent was social and not just when they believed a human was behind the agents' actions. Additionally, their experiments pointed to a "revised ethopoeia concept" (p. 1646), suggesting that on top of social cues of the interactive situation, human-like characteristics of the agent can further influence social behavior and experience.

Persuasive technology as social actors.

Differentiating persuasion from coercion and deception, Fogg (2003) suggests that interactive technology has tremendous potential for persuasion in the service of helping people in many specific areas in their lives. Applying well-studied and developed constructs of persuasion between people from social psychology, he demonstrates parallel phenomena in person-computing technology interactions. According to Fogg, persuasion is enabled by perceived credibility, which is composed of (1) "trustworthiness" (p. 123)—the sense that someone or an interactive technology is acting in some degree on behalf of one's interest—and (2) "expertise" (p. 124)—the sense that someone or an interactive thing has ability that matches its explicit or implicit role in the interaction. These can easily be seen as applicable to relationships between

people. As correlate to human-to-human relations, persuasive technology can be seen as acting like a person, a friend perhaps, who is perceived as trustworthy; but is only persuasive if he or she is also perceived as having the knowledge and capabilities to actually impart helpful information or act beneficially. Hence, to be persuasive, a person or interactive media must be credible, that is, both trustworthy and perceived as expert. In particular, Fogg delineates the following areas of functionality for which the perceived credibility of computers is critical: "instructing or advising" (p. 126); "reporting measurements" (p. 127); "providing information and analysis" (p. 128); "reporting on work performed" (p. 128); "reporting on [the computer's] own state" (p. 129); and "running simulations" (p. 130).

Fogg (2003) suggests that digital technology can interact persuasively "as tools, media, and as social actors" (p. 23). He breaks down persuasive credibility of computing technology into four basic levels differing in strengths and effectiveness. These are "presumed credibility" (p. 132), which results from people's frequent inclination to assume credibility due to the impressive nature of the perceived technological advancement; "surface credibility" (p. 132), established by "forming an initial judgment about credibility based on first impressions" (p. 132); "reputed credibility" (p. 135), created by information from other sources; and "earned credibility" (p. 136), which is formed over time through direct interactive experience. Fogg suggests that earned credibility is "the most powerful form of credibility" (p. 136) and "strengthens" (p. 136) or "declines" (p. 136) based on experience.

Although Fogg (2003) describes the powerful people-to-computing technology interactions and persuasive dynamics as parallels to phenomena between people, he

emphasizes some critically important differences. He points to the fact that computers are not emotional and do not *really* follow the rules of interpersonal engagement. This distinction seems paramount to the human-digital technology interaction phenomena and relates to the "strange" and "pseudo selves" described in the previous chapter. Hence, an emotional, psychological experience of an interactive dyad is formed: experienced by the human as social, but is, instead, a type of "social-digital hybrid" dynamic. Such an interaction is made up of all the complexities of person-to-person interactions and relationships; and, additionally, includes other dynamics completely new to the human species, possibly still very much outside the realm of awareness and consciousness.

Depth Psychological Bridge into Human-Computer Social Interactivity

The above social psychology studies related to psychological human-computer interactions suggest that they are inherently psychic-social in nature. As mentioned above, by enhancing the social situation through social cues and computers' human-like characteristics, the interaction as social can be made more prominent (von der Putten et al., 2010). However, as identified by Reeves and Nass (1998), the social qualities of human-digital interactions are *unconsciously* involved and actuated even *without anthropomorphizing*. Human-computer interactions follow the same basic framework as between humans, with the added, not insignificant twist of a human-like interaction with only one psychic-biological human and his or her technology-based interaction partner. From a depth psychological point of view, such research and discovery about the social dynamics of human-computer interactions occurring largely unconsciously invites a bridge into a social psychological perspective from psychodynamic and relational theories.

As a backdrop to the inherently social nature of human-computer interactions, Reeves and Nass (1998) state that

> during nearly all the 200,000 years in which *Homo sapiens* have existed, anything that acted socially really was a person, and anything that appeared to move toward us was in fact doing just that. Because these were absolute truths through virtually all of human evolution, the social and physical world encouraged automatic responses that were, and still are, the basis for negotiating life. Acceptance of what only *seems* to be real, even though at times inappropriate, is automatic. (p. 12)

These findings of the social and physical world may be understood further from depth psychological/archetypal standpoints. Jung (1948/1981b), describing archetypes in an essay in which he, according to the book's editors, first uses the term "archetypes" to refer to his previously theorized concepts of "primordial images," states that

> we also find in the unconscious qualities that are not individually acquired but are inherited, e.g. instincts as impulses to carry out actions from necessity, without conscious motivation. In this "deeper" stratum we also find . . . the *archetypes* of perception and apprehension, which are the necessary *a priori* determinants of all psychic processes. Just as his instincts compel man to a specifically human mode of existence, so the archetypes force his ways of perception and apprehension into specifically human patterns. (p. 133)

Jung's description of archetypes as unconscious and instinctually expressive, alongside social psychology's unconscious "social rules" (Nass et al., 1994, p. 77), seems to be describing the same phenomena from a different theoretical viewpoint. Hence, these "unconscious" (p. 77) "social rules" (p. 77) that frame and define psychological behavior with interactive media can be seen as archetypal (that is, unconscious patterning particular to the human species).

Strengthening the argument for a complementary relationship between social and depth psychologies, both can point to evolutionary foundations related to unconscious phenomena. Stevens (2003) suggests that archetypes are imprints representing

evolutionary instincts of the human species. He points out that instinctual attributes of early attachment between mother or caregiver and child are archetypal bonds. Stevens (2003) suggests that in light of Bowlby's (1983) attachment theory, Jung's archetypes can be understood as constellated unconscious patterns of relational meaning and experience expressed biologically, ethologically, and anthropologically. This insight further suggests that both social and Jungian psychologies are honing in on the same underlining social/relational phenomena.

Jungian archetypes are often conceived as symbolic images (Jacobi, 1959), which can be consciously accessed through various methods such as dream recollection (C. G. Jung, 1948/1981a; 1948/1981d) and amplification (von Franz, 1998) as well as active imagination (C.G. Jung & Chodorow, 1997). Therefore, a Jungian viewpoint of archetypally expressed social instincts has a unique investigatory contribution to human-computer interactions in that associated unconscious phenomena can be described symbolically through images. Such psyche-produced and psychologically relevant images, symbolic meaning, and associated interpretive exploration can significantly expand the scope and depth of understanding socially patterned and enacted human-computer experiences.

Therefore, looked at complementarily, potential can be seen in cross-pollinating both social and depth psychological perspectives for mutually gainful insights while deepening understanding of human-digital technology interaction and relationships. Specifically, social psychology's research on human-computer interactions could gain from depth psychology access to the rich knowledge of descriptive archetypal, symbolic, and relational concepts that have been developed through approximately a century of

intense direct interpersonal experiences, clinical observation, and continual theoretical reworking. Depth psychology, in turn, would partner with a discipline that can test its concepts quantitatively, and, in so doing, further guide its development in improving theory and therapeutic practice. In addition, especially as both depth and social psychological theories so frequently situate themselves in evolutionary and instinctive frameworks, contribution from the natural sciences, in particular neuroscience, may prove highly valuable.

As we learn more about human-digital interactions, we can collect and analyze enormous amounts of data, particularly through data capture capabilities of computerized functionality and situations. Such information can be exceedingly useful in understanding how underlining archetypal images and patterns present themselves in the psyche. These could result in extraordinary discoveries about human nature itself, as archetypes, according to Jung (1948/1981b), are "the *instinct's perception of itself*, or the self-portrait of the instinct" (p. 136). Such social-depth psychologies, quantitative-qualitative methodologies, and biological neuroscience can be used together to test and improve on psychological knowledge, conceptualizations, and speculation—clinically relevant and observed in the world at large. New findings could significantly contribute to understanding of human relationships, human-digital interactive phenomena, and the unconscious fabric of human beings.

Depth Psychology as Insight to Human-Computer Interactions and Relationships

Relational point of view.

This portion attempts to highlight some depth psychological concepts and suggests their potential value in further understanding the unknown, ever-expanding

territory of human-digital relationships. *Relatedness* and *relational experiences*, especially from a depth psychological perspective (C. G. Jung, 1946/1985b; Mitchell, 1988), are keystone concepts overarching the entire topic of this investigation. Human-computer interaction is relational, by definition: action of one entity, human or algorithmic, begets action of the other; which, in turn, induces an action of the first and so on. From the human perspective, as we have seen above, such interactivity triggers instinctual, evolutionary, social, and both unconscious and conscious behavior and emotional responses. Depth psychology's concepts and theories related to conscious-unconscious, intra- and interpersonal dynamics and associated symbolic material, therefore, can play critical roles in informing social psychology's investigation of the inter-"personal" aspects of human-computer interactions.

The following three parts of this section bring to light several significant depth psychological, mostly Jungian, concepts considering human interactions and relational expression. These are intended to suggest that the understanding of the constantly active unconscious milieu of human activity and interactivity should be extrapolated into the intense relationships we are forging with computer technology.

Relatedness, transference, and projections/introjections.

As touched upon several times above, a work-in-progress premise of this dissertation is that the paradigm shift from predigital human interactivity to interactions with digital entities requires qualifiers such as *strange*, *pseudo*, or *artificial*. For example, digital interactive entities should be considered psychologically as far as they are "*pseudo* personal," "*strange* other," and "*artificial* psyches." This seems at least true at our embryonic stage of understanding human psyche-digital interdependence. More

specifically, such qualifiers need be kept in mind in considering the following discussion of depth psychology concepts.

Although they differ theoretically and in approach, both psychoanalytically oriented and analytical (Jungian) psychologies consider some form of transference and projection as fundamental to basic functioning of interpersonal relations overall and core to the therapeutic relationship between analyst and patient (S. Freud, 1995; C. G. Jung, 1946/1985b; Mitchell, 1988). Turkle (2011) suggests that when relating personal information to a computer or robot, what we tell it "falls, literally, on deaf ears" (p. 113). However, at the same time, our interaction induces meaningful transference-generated projections about both the human and the machine or program and about the relationship. Considering relationships with computers for example, Suler (1998) suggests that just like past childhood primary relationships influence our relationships now and in the future through the phenomenon of transference, so do these influence our relationships with computers. Speaking of past relationships, Suler states that

> these models also shape how people select and experience things in their lives that are NOT human, but so closely touch our needs and emotions that we want to imbue them with human characteristics. We humans can't help but anthropomorphize the elements in the world around us . . . . We use our internal models to humanize and shape our experience of cars, houses, pets, careers, the weather . . . and COMPUTERS (Let's do a quick exercise section, para. 6).

Suler delineates transference-patterned relationships with computers as: "you as you, computer as parent" (para. 10); "you as parent, computer as you" (para. 18); "you as you, computer as wished-for parent" (para. 21); "you as wished-for parent, computer as you" (para. 25); and selfobject transferences, in which the relationship takes form as "mirroring . . . idealizing . . . [or] twinship" (para. 27).

Through a Jungian perspective, in human-to-human relationships, projections can be seen as unconscious aspects of emotional responses and perceptions of one person that are consciously perceived and experienced as if belonging to the other person as opposed to oneself (C. G. Jung, 1946/1985b). From such a point of view, in interactions and relationships between people, not only do both sides project onto the other (von Franz, 1978/1980b), but projection and "introjection" (C. G. Jung, 1954/1980a, p. 25) form the foundations of interpersonal communications and relatedness of any kind (C. G. Jung, 1946/1985b).

Through a classical Jungian transference-countertransference perspective, deeply impactful relationships can be seen as strongly influenced by dual directional human-to-human unconscious projections that can be understood symbolically and through psychologically relevant images (C. G. Jung, 1946/1985b). By expanding this relational phenomenon to the context of human-computer interactions, projection and introjections between human and computers may be explored through symbolic images portraying unconscious relationships that manifest in behaviors and relational attitudes. As alluded to above, here digital technology is in effect "artificial psyche" technology, into which the human unconsciously projects and from which he or she introjects emotionally impactful relational perception and experience. All the while in this interaction, the technology actively inputs and outputs digitally constructed, algorithmically directed data and information. In this way, deep, mostly unconscious emotional relationships can be forged for the human with the technology. These may present themselves archetypally and further shed light on emotional, instinctual, and meaning-making levels.

The spiritual-material unconscious milieu.

Jung (1946/1985b) paints a picture of the powerful relational attractions and movements made up of conscious and unconscious processes between people or between different aspects of an individual. Jung points out that differing if not opposing emotional aspects actively interact with and transform each other. He suggests that unconscious emotional impulses involved in relationships can be seen in "fantasy-contents of the instincts" (p. 175) and describes a metaphor for the backdrop of deep relationships as that of "the mystic marriage" (p. 167). Such relationships, he stipulates, were fundamental for premodern alchemists, whose "strictly chemical investigation . . . [fell] under the spell of the 'myth of matter'" (p. 168) which was projected out in the symbolic material of alchemical treaties, images, and, for many, the pursuit itself. This was an emotionally charged process of the quest for spiritually significant, matter-oriented experiences. Our modern-day occupation with the development of and interactions with digital technology may, indeed, be our own "royal or divine marriage" (p. 168) between psyche and matter.

Von Franz (1978/1980b), elucidating Jung's ideas related to projection, explains that an observing consciousness, as a separate phenomenological entity within the psyche, is a recent development in human evolution and has "force[d] a sharper differentiation between subject and object" (p. 9). However, Von Franz reinforces Jung's insight that, although humans today have this conscious capacity, it is the exception rather than the rule that people behave and function through the direct mediation of observational consciousness. She quotes Jung describing our developmentally early conscious functioning as the "'*immersion in a stream of events in which the inner and the*

outer are not differentiated, or very indistinctly so'" (p. 7). She emphasizes that this is "still a normal condition with us too, a condition that is interrupted only from time to time to the extent that the reflecting consciousness and a certain ego-continuity intervene" (p. 7). In other words, Von Franz suggests that most of our psychic phenomenology is not characterized by the guidance of discriminating consciousness. Rather, she points out, human phenomena are more fluid, undifferentiated, and unknown interactions of instinctual emotions and psyche-evocative images originating from both internal processes and external phenomena. She explains that only when consciousness intervenes do we begin to experience differences between inner and outer, self and other, subject and object, which become more recognized and defined.

From Jung's and Von Franz's descriptions of inter- and intrapersonal dynamics, it can be speculated that, also in the context of human-to-digital technology, subjective and objective, "inside" and "outside" remain relatively undifferentiated. Therefore, these can stimulate emotions, images, and instinctive reactions from or of the psyche as unconscious projections onto the strange pseudo other(s), while psyche-relevant images are introjected back. Since the majority of psychic phenomena take place outside of conscious watch, the primary building blocks of human experience, relationships, and interactions are composed of projections and introjections of which we are *not* aware. Gros (2008) says,

> The qualities, desires, fantasies, and possibilities that people today project onto the smartphone and its virtual world arise from quite basic human needs and longings, which are in fact not so far removed from the hopes and dreams of people long ago. Back then they projected their yearnings onto gods, such as Hermes; today we project similar yearnings onto technology gadgetry, the new "gods". (p. 141)

Hence, human-digital technology relationships and interactions may take place precisely in this psychic space of unrecognized projections and introjections that formulate powerful psyche-activating influences, emotionality, and meaningfulness.

The Western psyche and human-technology advancement.

Viewed from this perspective, it is possible that the human-digital endeavor is playing out what Jung and Von Franz see as ever-present, powerful, and unconscious psyche-matter projections, charged with yearnings for emotionally heightened relatedness and spiritualized relationships. Indeed, through a depth psychologically historical lens, Von Franz (1992b) observes that, most, if not all, science is actively rooted in unconscious religious pursuits, stating that "ideas that constitute the basic themes of modern natural science . . . are images of the divine" (p. 12). According to Von Franz (1992b), our modern science rests on the Greek "God-image" (p. 145) developed between 7th and 4th centuries BC, that of a "one divine basic principle—*arche*, as they called it—of the universe" (p. 145). Inquiry into this single universe-divinity combined with the influences of the highly advanced "techno-magic practices and experiences" (p. 148) of ancient Egypt and the East resulted in the origin of Western science in Greek alchemy. She explains that in the early Middle Ages, however, this objective inquiry and technological manipulating of matter originating in the ancient world become increasingly subjective and spiritually oriented with the introduction of Christianity. In particular, this became so through emphasis and "differentiation of ethical feelings" (p. 150) and a devaluation of matter, nature, and alchemical pursuits. As outlined by Von Franz, in middle and later Middle Ages, the reintroduction of alchemy into Europe via the return of the crusades from the alchemy-rich Middle East caused a confrontation between

Christian spirituality and Middle Eastern engagement with the elements of physical nature.

This psychic-cultural-political confrontation resulted not only in a clash, but also in a split between subjective spirituality and objective manipulation of matter, both of which powerfully play out in our own techno-scientific Western culture (von Franz, 1992b). Each side—subjective spirituality and objective materiality—projects into and introjects from the other, producing the movement of a spiritualized-scientific dynamic that drives and influences so many aspects of our society and culture today. Each side plays an unconscious and mystical counterpart of the other. Unconsciously spiritualized material endeavors can be as seen in many contemporary technological projects and social-technological-philosophical debate. Indeed, Allenby and Sarewitz (2011) argue that such movements and trends are technological quests that are fundamentally religious in nature.

Hence, in the context of a projective-introjective psychic milieu, repulsions *and* attractions exist between subjective-spiritual and objective-material experiences. This psychological landscape, therefore, suggests the probability that, at a core level, human-computer interactions may all somehow be qualified by deep unconscious spiritual-material projections/introjections. Furthermore, these may to be characterized by strong religious-relational undertones. Following this line of speculation and investigation, the techno-religious—what Von Franz refers to as the "techno-magic" (p. 148) experiences of ancient Egypt—may very much be alive and flourishing today, only under the cloak of scientific technological progress. In powerful and *unconscious* ways, projections and introjections may be firing off from both sides of the subjective-objective gap, strongly

enough, to possibly be the actual building blocks and force of the human-technology evolution/revolution itself.

From a depth psychological and cultural perspective, Romanyshyn (1989) explores technology as both "symptom" (p. 10) and "dream" (p. 10) stemming from such subjective-objective dynamics. His book suggests the possibility that the modern human pursuit of technological advancement rests on and is directed by the collective urge to live less embodied lives. According to Romanyshyn, the ever-advancing technology of Western civilization can be seen as originating from a change of mentality associated with the 15th-century advent of linear perspective. He argues that we are driven to externalize our experiences outside of our embodied selves and, through technology, attempt to become increasingly objective observers of our world. For Romanyshyn, this observer as a being who interacts with the world through linear perspective is like "an eye" (p. 82) looking through a "window" (p. 82) that separates the observer and that which is being observed. He suggests that the Renaissance of linear perspective is the precise point of psychic-historical departure from which our modern relationship with technology and ourselves originates.

Romanyshyn (1989) describes our obsessively attempting to free ourselves of our bodies, to eliminate our physical limitations, and to expand our experiences away from planet earth into spiritual pursuits of outer space. He observes that this push, however, alienates subjective experiences and results in disconnected and disavowed embodied expressiveness. "The dream" (p. 10) that pushes the drive to develop technology more and advance further our observing selves leaves the body and subjectivity unattended to and poorly cared for and, therefore, "symptomatic" (p. 206). Romanyshyn convincingly

points to an imbalance of objective-subjective harmony in Western society as well as in its individuals. He suggests that technology and science have been the tools for a dominating objectivity that overpowers subjectivity at the peril of the latter's ability to provide a harmonizing counterbalance and compensatory function toward wholeness, both collectively and individually.

Romanyshyn's insights are all the more poignant and currently relevant as they help shed specific light on Jung's and Von Franz's penetrating explorations of psyche-matter dynamics and their changes through history. Romanyshyn brings to the fore subjective-objective struggles of our day and describes our associated ambivalences of our technology-driven psyches. Reflecting on Romanyshyn's insight, this new way of engaging with the world may have resulted in exposing, activating, and radicalizing the subject-object relationship that, as Jung and Von Franz seem to suggest, has always been so very vulnerable to instability and change. Based on Jung, Von Franz, and Romanyshyn, object and subject are deeply and powerfully dynamic and strangely interchangeable in the human psyche. For instance, thinking through Romanyshn's speculation of the change that occurred with linear perspective, the world as object, that which is observed, becomes the subject of perspective or painting in the Renaissance. At the same time, the observing eye, the experiencing subject, is the objective source out of which the lines making up the entire perspective originate. But all the while, this eye is invisible, nowhere to be found. Indeed, such murky and unconscious, split, fused, and often reversed relationships seem to exist between subject and object in our submersion within human-digital technology interactions throughout our culture.

Picking up a related theme, Slater (2006) alluding specifically to digital technology, warns:

> Body, mind, psyche, though exposed to technology and partially adapted to it, have also remained substantially apart from it. This is about to change. Within decades the human body and mind will be redefined as they merge with developments in robotics and computing. (p. 172)

Slater points to the unconscious human-digital evolution as a reconfiguration of body-self, part biologically human, part information technology. The future of our digital technology-directed human evolution, of course, still lies in the unknown. Like an eye witness to the beginning of a process, Slater points at the radical transformation of the human into the human-digital. Jung, Von Franz, and even Romanyshyn's 1989 writing precedes these concrete events in human-digital evolution. But their reflections and insights are deeply and critically relevant. Indeed, by way of crossing the threshold of interactivity, achievable by digital technology, the new human-digital era may hold in store for us relationships and interactions, projections and introjections previously nonexistent under the sun. Have we truly created strange/pseudo/artificial new psychic beings? And if so, how strange have we made our world? How strange will we become?

Conclusion and Research Questions

Social and depth psychologies' synergistic potential.

The purpose of this chapter was to shed light on human-digital technology interactions through selected notions from both social and depth psychologies. This chapter provides context and reference for further exploring the evolutionary biological-emotional-symbolic psyche and qualities of interactions with digital algorithmic technologies in the chapters that follow. From social psychology, the discovery of the "mindless" (Nass & Moon, 2000, p. 81) "unconscious" (Nass et al., 1994, p. 77) social

behavior and attitudes of computer users is a foundational watershed for understanding human-computer interactions. From a depth psychological perspective, archetypes, attachment, transference, projection/introjection, subjective-objective dual reality, and spiritual-material interrelated dichotomies are just some concepts of unconscious aspects relevant to and potentially applicable to human-computer interactions. Therefore, social and depth psychologies can be used together synergistically to further explore attitudes and perceptions within socially experienced human-computer interactions. Archetypally/symbolically informed descriptions and insights can integrate into empirically understood behavioral and attitudinal analysis to better understand human-computer interactions and relationship.

Rationale for studying recommendation systems in the context of the evolutionary, emotional psyche: **Human-digital feeling-based interactions.**

The overarching subject of this inquiry is the psychological phenomenon of interactivity between the psyche and digital technology. More specifically, this research will look at psychological interactions with digital systems that can be understood as recommendation systems. At the core of recommendation systems is the functionality to "understand" (Ricci & Shapira, 2011, p. 5) a person's or people's preferences, that is, human subjective "wishes" (p. 4). Recommendation systems interact with humans in the context of informing their human users about value. From a human perspective, feelings can be understood as methods of measuring value-oriented experiences. Jung (1921/1976), for instance, defines the feeling function as specifically evaluative, "a process that takes place between the *ego* (q.v.) and a given content . . . impart[ing] to the content a definite *value* in the sense of acceptance or rejection ('like' or 'dislike')"

(1921/1976, p. 434). From a neuroscience perspective, Damasio (2010) regards feelings as bio-behavioral evaluators of embodied emotions, guiding environmental adaptability and survival of every living organism.

Therefore, if feelings are seen in their function as value indicators, recommendation systems' digital algorithms can be understood as programs designed to identify and directly interact with human feelings. Effectively, they can be seen as "feeling calculators" that output value-enhancing suggestions. Thus, recommendation systems' primary function can be seen as calculating, communicating, and "dialoguing" with human feelings. In this way, recommendation systems can be viewed as artificial psyches operating on personal value and feeling, both conscious and unconscious. Emphasizing the psychological significance of feelings, Hillman (von Franz & Hillman, 1998) points to their vital functional role in all relationships especially those that are deep, influential, and transformational. He highlights that "even that general goal of a Jungian analysis—the cooperative relationship between ego-consciousness and the unconscious dominants—is as a relationship, largely a function of feeling" (p. 102).

Statement of problem and research questions.

Hence, the feeling-based interactions between recommendation systems and people make this topic critically important within the larger topic of human-computer interactions. As digital technology becomes ever more sophisticated, ubiquitous, and merged with human experience, technology that processes and directly affects human feelings will play ever growing parts in our conscious *and* unconscious lives. Such advances open up vast potential, for utility and human development, but also for detriment and degradation. Feeling-oriented digital partners may expand human

experience *and* limit it—certainly, they will do both. The statement of the problem in this dissertation, then, is: in still little understood ways, human beings are increasingly interacting with and emotionally and behaviorally affected and influenced by digital, data-oriented, algorithmic interactive recommendation systems. We are only in the infancy of knowing the ramifications of these new types of interactions and relationships; therefore, any research that sheds light in this area is critically important. The research is guided by the overarching questions of (1) what psychological, feeling-oriented aspects and characteristics make up interactions with digital technology, in general, and with recommendation systems, in particular? and (2) as a background research question, how can the nature of this new dynamic between the psyche and digital algorithmic technology be conceptualized in psychological terms? This study utilizes a hermeneutical-depth psychological theoretical methodology to uncover phenomena of human-computerized technology. Through this approach of interpretation that creates understanding to illuminate the topic, this study also sheds light on the methodology itself. It illustrates an attempted endeavor of discovery related to complex, contemporary, and psyche-centered phenomena through an integrative multi-artifact interpretation. In this case, these interpreted artifacts include theoretical and research-oriented depth psychological writing, scientific theory and perspectives, algorithmic technology and design, human-computer interaction studies, and cultural exposition.

Recommendation systems represent a valuable research topic for further exploration into the realm of human-digital technology interactions and relationships. Interactions with digital technology, in general, and recommendation systems, in particular, serve as central topics of this psychological investigation. Interactions with

recommendation systems will be considered specifically in the next chapter on methodology and in Chapter 5. Chapter 4 serves as contextual exploration of the nature of the psyche vis-à-vis algorithmic technology. The next chapter describes the study's approach and method of research.

Chapter 3
Methodology

Introduction

The previous two chapters serve as introduction to deep and complex relationships with digital technology. The purpose for these chapters is twofold. First, they provide a questioning, curiosity-inducing perspective of the intricate and relational aspects of human experiences with interactive digital technology. These can be seen through the lens of interpersonal, unconscious phenomena from multiple theoretical viewpoints of psychology. Second, the preceding chapters attempt to make the case that such interpersonal relationships with digital technology are as impactful individually and culturally as they are strange psyche-relevant phenomena, never before seen in known history. This current chapter will describe the approach for further exploring the quality of human-digital relationships in this present study, through the subject of interactions with recommendation systems.

Rationale for Studying Recommendation Systems

The overarching topic of this inquiry is the psychological interactive phenomenon of between people and digital technology. In chapter 5, human psychological relationships and dynamics with digital recommendation systems will be used as exploratory illustrations of the phenomena. As established at the end of the previous chapter, recommendation systems function by ultimately interfacing with human feelings. They function to "understand" (Ricci & Shapira, 2011, p. 5) a person's or people's preferences and "wishes" (p. 4). Recommendation systems interact with humans, for instance, "to emulate the process of seeking advice from trusted sources" (Bonhard &

Sasse, 2006, p. 85). As identified in the previous chapter, human feelings function in value-measuring ways. This is the understanding of Jung (1921/1976) as he defines the feeling function in its evaluative capacities. Commensurately, from a neuroscience perspective, Damasio (2010) regards feelings as bio-adaptive evaluators. In this way, recommendation systems can be understood as preference evaluators and, therefore, digital algorithmically based feeling logic, interfacing with human feeling.

James Hillman (von Franz & Hillman, 1998) points out that "if the complexes are defined as groups of feeling-toned ideas, then one component of every complex is feeling" (p. 98). Therefore, as far as the psychic charge of complexes are autonomous and unconscious (C. G. Jung, 1948/1981f), recommendation systems function on unconscious feeling levels as well. In fact, Hillman suggests that in a sense, the function of "feeling is the *via regia* to the unconscious" (von Franz & Hillman, 1998, p. 99). In this way, recommendation systems can be viewed as artificial psyches operating on personal value and feeling, both conscious and unconscious. It is precisely due to the feeling-based, relationship-oriented interactions with recommendation systems that this subject is chosen for exploration to provide insight into aspects of deep psychologically oriented relationships experienced by humans based on their human-digital technology interactions.

Method and Approach of Research

This study employs a qualitative, hermeneutic, theoretical method for investigating the phenomenological experience of interacting with digital recommendation systems. Furthermore, this study expands the hermeneutic method through a depth psychological approach that regards unconscious phenomena as real

(Romanyshyn, 2007). In this way, interpretation of depth psychological theoretical material is examined along with neurobiological theories, and research and writing on algorithmic technologies interfacing with humans on emotional levels. The evolutionary-biological-emotional-symbolic nature of the psyche is explored and the impact of digital algorithmic technology is investigated through illustration of recommendation systems.

Hermeneutical method.

This study is guided by hermeneutical principles of interpretive inquiry into human phenomena. According to Palmer (1969), Gadamer sees that subject matter can be further understood through associated language and historically relevant relationships between past and present. In this way, this study will interpret texts and "cultural artifacts" (Cushman, 1995, p. 19) looking at not only what they explicitly assert, but also what they implicitly express; deepening meaning by exploring what may be "unspoken" (Palmer, 1969, p. 149) that lies hidden but present. These texts take the form of theoretical depth psychological theory, scientific theoretical writing, experimental human-technology interaction research, and writing on technology and design. In this fashion, the study will also attempt to gain insights about what it "means to be human" (Cushman, 1995) in today's world, given the "cultural matrix" (p. 17) of the digital age in which recommendation systems are becoming increasingly prevalent and important in our lives.

Packer and Addison (1989) compare and contrast the two main philosophical strains that led to and influence scientific inquiry today and suggest that the philosophical and theoretical stand point of hermeneutics offers an enhancing alternative, especially in the realm of psychological investigation. Empiricism views its investigated reality as

made up of building-block units each with "absolute properties" (p. 16); rationalism considers "formal structures," (p. 15) such as the logical components of systems that underlie the world as we see it. Hermeneutics, on the other hand, regards the subject of investigation as "action in context" (p. 15) and "texts and text analogues" (p. 16), discovering phenomena that is contextually informed. They argue that hermeneutics can contribute to an expanded, more accurate understanding of psychological phenomena in reality precisely because its approach is interpretive, studying "action" (p. 16) in its context and understanding our own "way of being in the world" (p. 43).

Key to this method of interpretive inquiry is "entering the hermeneutic circle" (Packer & Addison, 1989, p. 3). This is the phenomenon and research technique of continually learning about the subject matter through conversations between various parts and angles of interpretation as well as between the interpretation as a whole; a process that is ongoing in the endeavor of exploration, discovery, and arriving at meaning (Palmer, 1969). According to Packer and Addison (1989), especially related to psychological inquiry, the approach through the process of the "hermeneutic circle" (p. 34) is the only way to stay true to reality and the reality of inquiry itself, as the interpretation of human beings can never be dissociated from the process of study and the context in which human beings live.

Cushman (1995) states that inquiry guided by a social constructionist approach and one using hermeneutics are closely related as they both "focus on the everyday, lived context of whatever, or whoever, one is studying" (p. 17). Regarding his own inquiry, he states that the self is "one of the most discussed and yet most elusive of psychological concepts" (p. 23). In this way, he hints that all psychological investigation may have this

level of complexity and epistemological challenges. Therefore, he seems to suggest that studying such psychological phenomenon as "the self" through a hermeneutic approach can provide insights and knowledge unattainable by an approach that views psychology as independent of its culture and history. He states that the hermeneutic approach views the self as defined by its specific culture and history, and can only be understood interpretively through exploring the qualities and dynamics between the self and its context through history. Inquiry through hermeneutics, Cushman suggests, regards the subject as particular and defined by the qualities of its surrounds. It also looks at everything human-made, or "artifacts" (p. 24), as part of culture and informing about culture, including the subject of inquiry itself. In other words, in hermeneutically circular fashion, there are multiple dynamics "between the construction" (p. 24) of one aspect of culture and its history with the construction of all other parts and aspects.

Based on hermeneutic philosophy, Cushman understands that any and all aspects related to human beings can only be interpreted because "there is no single truth to be found" (p. 22), but "many truths, depending, among other things, on the historical and cultural context of the observed and the observer" (p. 22). Therefore, the study of human beings must proceed by way of the researcher's gathering understanding about a subject through all that relates to the subject (such as its culture, its history, and context). Cushman points to the necessity of gaining in-depth understanding of a subject through understanding its "cultural matrix" (p. 17), made up of aspects and qualities such as "language, symbols, moral understandings, rituals, rules, institutional arrangements of power and privilege, origin myths and explanatory stories, ritual songs and costumes" (p. 17).

Depth psychological approach.

As mentioned above, this study incorporates and blends into the interpretive approach a depth psychological perspective. However, the field of depth psychology theory, practice, and understanding is very wide, extremely diverse, and historically contentious. Therefore, for the purposes of this study, depth psychology will be considered as the field that regards the mind as functioning through both conscious and unconscious ways, each influencing the other. Critical to this are the theoretical foundations laid down by Freud, Jung, Klein, Von Franz, Neumann, Winnicott, Bowlby, and many others who have played a role in the history and development of depth psychology. Such phenomena that are in one way or another not conscious are, however, given many divergent names and are seen in various ways by many different researchers and disciplines, including social psychology (Reeves & Nass, 1998); neurobiology (Damasio, 2010; Edelman & Tononi, 2000; Kandel, 2012; Ramachandran, 2012); economics (Kahneman, 2011); various theorists of cognition (Minsky, 2007; Searle, 1983); cognitive-behavioral theories (Beck, 1991); somatic approaches (Levine & Frederick, 1997; Ogden, Pain, & Fisher, 2006); and many more in the "new science of the unconscious" (Brooks, 2012; Mlodinow, 2013), in addition to, of course, all psychodynamic theories. Today, many depth psychologically oriented thinkers are exploring multidisciplinary and multitheoretical approaches to understanding the complexity of the psyche, which includes both mind and brain. This is the case with approaches such as Interpersonal Neurobiology (Solomon & Siegel, 2003), contemporary relationally oriented psychoanalytic thinking (Mitchell, 1988), and depth psychology-chaos theory/cybernetic exploratory endeavors (Robertson, 2009), among many others.

In this study, a depth psychological viewpoint opens up to ideas from neuroscience and digital algorithmic technological development and design as relationships between conscious and unconscious dynamics within the psyche are explored. These are understood as significantly important in contributing to psychological knowledge of human-digital interactions. As presented in Chapter 2, many of the fields and research in human-digital interactions and new media have not been associated with depth psychology, but do study both conscious and unconscious phenomena. By remaining open to all psychologically disciplines as potential expansions to a depth approach, this study employs hermeneutics' "openness of experience . . . [through] . . . structure of a question" (Palmer, 1969, p. 198) *and* a depth psychological approach that is "open to a plurality of methods . . . among these . . . a hermeneutics of the depths . . . [that] takes into account the unconscious dynamics" (Romanyshyn, 2007, p. 241).

Integration of Hermeneutic Method and Depth Psychology Approach

Hermeneutics emphasizes exploring the lived phenomenological world that makes experience. Furthermore, "Western metaphysics" (Palmer, 1969, p. 125), conjectures, and scientific goals of objectivity are seen as obstacles to gaining understanding and meaning (Packer & Addison, 1989). Therefore, a hermeneutical study that takes a depth psychological perspective may seem at first paradoxical, as many theoretical branches of depth psychology presuppose specific principles and structures of the psyche. However, two key ways of approaching depth psychology reveal themselves as conduits to supporting and expanding hermeneutical study. First, depth psychology can be seen primarily as a viewpoint that considers the unconscious and unconscious phenomena as

making up a significant part of reality (Romanyshyn, 2007). The unconscious has not been recognized by phenomenological and hermeneutic philosophical thinkers (Romanyshyn, 2007) nor, for many years, by modern psychological theorists and researchers (Kihlstrom, Barnhardt, & Tataryn, 1992; Mlodinow, 2013). However, as mentioned above, unconscious phenomena are now almost universally recognized, albeit identified and called by many names. Through an integrative viewpoint, unconscious phenomena can be understood as part of the "life-world" (Husserl & Welton, 1999, p. 363), part of the experiential landscape that makes up the world in which we live and to which we relate. In this way, depth psychology can be utilized as a perspective that actively explores what is hidden within the hermeneutic process of inquiry, mining into the unconscious depths of the world and being (Romanyshyn, 2007). Palmer (1969), himself, points out the hermeneutic endeavor of reading between the lines of texts and uncovering the unspoken aspects of language, art, and culture. Therefore, as Romanyshyn (2007) suggests, an argument can be made that unearthing unconscious psychological content and phenomena can be seen as expanding the hermeneutic process even more deeply. Palmer (1969) describes Gadamer's hermeneutical dialectic quality that "reflects itself in the question-answer structure of all true dialogue . . . [where] . . . the subject matter in dialogue will emerge in the ensuing analysis of questioning" (p. 198). Hence, by keeping in mind the depth psychological principle of a dynamic relationship between conscious experience and behavior vis-à-vis unconscious phenomena, such an approach can be seen as commensurate to the hermeneutic approach modeled on dialogue. In this way, too, scientific texts that investigate conscious-

unconscious phenomena may significantly contribute to insight in the overall depth psychological-hermeneutical exploration.

Here it is important to recognize that a depth psychological approach to hermeneutic inquiry does not necessarily endanger hermeneutics' opposition to metaphysical notions which are largely antithetical to its understanding "in epistemological terms" (Palmer, 1969, p. 100). If the depth psychological approach is guarded against formulations of overly abstract metaphysical notions of psychic structures and dynamics, a dialectic relationship between hermeneutics and depth psychology may prove very insightful to both. Through such an integration, hermeneutics expands its world of interpretation to include a vastly larger related world made of depth psychology's own interpretive endeavors. As hermeneutics and depth psychology join forces, hermeneutics expands its landscape and depths while depth psychology is protected against metaphysics.

The second quality of a depth psychological perspective's applicability to hermeneutic inquiry is based on depth psychology's theoretical principles that are rooted in history and relatedness, two concepts critically important to hermeneutic exploration (Palmer, 1969). Subsequent to Freud, all further development of psychoanalytically oriented thinking and therapy has positioned psychological development, experiences, and coping as somehow causally linked to each person's personal relational history. These developments include, among many others, object relations (Segal, 2006); attachment theory (Bowlby, 1983); and self psychology (Kohut, Goldberg, & Stepansky, 1984); psycho-socio developmental theories (Erikson & Erikson, 1998); and relational psychoanalysis (Mitchell, 1988). Even emphasis on "here and now" (Rank & Taft, 1950,

p. 39) relates to coping with and in the past. Furthermore, recent biologically based treatments such as somatic experiencing (Levine & Frederick, 1997) and sensorimotor psychotherapy (Ogden et al., 2006) also view past trauma as directly influencing levels and strategies of affect regulation and tolerance.

Depth psychology's contextually historical and relational foundations are also evidenced in Jung's thinking. For Jung (1954/1980a), the levels of unconscious material experienced by individuals relate to various historical layers of human existence. These unconscious levels that impact us include one's personal past and present; cultural/familial background; and archetypal or collective unconscious composed of evolutionary, instinctual, and primordial impulses and content (C. G. Jung, 1954/1980a; Neumann, 1949/1973b; Romanyshyn, 2007; Stevens, 2003). In addition, Jungian thought has emphasized transference as unconscious interrelatedness within deep relationships (C. G. Jung, 1946/1985b); and unconscious projections and introjections as among defining elements of interpersonal interactions (von Franz, 1980b). Through a Jungian lens, then, a depth psychological approach can be argued as commensurate with a hermeneutic method of inquiry into lived experience, past, present, and future. In this way, psychological phenomena can be uncovered and more deeply understood relationally through interpretation of unconscious symbolic material accessed through dreams, spontaneous fantasies, and all psychologically relevant and culturally meaningful events and endeavors through history (C. G. Jung, 1964/1970b; Neumann, 1949/1973b; Romanyshyn, 2007; von Franz, 1993).

Next Chapters of Exploration

As mentioned above, the following chapters expound on the topic of human interactions with digital algorithmic technology and with recommendation systems in particular. In Chapter 4, through interpretations of depth psychological writing and ideas as well as neuro-scientific theory, an image of the psyche unfolds, characterized as evolutionary, symbolic, emotional, and unconsciously-consciously dynamic. Erich Neumann's work serves as both a starting point and as navigation toward viewing the psyche as evolutionarily biologically-symbolically rooted. From a scientific perspective, neuroscience and emotional theory are used as augmentation as well as support, from a scientific perspective. A conceptualization of digital algorithmic technology is constructed and emphasized as nonbiological, therefore, incongruent with the instinctual directedness of the psyche. At the same time, it is shown that psychic-algorithmic interactions are increasingly pervasive and impactful at core psychic structural levels, perhaps in ways never before seen. A case is made that psychic-algorithmic interactions newly unfolding in our historical period may have evolutionary consequences.

In Chapter 5, algorithmic systems are surveyed and human-algorithmic interactions are further interpreted. As mentioned above, the digital algorithmic systems that fall under the category of recommendation systems are viewed through a psychological lens. An introduction to digital/algorithmic technology that makes these complex and sophisticated programs possible is included; and several types of technologies are described throughout the chapter as their impact on the psyche is interpreted. The ideas developed are put into context with the previous chapter's conclusions related to the dynamics between the biological psyche and digitalized

algorithms. In this way, Chapter 5 builds up from Chapter 4 as one interpretive endeavor rests on the other.

The concluding chapter summarizes the entire dissertation and emphasizes its main principle. This is that symbolically oriented and idea-formulating psyche must be viewed as evolutional, biological, and emotional, whereas digital algorithmic technology in its complexity, interactivity, and seeming psychic-affinity, is not biological. As these two interact, because they are based on different value-systems—one on biologically-emotional-symbolic information and the other on information that is mathematical-statistical-algorithmic and digitalized—they not only interact with each other, but also hybridize each other. In this section, the point is also made that since humans are becoming pervasively interactive with algorithmic technology on every level of the psyche, clinical psychologists must more finely understand these interactions and relationships. To do this, psychologists may find helpful understanding more about how digital technology works and about aspects of its design as well as market and social forces that direct technology development, implementation and use.

The Role of the Researcher

Hermeneutical subjectivity-objectivity dynamic.

Throughout the philosophy of phenomenological hermeneutics, consideration of the subject-object relationship challenges Western dichotomy-based thinking. For instance, Dilthey, quoted by Palmer (1969), describes a distinctive areas of inquiry by saying "a science belongs to the human studies only if its object becomes accessible to us through a procedure based on the systematic relation between life, expression and understanding" (p. 106). Palmer further elucidates on Dilthey, quoting him as stating that

experience "is that act itself" (p. 108), which "means that experience does not and cannot directly perceive itself, for to do so would itself be a reflexive act of consciousness . . . thus, experience exists before the subject-object separation" (p. 108) and, at the same time, is the "unit of meaning" (p. 108).

Van der Berg's views further highlight how the subject-object interplay and threshold of differentiation can be ever so challenging and at the same time so important for inquiry. Van den Berg's "the principle of non-interference" (p. 281) guides the researcher in considering phenomena as directly as possible, without the attempt of explaining through cause and effect rationality. This allows for the researcher's openness to phenomena that enables him or her to see it more fully and understand its significance more accurately. Romanyshyn (2008) states that this approach to "phenomenology indicates that the mirror relation between humanity and reality is one of *participation*" (p. 506). Keeping to this principle is the researcher's not interfering with this participation but exploring it as such. It is a very fine and challenging line to study the changes of human beings, their world, meaning, and experiences: the researcher in the present must view himself or herself as one who is different and changed from the human he or she is studying; but, in doing so, needs to embrace the studied subject "other" in a way that can be understood and experienced through the reality of this other. Here subjectivity and objectivity, of both the researcher and the studied, are so intertwined that they must be appreciated for their interdependency and undifferentiated dynamic, in order to grasp both the past and the presence in each and both of their "'complete' reality as man experiences it" (Claes, 1971, p. 273). Interestingly, as we have seen in the previous

chapter, this overall lack of differentiation between object and subject is highlighted by Von Franz (1992b), albeit from the perspective of conscious-unconscious dynamics.

As mentioned above, Packer and Addison (1989) use the hermeneutic perspective to critique empiricism and rationalism as models for psychological inquiry. They expose an epistemological fallacy of empiricism: that its factually oriented philosophy does not prove that reality is indeed objective and that it can only be factually understood, other than through assumptions themselves as "self-evidence" (p. 20). On the contrary, they state that "the so-called objective reality is a product of human invention" (p. 17). This erroneous assumption, Packer and Addison emphasize, is especially egregious when studying psychological phenomena.

Rationalism also suffers from a self-referenced inadequate understanding of the world as it "reconstructs a portion of human knowledge or experience" (Packer & Addison, 1989, p. 17). In other words, similar to empiricism's defining the world in its own way, rationalism defines the world through abstract logic assumed to lie behind the immediately observable. But no matter how internally consistent and provable the logic is demonstrated to be, rationalism cannot prove that its viewing the world through "abstraction" (p. 17) is an accurate representation of reality.

This dissertation attempts to use depth psychological writings, neurobiological perspectives, and technology design, research, and commentary as artifacts woven together for interpretation of human-algorithmic dynamics to gain insight to our present day lives. Through this process of interpretation, a picture of the psyche at an evolutionary crossroads is painted. Throughout the next chapters, it is intended that the quality of the *strangeness* of psychic-algorithmic interactions reveals itself more and

more. It is hoped that the digital algorithmic impact on unconscious-conscious dynamics as well as the symbol itself become better understood and their unknown future become more recognized.

The depth psychological "complex" researcher.

Research from a depth psychological perspective can take form in many ways depending on the theoretical inclination and actual execution of the work. Robert Romanyshyn (2007) developed the "alchemical hermeneutic" (p. 159) approach as a depth psychological perspective to research. His vision and understanding of depth psychological research not only considers the subject matter through the lens of both conscious and unconscious phenomena, but takes into account, as part of the research material itself, both conscious and unconscious aspects of the researcher in all that may be relevant to the research. Romanyshyn bases his depth psychological understanding and approach to research on Jungian concepts of unconscious phenomenon, namely the deep and significant influences "rooted in complex unconscious dynamics that tap into the soul of the" (p. 159) research as "vocation" (p. 105). Romanyshyn points to the critical importance of the researcher exploring his or her own unconscious material as it relates to the research and research topic. The depth psychological research approach that Romanyshyn develops and articulates is of uncovering unconscious but active material in order to discover and expand associated knowledge. This, he suggests, is done through Jung-influenced techniques of exploring individuals' conscious-unconscious experiences.

Significantly, in line with the suggested affinity between hermeneutics and depth psychology, Romanyshyn is essentially describing the hermeneutic exploration of

unconscious complexes. "The complex researcher" (2007, p. 136) is called to be "in service" (p. 75) of the work, to address "unfinished business" (p. 83) that may be playing out unconsciously on personal, ancestral, cultural, historical, archetypal, and "eco-cosmological" levels (pp. 152-153). Although these levels and experiences of the researcher need not necessarily be part of the final work-product of the research, that is, the final written work, Romanyshyn emphasizes that a critical part of the research process includes taking seriously as information and insight the unconscious material that becomes activated. From this perspective, therefore, this current research will also be impacted by both conscious and unconscious relational aspects between the researcher, research topic, and research process. In this way, a hermeneutic circle can be seen as activated dialogue between researcher and research and between conscious and unconscious material. Therefore, as context to conscious and unconscious aspects of my relationship to the research topic, in the next section I will briefly describe my background to give insight to some of my own personal and subjective perspectives that affect my research exploring relationships with technology.

The author as complex researcher.

The following is a brief research-relevant personal exposition related to how I, as researcher, am positioned vis-à-vis the research topic. My complex vocational connection to the topic of "relationships with digital technology" revolves around my optimistic excitement about the advancement of algorithmic technology and its potential to improve our lives, and, at the same time, my fear that we are becoming overly reliant on digital technologies in many ways. In the rest of this section, I attempt to articulate

the foundations of this complex point of view that both impacts me on a personal level as well as may help shed light on unconscious aspects related to the topic at large.

Before my academic and clinical pursuit of psychology, I was a technologist developing software products for many years. My interest and plan is to combine depth psychological understanding and technology to help individuals relate to digital technology in more creative and productive ways as well as to promote building more positively psychologically-minded technology. As an "insider" in both technology and depth psychology, I view our ever digitalized world both as a sickness and as potential for positive transformation. This dichotomy of our relationship with digital technology relates directly to Romanyshyn's (1989) notion, mentioned in the previous chapters, of "technology as symptom and dream," the title of his book. He describes a technology-influenced psychic-cultural Western drive of distancing ourselves from embodied phenomena and pinpoints the start of this shift as the invention/discovery of linear perspective in the 15th century. Published approximately 24 years ago, it is remarkable how still fresh and applicable his thinking is to today's unconscious-consciousness-technology complex, in terms of historical/phenomenological contextualization and insightful warnings for the future.

Today we are seeing the latest manifestation of technology's disembodying effects. I believe that we are currently at a largely invisible shift of human unconscious-consciousness as significant as the shift that Romanyshyn unveils and correlates with linear perspective. According to Romanyshyn (1989), linear perspective represented a new consciousness of people experiencing themselves and the world as an eye viewing a window, looking out of themselves and, hence, more and more out of their bodies.

Today, in line with McLuhan's (2001) predictions and description presented in Chapter 1, we live (almost) everywhere somehow within the medium of digital information. As our conscious and unconscious phenomena interfaces with our digital surroundings, it is my belief that the window of linear perspective is morphing into the medium of virtual reality. In this way, we are living our real biological lives in digital reality.

This new reality of humanity seems to me an ever desperate but direct manifestation of the symptomatic striving of the human soul for freedom from a symptomatic body through technology, related to the unconscious human technological endeavor described by Romanyshyn (1989). I believe that our ever more ubiquitous dynamic relationships with digital interactive technology represents nothing less than a species-scale phenomenological shift. *Homo sapiens sapiens* are becoming "*Homo sapiens digitals*" mostly in hidden but extremely powerful and unconscious ways. Associated with Romanyshyn's point, the more this human-digital interface remains unconscious, the more the human-digital technology interaction becomes symptomatic. We see this already all around us in massive and powerful ways, including: people addicted to the Internet (Young & Abreu, 2011) and, perhaps the most devastating of all, losing the capacity for empathy between people (Turkle, 2011).

Despite (or perhaps because of) my worry about the negative psychic-social-cultural impact of digital technology, I am called to this research and to promote creativity and relatedness within our digital age.

Ethical Considerations

This qualitative theoretical study does not utilize any human subjects or participants and, therefore, issues of direct clinical impact are not relevant. It is the

purpose of this research to be at the service of and promote psychic-social-cultural relatedness via insights of this inquiry.

Chapter 4
Evolutionary Changes of the Psyche

In this chapter, a theoretical notion of where interactive digital algorithmic intelligence may be situated in the evolving psyche will be introduced. This will be presented and explored utilizing depth psychological constructs, in particular, Erich Neumann's formulations of the psyche, as well as selected neurobiological ideas. An attempt will be made to understand if and how engaging with interactive computerized data, information, and intelligence is fundamentally different from other psychological processes. It is hoped that this exploration will help place interactive computing in newly appreciated perspectives within the contexts of conscious and unconscious spheres of experience and phenomena. The first portion of this chapter will lay groundwork for considering unconscious-conscious dynamics. The second part will introduce digital algorithmic technology within this psychological perspective. The chapter as a whole will serve as spring broad for the following chapter that will look at specific examples of psychic-digital interactions in the form of those with recommendation systems. The goal is to stimulate more questions that challenge assumptions and to invite further investigation in order to expose otherwise invisible "goings on" between the psyche and new interactive media.

Unconscious Activity Everywhere

Building up from Freud, Jung (1954/1981e) emphasizes that the unconscious is truly unconscious. It is "the *unknown psychic*" (p. 185) which includes what may become conscious experiences *and* psychic processes and phenomena that are outside of conscious perception all together. By definition, then, unconscious processes are

extremely difficult and, in many ways, impossible to comprehend. Clearly there is a paradox in considering both consciousness and unconscious phenomena: we do not know anything other than what we know (that is, consciousness), but we know that there is *something else* and see evidence of its manifold existence through reflections and distanced observations. As mentioned in Chapter 1, evidence of unconscious phenomena appears to us everywhere in countless ways, including: in our everyday experiences like automatic decision making (Brooks, 2012; Lehrer, 2010); in modern philosophic consideration (Metzinger, 2009); in clinical observations (Weiss, Sampson, & Group, 1986); in social/psychological research (Ariely, 2008; Reeves & Nass, 1998); as well as in neuroscience (Damasio, 2010; Edelman & Tononi, 2000; Kandel, 2007; Koch & Greenfield, 2007; Ledoux, 1998; Lewis et al., 2007; Ramachandran, 2012; Solms & Panksepp, 2012). Studies of states of sleep, wakefulness, and those under anesthesia and coma conditions point significantly to the still mysterious states of unconsciousness that play vital and impactful roles in living (Carney, Edinger, Manber, Garson, & Segal, 2007; Dement & Vaughan, 1999; Fort, Bassetti, & Luppi, 2009; Friedman, Sun, Moore, Hung, Meng, Perera, Joiner, Thomas, Eckenhoff, Sehgal, & Kelz, 2010; Koch & Greenfield, 2007; Laberge, Nagel, Dement, & Zarcone, 1981). Since before Freud and after, unconscious phenomena have been the subject of intense study, from hypnosis (Erickson & Rossi, 1980) to repression (S. Freud, 1977); dream material (S. Freud, 1900/2010; C. G. Jung, Hull, & Shamdasani, 2012); historical psychic-cultural movements like those of alchemy (C. G. Jung, 1967/1970a; von Franz, 1980a) and historical individuals' personality development (Erikson, 1969); studies of myths and narratives (Fierz-David, 1950/1987; Neumann, 1952/1973a; von Franz, 1992a; Wolkstein, 1983); clinical cases

(Mackay & Poser, 2004); and, qualitative depth psychological research (Romanyshyn, 2007).

Studies of emotional functions of the brain, centered and connected to the limbic system, exhibit, in no uncertain terms, that so much of our experiences and *being* our outside of conscious perception and control (Edelman & Tononi, 2000; Ledoux, 1998; Lewis et al., 2007). Our organs and their cells, functioning in mind-bending complexity, have an intelligence of their own. Phenomenologically, we are completely in the dark about this intelligence, and scientifically, we are still in the infancy of understanding. The eyes' retina functioning and behavior, for instance, are unconscious phenomena that serve as gateways to conscious visual experiences (Edelman & Tononi, 2000). Clinically, unconscious forces can be seen in action everywhere emotions manifest in ways not immediately understood by the person exhibiting them or acting them out (Streeck, 1999). Illustrated in Chapter 2, we clearly and empirically saw that through unconscious phenomena shaping our social-emotional interactions, people interact with computerized technology through social protocol *without deliberately wishing to and without knowing it* (Nass et al., 1994).

The endeavor of studying the psychological unconscious is quite precarious, because as soon as we discover something that had been unconscious it becomes conscious, whether or not the psychic process itself actually does. Furthermore, we tend to overvalue conscious perception and not its unconscious influences (Edinger, 1992; C. G. Jung, 1944/1980b; Sharp, 2001; von Franz, 1980b). Understandably so, as the emotional source is indeed unconscious, imperceptible to our self-reflective awareness, per Jung's (1960/1981g) emphasis. Jung conceptualizes the modern phenomenon of

over-emphasizing consciousness as the tendency for it to become "inflated . . . always egocentric and conscious of nothing but its own existence" (1944/1980b, p. 480). Hence, modern consciousness tends to undervalue and deemphasize other essential aspects making up the whole psyche and personality, namely those that are unconscious as well as those at the heart of "the mystery . . . of nature" (p. 480). This analytical/Jungian psychological insight serves as a guidepost to further depth psychological research as well as clinical work (C. G. Jung, 1946/1985b; von Franz, 1993). It is hard enough to conceptualize that there are unconscious foundations of our psyches; and even harder, mostly impossible—by definition of unconscious—to recognize our own unconscious processes that color and motivate our conscious perceptions, motivations and actions. We will come back to this conscious-over-unconscious bias in considering relationships with technology toward the end of this chapter.

From a depth psychological perspective, along with neurobiological support, we can gain insights to relationships between unconscious and conscious parts of the psyche by exploring theory related to how human consciousness came into being. As mentioned in Chapter 3, a depth psychological approach to research is one that investigates human meaning and experiences through direct conscious experiences *as well as* phenomena that serve as precursor and partner to conscious evaluation and action (Romanyshyn, 2007). In addition, according to Romanyshyn, depth psychological research attempts to include all potential relevant disciplines and their perspectives as contributing insights about the psyche. It is hoped that such consideration will be helpful in looking at where digital-algorithmic technology fits into and with the psyche.

Exploring and theorizing on how consciousness came into being is precisely what Erich Neumann (1949/1973b) has undertaken with remarkable innovation in *The Origins and History of Consciousness*. Through this work, he uses investigatory tools of depth psychology and integrative multidisciplinary areas of research, including anthropology, mythology, history, philosophy, and symbols as languages of the psyche. His exploration centers on an evolutionary approach to the formation of the psyche. Neumann's depth psychological work, along with selected neurobiological hypothetical conclusions will be utilized here to project a background of human unconscious-conscious dynamics, development, and evolution, into which, in our era, interactive algorithmic technology has been introduced.

Neumann's model of unconscious-conscious dynamics is uniquely valuable in this study because, at its base, it considers how psychologically meaningful consciousness emerged and formed out of the unconscious psyche for the human species. This work specifically looks at Western culture, in which "the creativity of consciousness" (1949/1973b, p. xix) has taken root for each individual. As Neumann wrote mainly during the 1930s, 40s and 50s, just prior to the threshold of our digital age, his proposed unconscious-conscious configurations and relationships will be expanded to incorporate the new realities of our modern world, characterized by the historically and evolutionarily significant introduction of computerized interactive entities dynamically impacting our conscious and unconscious psyches. In the next sections of this chapter, some of Neumann's relevant ideas will be described in conjunction with neurobiological ideas. In the concluding section of this chapter, these ideas will help shed light on the ever-increasingly algorithmic influences on our psyches.

A Symbolic and Evolutionary Approach to the Psyche

Neumann (1949/1973b) describes the qualitative nature of the human psyche as a living system that is symbol-generating and symbolically self-representing, evolving since the inception of the species through meaning-directed, conscious-unconscious dynamics. Neumann was both influenced by and contributed to Jung's theoretical thinking. In his writings, Neumann formulates significantly new and original ideas using Jungian thinking as a springboard. Such is exemplified by his theoretical work, *The Origins and History of Consciousness* (1949/1973b), on the evolution of human consciousness and the ontological development of consciousness in individuals. While framing his exploration through an evolutionary lens, Neumann uses Jung's idea of archetypes along with anthropological and historical motifs and symbols. One of the goals of his work is to explore and present how consciousness may have been conceived and evolved from a type of unconscious state of being to become definitively human. Key to his exploration and discoveries is that the process of conception and evolution of human consciousness for the species can be understood in *symbolic* and *psychological* terms that also get played out in the development of each individual's consciousness. Each individual's psychic ontological development, according to Neumann, is structured as a microcosm of the entire human species' psychic evolution through a parallel process to the formation and transformation of consciousness for the species. This work is a masterpiece depicting the nature of dynamics and transformation of the psyche through the language of the psyche: from prehistoric emerging human ideas, images, and the process of change and creativity. Retrospectively, this work and his subsequent others (1952/1989; 1991, 1994) may be held as centerpieces exploring depth psychological

conscious-unconscious dynamics that devote themselves to psyche in its specifically human transformational quality, structured around processes of the psyche as a *living* system. This is explored through hypothesis and interpretation of changes, evolution, and growth, guided by human meaning through the symbolic language of the psyche.

Indeed, in *The Origins and History of Consciousness*, Neumann (1949/1973b) suggests that the evolutionary development of the human psyche is documented in the language of symbol throughout time. He presents his ideas in psychic-mythical-historical-analytical fashion through symbols and their meaning. Neumann is a detective of the evolution of the psyche and finds psychic fossils and connective clues to the preconscious beginnings in the symbols of humanity. He traces and interprets these from the very inception of consciousness to its evolving states and empowerment in modernity. Significantly, neuroscientists Edelman and Tononi (2000) propose that "higher-order consciousness" (p. 194)—quintessentially human consciousness—is characterized by the function and ability of using symbols for discriminating ideas and experiences and employing them for communication. Hence, in light of advanced neurobiological evolutionary study, well after Neumann's writing, it can be seen that Neumann uses these same human-produced symbolic ideas and historical representations as building blocks in his exploration.

It is critical to recognize that in this work on the birth and development of consciousness, Neumann (1949/1973b) uses interpretation, analysis, and symbols to convey, not concrete, literal reality, but the reality of the psyche, in psyche-oriented symbolic terms. This approach, attempting to connect with and envision humans' preconscious *psychic* bedrock, employs "*symbolic thinking* . . . [in order] to grasp

contents which even our present-day consciousness can only understand as paradoxes, precisely because it cannot grasp them" (p. 11). For Neumann, the development of human consciousness is always in relationship to the psyche's all-influential unconscious, which processes and patterns itself and its behavior in nature. At the same time, Neumann understands that the meaning interpreted by consciousness is directly influenced by symbols carried by the psyche since the earliest days of human history. These symbolic roots from the preconscious prehistoric psyche still powerfully influence our unconscious-conscious dynamics today. Neumann presents that the state of the psyche before the emergence of human consciousness can only be comprehended symbolically because it predates the analytical descriptive capacity of human consciousness. At the same time, symbolic expression began at the most nascent states of human consciousness. These symbolic representations of the "evolutionary states" (p. 11), what he refers to as "mythological states" (p. 5) of the evolution of the human psyche, "can be 'recollected' in the psychic structure of every human being" (p. 11) and provide insight to "the psychic background of modern man" (p. xvii).

The Preconscious, Unconscious Nature of the Psyche

Using the perspective and language of mythology and historical symbols, Neumann (1949/1973b) describes the preconscious evolutionary state of the psyche as

> [a] beginning [that] is perfection, wholeness that can only be "circumscribed," or described symbolically; its nature defies any description other than a mythical one, because that which describes, the ego [consciousness], and that which is described, the beginning [preconsciousness], which is prior to any ego, prove to be incommensurable qualities as soon as the ego tries to grasp its object conceptually, as a content of consciousness. (p. 6)

Neumann presents the process of the birth of consciousness—both for the prehistoric human bio-psychic species and in the modern individual person—as emerging from what may be seen as a paradoxical state of actively living in "the psyche and the unconscious" (p. 8). He names this phase of the psyche's evolutionary process "the creation myth" (p. 5) of consciousness, encompassing how and when it first emerges out of unconscious psychic biology. Here Neumann does not mean unconscious as a form of un-aliveness or inertness—quite the opposite. He describes the unconscious as a form of nature as self-organizing patterns and dynamics existing *before* human conscious intelligence perceives it as such. This unconscious can be understood as autonomous living, biological-neurological processes and dynamics. Such depth psychologically understood unconscious processes seem commensurate with the coordinated cellular and organic neurobiological functioning, combined with some form of animal consciousness along the evolutionary path. The former is described by neurobiologists Edelman's and Tononi's (2000) as the [zz_is reflexlike correct?] "reflexlike functionally insulated circuits . . . active in the spinal cord, brainstem, and hypothalamus . . . unconscious . . . completely inaccessible to conscious monitoring or control" (p. 177). The latter, they define as "primary consciousness" (p. 102), neuro-anatomy and processes of the more recently evolved portion of the animal kingdom. They explain that "an animal has biological individuality but has no true self, a self aware of itself" (p. 194). It "has a 'remembered present' . . . [with] no concept of the past or future" (p. 194). According to the authors, such consciousness allows for the forming of a "scene" in the present through neurobiological perception and evolutionary mechanics of memory. This type of animal consciousness is characterized by "highly differentiated or informative" (p. 111)

functioning through a "remembered present" (p. 110) as one momentary experience or act in time excludes all others. The authors theorize that upon this evolved animal consciousness, human consciousness later evolved: "Higher consciousness is built on the foundations provided by primary consciousness and is accompanied by a sense of self and ability in the waking state explicitly to construct and connect past and future scenes" (p. 104). It seems possible that some point within the evolutionary process of "primary consciousness" (p. 103) and "higher order consciousness" (p. 103) correlates with the symbolically oriented psychic evolution of human consciousness described by Neumann.

Using prehistoric and early historic symbols, Neumann (1949/1973b) puts together a tapestry of prehuman consciousness, giving form to images such as "circle" (p. 8) and "the round" (p. 11) that symbolically represent an essence of dynamic psychic oneness that is part of nature and its cycles, while also conveying a oneness in and through time. For Neumann, the unconscious is nature's intelligence that not only precedes human intelligence and human self-aware consciousness, but serves as their ultimate and perpetual source. Elsewhere, Neumann (1952/1989) describes this unconscious intelligence as a type of unconscious "extraneous knowledge" (p. 6) of the psyche, influencing and shaping each person's conscious experiences, self-awareness, and engagement in and with the world. Hence, translating and interpreting Neumann's symbolic language, one can imagine the psychic unconscious as all-nature in specifically patterned motion and symbol production as it interacts with the world of nature and is an inseparable part of it. One may imagine, from Neumann's descriptions, correlates such as patterns of weather; the aliveness of a tree (Abramovitch & Badrian, 2006; Neumann, 1991) and its growth cycle; the dynamics, instincts, and behavior of the animal kingdom,

functioning as elaborate eco-system. But this nature-unconscious state of aliveness is in the context of the psyche and the source of consciousness's inception. Therefore, Neumann stresses that the unconscious psyche's properties and patterns *must* be appreciated and expressed symbolically, per psyche's language and per the anticipation of human meaning, consciously understood. All these as such, according to Neumann's conceptualization of unconscious, were once completely and specifically unknown; *but* were instinctively *lived* through.

All nature, including the pre-human-conscious animal, lived and dynamically interacted in participation with nature's elements and their dynamics. Neumann (1949/1973b) describes "aspects of the Self-contained . . . in its preworldly perfection . . . [where] in its roundness there is no before and no after, no time; and there is no above and no below, no space" (p. 8). Interestingly, this psychic existence, indistinguishable through the concept of time, seems to fit somewhere within Edelman's and Tononi's (2000) conceptualization of neurobiological phenomena that gave rise to "primary consciousness" (p. 103) with its ability to experience the "present" (p. 110) that is "differentiated" (p. 111) and "informative" (p. 111), a precursor to the evolutionarily unfolding human abilities "to plan and link contingencies constructively and adaptively in terms of its own precise history of value-driven behavior" (p. 109).

Nascent Consciousness

Neumann (1949/1973b) emphasizes an important version of the symbolic "great round" (p. 18) images, helping to convey the state of All and "Self-contained" (p. 8) world-psyche-nature prior and at the inception of embryonic human consciousness. This symbolic image introduced and explored by Neumann is of the uroboros—a snake in

circular shape eating its own tail—as symbol of a state of all-instinctive participation. Not accidentally, the uroboros is an ancient Egyptian symbol, according to Hornung and Lorton (1999), first seen in one of the Tutankhamun's shrines from approximately 16,000 years ago, representing "the genesis and the end of time" (p. 74). It comes in many variations throughout prehistory and history: a snake eating itself, head connected to tail as both source and reception of nutrients, in a circle where beginning and end has no relevance. In fact, many alchemical treatises employed versions of this symbol as expressions of the process of psyche-matter contemplations (C. G. Jung, 1944/1980b; von Franz, 1980a). For Neumann (1949/1973b), this symbol conveys all relationships within preconscious nature as interconnected transformations where destruction and decay is also creation and growth. Additionally, Neumann sees the uroboros as symbol of relationships between aspects of the preconscious human psyche through instinctive unconscious "extraneous knowledge" (1952/1989, p. 6) that interact and make alive the biological being. In such an "uroboric state" (1949/1973b, p. 33) from where consciousness is to emerge, beginning, middle, and end have no meaning as such. Neumann's idea of the image of preconsciousness connotes phases of aliveness that simply are and move and become, but are yet unknown; at this stage, stories, human stories, the concept of plot, too, nowhere exist. For both Neumann and Edelman and Tononi, these emerge with the evolutionary appearance of human consciousness.

According to Neumann (1949/1973b), the uroboric unconscious psyche takes on another form from which consciousness would emerge. Neumann evokes the image of the preconscious psyche through the symbol of the "womb" (p. 13). Expressed symbolically, the properties of this psychic womb-unconscious is one that is uroboric in

its undifferentiated nourishment-body-nourishment cycle of life; but also has a matriarchal quality of birthing another from itself. This other will become the state, capacity, and capability of consciousness. However, the just birthed, nascent consciousness is barely any different from the unconscious aliveness from out of where it extended. Neumann links this earliest of states of consciousness as a relationship of human animal to earth. In the stage of early humanity and its consciousness, human existence was wholly characterized by the relationship with nature, the source of food, symbolically under the auspices of "Great Mother" (p. 43) earth. Neumann explains that at this stage of human psychic development, "consciousness is undeveloped and still embedded in nature and the world" (p. 42). This is the "stage of maternal uroboros [which] is characterized by the child's relation to its mother, who yields nourishment" (p. 43) and is represented "by the image of the Mother Goddess with Divine Child" (p. 43). Interestingly, Edelman and Tononi (2000) point to the concept of mothering in describing the formation of human "higher-order consciousness" (p. 103) and its differentiating, symbolizing, and communicating capabilities. Describing newly evolved human unconscious neurological functions, they state that

> the emergence of these neural connections and the appearance of speech allowed reference to inner states and objects or events by means of symbols. The acquisition of a growing lexicon of such symbols through social interaction, probably initially based on the nurturing and emotive relationships between mother and child, allowed for the discrimination of a self within each individual consciousness. (p. 195)

Part of Neumann's (1949/1973b; 1976) conceptualization is that at the early stage of conscious formation—both evolutionarily for the human species and for the developing infant—consciousness is ever-so weak and barely differentiated from the rest of the psyche. Yet for Neumann, as for others including Edelman and Tononi (2000),

conscious capability and functioning is that of being differentiated and differentiating, discriminating, per se (Müller, Carpendale, Bibok, & Racine, 2006; Tononi & Edelman, 1998). Indeed, mother-infant relationships have been understood from multiple disciplinary viewpoints as fundamental to human development (Ainsworth, 1989; Bowlby, 1983; Stevens, 2003). Neumann (1976) describes a newborn in a state of "dual union" (p. 17) within a mother-child dynamic biological bond, commensurate with a state of existence as a single psychic-bio organism. He describes the nondifferentiated mother-child oneness as the precursor and initial state out of which separation and differentiation occur in the formation of individuals' human consciousness. Through the relationship, the child's consciousness, as individual, develops and advances. Initially the Mother-Child quality of bio-psychic unity is the predecessor of emerging consciousness. It is also symbolically represented by the uroboric dynamic of psyche-earth, food-body, life-death, undifferentiated and without recognition by consciousness. Just like nascent consciousness of the human species so many years ago, infant consciousness is still unable to differentiate between itself, the psyche, and the world, in a state of "nonseparation of opposites" (1949/1973b, p. 41). Neumann explains that "only when the ego experiences itself as something distinct and different from the unconscious is the embryonic state [of consciousness] overcome, and only then can a conscious system be formed that stands entirely on its own" (p. 46).

Emerging Consciousness

Through mythological symbols, stories, and prehistoric and historic ideas, Neumann (1949/1973b) further describes and unfolds images representing the forming of consciousness out of psychically unconsciously alive nature. According to Neumann, as

the human species evolved, the world of earth and food was one of great difficulty and constant hardship. Neumann describes this state as

> exposed to the dark forces of the world and the unconscious . . . [in] constant endangerment . . . the external world, with its sickness and death, famines and floods, droughts and earthquakes . . . the terrors of a world ruled by the irrationality of chance and mitigated by no knowledge of the laws of causality. (p. 40)

Here, Neumann gives a crucial clue to the very first indication and phenomena of the initial formation of the capacity of consciousness as an outgrowth of unconscious aliveness. This hint is in the form of describing the emergence of *relationship*, initially as struggle vis-à-vis the earth, "Mother Earth or Great Mother" (p. 51) that gives food but also takes away life. This is seen in individual psychic development, too, as consciousness "struggling to free itself from the power of the unconscious and to hold its own against overwhelming odds" (p. 127). Although Neumann does not explicitly state this in these terms in *Origins* (1949/1973b), it is clearly implied that the initial human-earth struggles can be understood as *the first* consciously emergent psychic experience of relationship. It is from these relational experiences that the visceral-symbolic recognition of different entities formed and the capacity to differentiate began to develop. According to Neumann, "this early stage of conscious-unconscious relationship is reflected in the mythology of the Mother Goddess and her connection with the son-lover . . . [who is] loved, slain, buried, and bewailed by her and [is] then reborn through her" (p. 46). Neumann describes the dynamics, difficulty, and precariousness of the emerging, evolving consciousness in this stage when

> consciousness begins to turn into self-consciousness, that is, to recognize and discriminate itself as a separate individual ego, the maternal uroboros overshadows it like dark and tragic fate. Feelings of transitoriness and mortality, impotence and isolation, now color the ego's picture of the

> uroboros, in absolute contrast to the original situation of contentment. Whereas, in the beginning, the waking state was sheer exhaustion for the feeble ego consciousness, and sleep was bliss . . . now this return becomes more and more difficult and is accomplished with increasing repugnance as the demands of its [consciousness'] own independent existence grow more insistent. For the dawning light of consciousness, the maternal uroboros turns to darkness and night. *The passage of time and the problems of death become a dominant life-feeling*. (p. 45) (Emphasis added)

Neumann deepens understanding of the process of development through copious and prodigious examples and insights from mythology and parallel psychological development in individuals. Psyche's early consciousness developed, through both the powerful attraction to the earth and nature in life and death; *and at the same time*, increasingly, through an impulse of establishing itself in its own right, attempting to break from nature's hold and become independent. Indeed, this psychological process, sparked by a type of existential ambivalence, *is* "the growth of self-consciousness" (p. 94). This is the tension between, on the one hand, a pull to return into the natural unconscious state of being one with the "Great Mother" (p. 43), the uroboric Earth-Nature; and, on the other hand, the drive to become independent of this source. Therefore, Neumann provides another great clue to how the next stage of consciousness's formation came into being: the emergence of a deep undercurrent of *ambivalence*. Core existential ambivalence constellates these two irresolvable, but ever present, opposite psychic inclinations of the newly evolving human—the unconscious vis-à-vis developing consciousness. Hence, it can be said that the ability to differentiate, *the* process through which consciousness functions, transformed out of the forming ambivalence in the human animal-to-earth relationship. In this context, Neumann refers to Freud's notion of "the opposition of the life instinct and a death instinct in the unconscious" (p. 98) and Jung's

emphasis on "the principle of opposites" (p. 98). These are, indeed, extremely significant tracks of thinking about emotional-symbolic processes related to the nature of differentiated and differentiating human consciousness: the relationship of opposites and differences. The growth-oriented psychic dynamic between unconscious processes and consciousness *is* the capacity of experiencing the struggle of opposites along with specific new coping and adaptation—represented symbolically, processed relationally and psychologically, and functioning through "the connection to time and reality" (Abramovitch & Badrian, 2006, p. 195). Forming consciousness orients itself in dynamic position with unconscious processes. Thus, according to depth psychological thinkers and neurobiological scientists, this developed capacity to "differentiate" (Neumann, 1973b, p. 14) and "discriminate" (Edelman & Tononi, 2000, p. 29) transforms into the offshoot psychic entity that is, itself, differentiated from the rest of the psyche. This is consciousness.

One of the key acts and modus operandi of human consciousness, therefore, is differentiating the interflowing, interactive, transforming opposites of the world, including the sense of self, other, nature, and human-made artifacts. As Neumann (1949/1973b) describes:

> The experience of "being different," which is the primary fact of nascent ego consciousness and which occurs in the dawnlight of discrimination, divides the world into subject and object; orientation in time and space succeeds man's vague existence in the dim mists of prehistory and constitutes his early history. (p. 109)

This is the process of differentiation taking hold within the psyche as a newly forming active component within the whole of the psyche. In this differentiated and differentiating realm of the psyche, therefore, the newly conscious human begins to

become self-aware, to analyze, and to belong. Indeed, Edelman and Tononi (2000) describe "higher-order consciousness" (p. 194), human consciousness, as newly capable of "concept formation" (p. 196), ideas of past and future, and semantics, which enables "the ability to express feelings and refer to objects and events by symbolic means" (p. 194) and participate in "social interactions" (p. 194). These evolutionary human capabilities of consciousness are all further advancements in the act of differentiating something from another. Indeed, Edelman and Tononi theorize that these neurobiological developments of the "emergence of the self leads to a refinement of phenomenological experience, tying feelings to thoughts, to culture and to beliefs . . . [that] liberates imagination and opens thought to the vast domain for metaphor" (p. 191), "meaning" (p. 197) and symbolic communication.

Because this exploration attempts to serve as base for the central investigation of this dissertation related to the juxtaposing between the psyche and computers/algorithms, the following question should be kept in mind: Do human-technology interactions primarily represent consciousness-with-technology interactivity or unconscious processes-with-technology dynamics? Equally important is this question: Does interactive informational technology function in a way that is commensurate with either unconscious process or consciousness or does it represent new psychologically impactful types of entities that do not conform to the nature of the psyche as it has evolved for so many thousands of year? But before confronting these questions head on, let us first consider further proposed properties of the dynamics of the human unconscious-conscious relationship and how consciousness forms within the psyche to become part of it.

Unconscious-Conscious Dynamics

As complement to Neumann's symbolic exploration of consciousness, here we make use of Neumann's (1952/1989) proposed epiphenomenal hypothesis of unconscious-conscious relational dynamic. Neumann describes the psyche's unconscious processes as informed through "the reality of an uncentered system of knowledge . . . not linked to the ego [consciousness]" (p. 5), that is, not originating or initially experienced consciously. He calls this "*extraneous knowledge"* (p. 6) and distinguishes it from "forgotten or repressed content." In bringing to light conscious and unconscious types of knowledge, he states that "unconsciousness signifies merely unconsciousness of knowledge, not its absence. There are various forms of unconscious knowledge, and ego-consciousness only represents one particular form of knowledge" (p. 7). Hence, Neumann refers to knowledge that we are aware of as just a small sliver of the vast knowledge to which our entire organism or "total personality" (p. 7) has access. However, as discussed above, we are only aware of what we are conscious and psychologically tend to erroneously believe that consciousness is not just a single perspective out of many processes, but the entire field of our knowledge. According to Jung (1948/1981f), the psyche as a whole is made-up of multitudes of unconscious "complexes" (p. 97), while the sense of one's self is experienced through a psychic structure that is conscious. This is also related to the depth psychological principle represented by Von Franz's observation, mentioned in Chapter 2, that consciousness is merely a piercing through of unconscious phenomena, occurring in everyday much less frequently than we may think. According to Neumann (1952/1989), "this identification" (p. 7) with our ego knowledge, that is the conscious component of the psyche, "was historically significant and necessary

for our development, *but* it is nevertheless false and responsible for a dangerous narrowing of our horizon and of our 'knowing'" (p. 7) (emphasis added). It is the argument of this chapter, more fully articulated in the next section, that bias toward consciousness presents deep, if not insurmountable, problems of our interactive digital lives and contributes to the difficulties in attempting to understand them.

Neumann (1952/1989) describes the relational dynamic between conscious aspects that we experience as ourselves and our total personalities which encompass the entirety of the human organism. He schematically conceptualizes the intrapsychic relationship between the total personality's unconscious knowledge base along with its instinctive drives vis-à-vis the understanding and action of the conscious component of the psyche. He refers to this active relationship as "the ego-self axis" (p. 34), which can be seen as a line of communication sourced from the bio-psychic unconscious self to the conscious ego as a differentiated extension. This relational line or "axis" (p. 34) between the two is based on the early evolutionary relationship we have seen in Neumann's *Origins* (1949/1973b) that started as a oneness within psyche-nature out of which self-awareness evolved.

As above, we also see this in Neumann's (1976) consideration of human mother and infant dynamics, where the two form an undifferentiated psychic–biological unity that evolves into dynamics of tensions between separateness and returning to this bond. This encompasses the processes of the child's growth and developing conscious experiences. Human consciousness as extension and differentiation from the unconscious psychic whole, therefore, is an interactive product and partner of the unconscious source. Consciousness is reliant on unconscious data, which it receives and

interprets through pathways of communication within the psyche. Indeed, many neurobiological unconscious centers, including the fear-producing amygdala as discovered by LeDoux (1998), function powerfully through their own pathways to give rise to emotional biological changes and behavioral reactions. Although interactive, such emotional centers of the brain react faster than conscious processes and, when highly stimulated, can overshadow consciousness all together (Goleman, 2005; Ledoux, 1998). Hence, consciousness cannot sever the cord of dependence from the unconscious foundations of the psyche.

Feeling as Bio-Psychic Evaluation

This vital service of the unconscious can be understood as part of the neuro-biological instinctive processes of measuring life-sustaining value through emotions, as described by the neuroscientist Antonio Damasio (2010). He theorizes that every living organism, including cellular organisms, function through biologically changing states which can be understood as "emotions" (p. 9) responding to environmental variables. Furthermore, neurobiological "feelings" (p. 9) function as evaluators of these emotional states to determine survival value and associated adaptive behavior. These processes represent unconscious neurobiological intelligence and value-oriented knowledge that extend into human consciousness; but at the organic, cellular level, as survival-based environmental biological adaptive responses, they *do not* require human consciousness. These can be seen as commensurate with Neumann's description of "extraneous knowledge" (p. 6) of the unconscious psyche. As mentioned in previous chapters, Damasio's biologically based emotions-feelings phenomena may also correspond to Jung's (1928/1981c) psychological conceptualization of "feeling toned" (p. 11) unconscious "complexes" (p.

11). Jung states that "emotional phenomena . . . known as *feeling-tones"* (1931/1981h, p. 141) are core to the process of "*evaluation"* (p. 141); some of which are unconsciously made of "certain constellations of psychic elements grouped in feeling toned contents" (1928/1981c, p. 10). Consciousness is a direct consumer of this emotional-biological-evaluative data and, through differentiation, analysis, and communication, can further utilize this instinctive biological information (Damasio, 2010; C. G. Jung, 1960/1981g; Neumann, 1952/1989).

Hence, these two dynamically interactive psychic entities—unconscious and conscious—are not equal in stature: as we have seen above from Neumann's symbolic analysis of the formation of consciousness, ego consciousness is a product of and represents a small portion of the otherwise unconscious psychic-biological, instinctively directional psyche. Consciousness can and does affect the unconscious psyche as it is the only phenomenological asset we have for becoming directly aware of both ourselves and our experience. However, Neumann makes it very clear that, at least in the formation of consciousness, the yet undualistic unconscious psyche is the source, while the discriminating, analyzing consciousness is its progeny. The unconscious psyche, with its "extraneous knowledge" (p. 6), influences the entire personality and its relationship with conscious processes through instinctual, evolutionary and symbolic patterns and reactions. This knowledge can be understood as unconscious psychic-biological-instinctive imperatives and associated data. These can be seen as similar, in many ways, to the biological adaptive, value-oriented emotions-feelings of all living entities described by Damasio. Consciousness, in turn, forms differentiated symbols out of these in order to consume and make use of in meaning-making, communication, and creative acts.

Complexity of Consciousness

As part of their intriguing theory of consciousness, Edelman and Tononi (2000) propose that fundemental to the attainment of "high-order" (p. 49) consciouness is the phenomenon of "reentry" (p. 49) by which parts of the brain function in "mass parraellism" (p. 49) and "synchronous firing" (p. 48), producing the "the *unque* feature of higher brains" (p. 49). They describe this phenomenon as an "ongoing, recursive interchange of parallel signals between reciprocally connected areas of the brain, an interchange that continually coordinates the activities of these areas' maps to each other in space and time" (p. 48). Consciousness, then, is the harmonizing and the interconnecting of parts of the brain together—not necessarily in linear causilty—centered largley around the neuroanotomical "thalamocortical meshwork" (p. 48). Emphasizing reentry's importance to the formation of consciousness, they state that

> the intralaminar nuclei send diffuse projections to most areas of the cerebral cortex and help synchoronize its overall level of activity. All these thalamocortical structures and their reciprocal connections acting together via reentry lead to the creation of a conscious scene. (p. 108)

This functioning, they propose, *makes* consciousness, not just through feedback between different areas of the brain, but through a synchipation of brain activity and frequencies that together form something like music harmonies expressed through "improvisation" (p. 49). This is similar to Greenfield's (Koch & Greenfield, 2007) hypothesis that consiousness is the manifestation of action of specific "'assemblies' of coordinating cells . . . in the right space and timescales for the here-and-now experience of consciousness" (Greenfield speaks section, para. 6).

In addition, it may be that something akin to these types of processes—part anotomical and part vibrational—is the neurobiological corralate of Neumann's

(1952/1989) theorized "ego-self axis" (p. 34), informed by unconscious "extraneous knowledge" (p. 6) and conscious differentiation. Furthermore, Edelman and Tononi (2000) describe reentry and its associated neurbiological functioning of consciousness as "without any superordinate map to guide the process" (p. 108). This seems significantly commensurate with Neumann's (1952/1989) description of the unconscious psychic-biological system as "an *uncentered* system of knowledge" (p. 5) (emphasis added), per above. This similarity points to the possibility that such synchronized complexity occurs at the psyche's unconscious-conscious thresholds and can be appreciated by both neurobiological and depth psychological perspectives, as different as they are.

Biological Emotions as Experience

Complicating the exploration of unconscious-consciousness dynamics, but critically important to the investigation into meaning-oriented experiences are new perspectives on neurobiological emotional phenomena; in particular, those challenging existing theories that tend to relegate emotions to the sphere of unconscious processes. Solms and Panksepp (2012) take a "neuro-psycho-evolutionary" (p. 147) approach to understanding emotionality and advocate considering emotions as largely conscious phenomena, contrary to many current neurobiological scientific theories. They highlight and further extrapolate the evolutionarily, adaptive, and evaluative nature of emotions, in line with Damasio's theories. At the same time, they critique theories that underappreciate the extent of emotional neurobiological consciousness. Using a "neuropsychoanalytic framework" (p. 148), Solms and Panksepp argue that human *emotional consciousness* occurs in much the same way as it does in many animals, in terms of location in the brain and neurobiological processes; and as evolutionary

functioning of emotional neurobiology rooted in phenomena commensurate with Freud's pleasure principle. These active emotional brain areas include lower brain anatomy like the upper brainstem, commonly associated with unconscious, biologically instinctive functioning. Like Damasio, they explain that emotional/affective consciousness serves as life-adaptive biological processes by creating positive or negative feelings that accordingly direct an animal as well as a person toward specific behavior. Describing biological "subjective experiences" (p. 148) as affective, evolutionary, biological phenomena, they state:

> Interoceptive consciousness, too, is phenomenal; it "feels like" something. Above all, the phenomenal states of the body-as-subject are experienced affectively. Affects, rather than representing discrete external events, are experienced as positively and negatively valenced states. Their valence is determined by how changing internal conditions relate to the probability of survival and reproductive success. At this level of the brain, therefore, homeostasis is inseparable from consciousness . . . affective consciousness represents diffuse internal (automatically evaluative and subjective) . . . reactions to those happenings. Affectivity is, in this respect, a unique experiential modality (p. 156)

Furthermore, the authors emphasize that this emotional neurobiological consciousness also serves as the foundation for cognitively oriented consciousness. It is possible that the latter corresponds to the differentiating consciousness that has been focused on above; while the former may correlate to aspects of the formation of ambivalence and associated struggles so vital to conscious development, as described and alluded to by Neumann.

Solms and Panksepp (2012) advocate an understanding of psychic-biological emotions as biologically and subjectively conscious. This proposition seems a very significant contribution to a realignment of modern neurobiological-psychological conceptualization of conscious and unconscious phenomena that strengthen and further validates Jungian ideas of the unconscious. As mentioned above, analytical psychology

stresses that unconscious processes and material is indeed experientially unknown. However, in Solms and Panksepp's article, the experience of emotion, for instance, anger or fear, is *not* unknown but is *experienced consciously*. Therefore, if emotions are consciously experienced, then truly unconscious processes and influences, like Neumann's (1952/1989) conceptualization of "extraneous knowledge" (p. 6), must be understood as categorically different from, but interwoven with conscious phenomena such as experiencing emotions and cognition.

The precise interface between unconscious and conscious processes is extremely challenging to pinpoint, per Chalmers' (2010) "the hard problem" (p. 3) of consciousness (Susan Greenfield, 2012). However, Solms and Panksepp's neuropsychoanalytic biological approach may contribute in understanding where such a threshold between unconscious and conscious may lie. Based on their article and their insights from modern neurobiological and psychoanalytical theories, we can understand the unconscious-conscious dynamics as encompassing: (1) unconscious psychic-biological functions; (2) emotional consciousness; (3) and the consciousness of ideas and meaning-oriented differentiation. The emotional conscious layer, therefore, seems to be situated as bridging phenomena between unconscious biology and meaning-forming consciousness. In this way, emotionality can be seen as a medium interconnecting the aliveness and evolutionary adaptability of unconscious biology with all meaning-oriented and conscious differentiation, analysis, and creativity. Solms and Panksepp (2012) state that

> the internal body gives rise to a background state of "being"; this aspect of the body is the subject of perception. We may picture this type of consciousness as the neurodynamic page upon which, or from which, exteroceptive experiences are written in higher brain regions. (p. 156)

As will be seen soon, emotionality, whether precisely conscious or unconscious, plays a keystone role in our exploration of relationships with digital algorithmic interactive entities. As we continue our investigation, we will see emotions and their feeling-evaluative phenomena lying so closely to our conscious ideas that, as powerful as emotions are, they are experientially misunderstood, at best, and, otherwise, mostly consciously ignored. As we will see, emotions are often not consciously registered, especially when interacting with digital technology. Therefore, although Solms and Panksepp (2012) convincingly argue that emotionality is part of conscious phenomena, its elusiveness and proximity to truly unconscious biological precursors, often casts emotions *as if* unconscious. This, all the more, sets the stage for psychic vulnerability and emotionally mistuned experiences vis-à-vis algorithmic technology that, as will be seen in the next chapter, center around *emotional* reactions.

Interactive Algorithmic Technology: Consciously Created, Unconsciously Consumed

Conscious-unconscious dynamics as affinity and opposition.

Depth psychologists and neurobiologists seem to agree that consciousness is far from the seat of the human organism, whereas conscious emotionality is often unrecognized. Through unconscious knowledge, the unconscious psyche informs and influences emerging consciousness. The biologically alive unconscious, through intermediary emotionality, had given birth to consciousness in the early days of the human species and gives it birth within each healthy developing individual psyche (Neumann, 1949/1973b). The further development of consciousness is the increased

capacity to be self-aware and to differentiate, discriminate, analyze, value, and communicate about oneself and one's mentalizations using symbolic, semantic language (Edelman & Tononi, 2000). By differentiating itself, consciousness has been able to differentiate the world and, therefore, able to create. It creates through differentiating and creating new differentiations. Indeed, with the backdrop of unconscious aspects of the psyche and its associated emotionality, human consciousness crafted civilization, from prehistoric rituals to the modern world (S. Freud, 1930/2005).

As we have seen, from a depth psychological perspective, supported by neurobiological hypotheses, human consciousness can be theorized as an evolutionary outgrowth from an unconscious psyche that includes both "extraneous knowledge" (Neumann, 1952/1989, p. 6), a "primary" (Edelman & Tononi, 2000, p. 103) animal consciousness, and unconscious life-adaptive functioning at the organ and cellular levels (Damasio, 2010; Edelman & Tononi, 2000). Moreover, human consciousness can be understood as a type of evolutionary psychic-neurobiological phenomenon that splintered off from the all-encompassing nature-unconscious aliveness of the prehuman conscious condition, which included animal consciousness. Therefore, the evolved differentiated inner-psychic *differentiating/analyzing conscious entity* that now interacts with other components of the psyche can be seen as part of nature and, also, as opposed to it (Neumann, 1949/1973b). As differentiated from and differentiator of the holistic nature-psyche-unconscious and world, human consciousness can be understood as an "other" vis-à-vis nature. But at the same time, as we see clearly, from both the neurobiological theories and depth psychological thinking explained above, it is always in some state of psychic-bio relationship with the unconscious aspects of the psyche. With insight from

hypotheses such as Solms and Panksepp's neuropsychoanalytic thinking, the bridge between unconscious psychic-biology and differentiating ego consciousness may be significantly formed by conscious emotionality that we share with the animal world. Biological pathways of communication intrapsychically serve as conduits to the integration of emotional self-awareness and differentiating analysis. On the one hand, differentiating, analytical consciousness, as psychic entity, can be seen as partner to the instinctual, nature-unconscious psyche. On the other hand, this relationship between nature-produced consciousness and nature-unconscious-psyche often seems extremely problematic in light of the current state of human activity, massively altering our environment and nature in negative and dangerous ways (Zalasiewicz, Williams, Steffen, & Crutzen, 2010). Jung (1942/1970c) suggests and warns of this highly tenuous and paradoxical relationship, saying, "nature *must* not win the game, but she *cannot* lose" (p. 184).

New psyche-engaging entities, products of differentiating consciousness.

In any case, "higher order" (Edelman & Tononi, 2000, p. 194) human consciousness is a *differential* from nature's original unconscious psyche. This connotes both differentiating itself as other *and* existing in a "once removed" reality from original nature. For thousands of years, consciousness, once removed from, but in relationship with the unconscious psyche, created civilization. As mentioned above, consciousness created things and ideas, influenced by conscious-unconscious dynamics, through what Neumann (1952/1989) theorizes as a "ego-self axis" (p. 34) transmitting bio-instinctive-symbolic knowledge and unconscious-conscious feedback. Neurobiologically, as described by Edelman and Tononi (2000), this can be seen in "input-output connections"

(p. 178) as "ports" (p. 178) of neurobiological pathways between conscious and unconscious brain processes.

However, although human consciousness creates, it has *never,* itself, given birth to a new type of psychic entity, like the unconscious had given birth to consciousness for the human species and as it does in each human individual; not, that is, until consciousness created computerized, algorithmic interactive technology. It is precisely human "higher-order" (Edelman & Tononi, 2000, p. 103) differentiating and symbolizing consciousness that produced mathematics, computers, and digital technology. "The acting, willing, and discriminating" (Neumann, 1949/1973b, p. 318) consciousness, through neurobiologically processed "meaning and semantics" (Edelman & Tononi, 2000, p. 196), has engineered the computer quite recently in evolutionary terms. In this way, the advancement of computing can be seen evolutionarily as an extension and product of human consciousness. With the advent of interactive digital/information/algorithmic technology, something new has been created. However, interactive algorithmic intelligence is so different from all other creations that it represents not just a creation, but a birth of a new type of entity in physical, informational, and psychic reality. This is so precisely because, as we will continue to see through depth psychological perspectives, interactions and relationships with highly advanced digital algorithmic information technology fundamentally take place—deceptively—first and foremost *unconsciously*. We see this phenomenon clearly in the social psychology experiments described in chapter 2 showing that unconscious processes and behaviors of people contradict their own conscious understanding and beliefs of the way they interact with computers (Nass et al., 1994). Therefore, in an

extraordinary evolutionary twist, despite being so "conscious-oriented," consciousness, the differentiator, seems to falter in its ability to differentiate this new type of entity, even though it, itself, is the creator. As a consequence, consciousness lacks the capability to differentiate accurately how this creation impacts its own experiences. Such significant discrepancies between unconscious and conscious processes when interacting with computing technology strongly hint at the poignant and possibly massive effects within and upon our psyches.

Biological versus nonbiological value.

It is hypothesized here that in addition to the limited scope of consciousness in interactions with digital/algorithmic action, there is also a significant incongruence between algorithmic intelligence and the psyche overall, including unconscious processes. That is to say, there is a categorical teleological mismatch between the dynamics of the psyche and digital/algorithmic action. One is evolutionary-biological-emotional-symbolic; while the other is digital-computational-mathematical-statistical. In this way, algorithmic action *is not* commensurate with the makeup of the psyche in its dynamic composition of relationships between unconscious processes, emotionality, and differentiating, meaning-oriented, creative consciousness. The unconscious-conscious relationships that form the psyche, as we know it, are biologically based and function in psychically evaluative ways *biologically*. Therefore, it follows that at the smallest and most finely grained levels of unconscious-conscious dynamics, artificiality cannot mimic precisely and accurately these natural categorically biological phenomena. These are nature-biological substrates that manifest as *valuing systems of biology*, like Damasio (2010) describes of emotions and feelings and like Jung (1948/1981b) expresses by

instinctive "*feeling-value* of the archetype" (p. 209). As simple as it is fundamental to the phenomena, it is suggested here that biological value cannot be replicated without biology. Anything else will be, by definition, based on something other than a biological directive value system. Although this sounds like a self-referential argument, it is a key distinction that seems to be overlooked within our society that is rapidly becoming "digitalized." While this "something else" may be dynamic and psyche-influencing; integrated with the psyche, it will create a biological psyche *composited* with this something else—no longer the evolutionary biological psyche in and of itself. Hence, the dynamic will be the psyche hybridized with something different that is not psyche.

This difference is of utmost importance, because, although the theorists discussed understand that biological value and motivation is the *foundation* of all psychic states, the value system at its core is still unknown and may be in perpetual state of evolutionary change. Therefore, information or "knowledge" (Neumann, 1952/1989, p. 6) passed between unconscious and conscious may be understood as something akin to "bio-nature-value" units, which at their core are still very much mysteries to science and remain reductionistically in the sphere of the unknown. In contrast, digital, algorithmically formed information, by definition of functioning through units of value different from bio-nature-value units of data, *cannot* participate in information exchange through the exact substrates as the psyche's biologically rooted unconscious-conscious dynamics. Furthermore, unconscious processes have never had to contend with information that is dynamically unconscious-*like* in its influence, but *not* part of the psyche itself, whether within one psyche or between psyches. The interactive algorithm as such is invisible and unconscious to the human; while it "acts" artificially vis-à-vis the bio-psyche. It is,

therefore, a new entity in the psychic landscape that changes the very landscape into which it has been introduced.

Unconsciously processed interactivity.

As an extension of what is hypothesized above, our conscious minds, having no way of understanding technology's behaviors algorithmically such as they are, cannot directly and accurately process differentiated human meaning from machine action and information. This is so because, while the human conscious mind created artificial digital entities, these are now becoming so autonomously interactive that perceptions of their actions bypass conscious processing and are immediately *processed unconsciously*. It is suggested that these unconscious ways of perception are commensurate with the emotion-feeling biological adaptive process, per Damasio's theory mentioned above; through neurobiological unconscious processes establishing social-emotional relationships (Lewis et al., 2007; Stevens, 2003); and, per Neumann, based on unconscious psychic "extraneous knowledge" (1952/1989, p. 6). Only after unconsciously processing these emotional, feeling, and symbolic information, are they available for conscious differentiation and further symbolizations. But, all the while, through conscious awareness and conscious experience, people *falsely* believe they are aware of the *entirety* of the experience with the interactive technology. Of course, unconscious processes are core to all experiences and relationships (C. G. Jung, 1946/1985b; Lewis et al., 2007; Mitchell, 1988); but, with interactive digital technology they are all the more deceptive and hidden, because: (1) we do not conceptualize that such emotional and relational processes can exist in response to machines; and (2) digital/algorithmic effects on unconscious or emotional processes are new and foreign within the realm of the entire

evolutionarily formed human psyche. This will be seen through examples in the following chapter.

Summing the above, it is as though once consciousness creates this level of artificial interactivity, consciousness loses the ability to understand it. In this way, consciousness—the psyche's entity that is once removed from nature, gives birth to an entity that is twice removed from nature; and, in significant ways, this new entity is no longer understood by the very consciousness that created it. We see in literature the prefigurations of such challenged human-to-algorithm relationships. Mentioned in Chapter 2, examples include stories of the Golem in Jewish folklore (Scholem & Alter, 1995); Mary Shelley's (1999) "Frankenstein; or, The Modern Prometheus"; and the robots that take over in the play "R.U.R. (Rossum's Universal Robots)" (Capek, 2010). These literary imaginations from the past give form to our present-day human endeavors. These began as creative acts, but now give rise to technology that, by definition, is incomprehensible *and*, therefore, psychologically altering.

Illusive dynamics of psyche-digital technology.

The overall erroneous tendency of assuming that interaction with digital technology are consciousness-based seems to be the result of at least three underlying psychic-cultural factors, each an extremely powerful force in its own right: (1) the assumption that the effects of technology are conscious-based because technology is consciously produced and scientifically formulated and evaluated; (2) the psychic bias toward over-valuing and over-estimating conscious reality especially in our materialistic, objective-oriented Western society; (3) and the pull of innovation and capitalistic structures and influences that may be threatened by giving more pause to possible

unconscious negative effects of technology (Lanier, 2013). At the same time, neuroscientist Susan Greenfield (2009) points out that there is no more important subject of investigation "of all our current world" (p. 14) than understanding better "how the new technologies might impact on our brains in completely novel ways, thereby actually transforming us as people" (p. 14). Giving even more weight to the evolutionary argument of digital/algorithmic impact on the human species, she emphasizes both the urgency and degree of challenge presented by human-altering technological innovations, stating that "there is no precedent in the history of our species that might give us a clue as to what might happen, and what would now be the best course of action" (p. 13).

Given the bias toward consciousness that undervalues biological unconscious processes and emotionality, it is easy to understand how a phenomenon of information technology can be imagined, proposed, and hypothesized as at least theoretically attaining consciousness. From a psychic-biological perspective, this seems erroneously arrived at by disregarding the requirement for the biological quality of unconscious-conscious dynamics that form living consciousness. For instance, Tononi (2004), in his article "An Information Integration Theory of Consciousness," proposes a theory of consciousness that is based almost exclusively on physical properties of information, *without* explicit dependencies on biological, evolutionary and instinctive adaptability as basis for consciousness. In his proposal, the difference between human consciousness and theorized informational computation of a digital, information-detecting and analyzing device is only in quantity and complexity. His theory of consciousness as articulated in this article states that consciousness exists when a threshold of complexity is crossed in the capacity of "differentiation" (p. 1) between experienced information and "information

integration" (p. 1) of experiences, in space and time. Although Tononi does consider specific neuroanatomical areas in terms of their functioning consciously according to his informational criteria, he does not seem to categorically define a contrast between biological consciousness and computerized or informational consciousness. That is, he does not seem to consider *biological evolutionary value-directed processes* as specific and prerequisite to consciousness. In other words, from a bio-psychological perspective, although his theory may make an information-based contribution to consciousness, it may not encompass a large enough definition of psychic-biological consciousness to be applicable to animal and human phenomena. His criteria for consciousness in this article seems to expand the spirit of thinking that he articulates in his prior writing with Edelman where they seem to hint at the specifically biologically oriented, evolutionary complexity of consciousness. For example, they state that

> conscious experience does not just float freely above an ocean of functionality insulated, unconscious processes. Instead, it is constantly influencing and being influenced by many unconscious processes. Indeed, there are thousands of examples in both perception and action, thought, and emotion, that demonstrate conscious and unconscious processes are regularly in touch and their separation is often far from clear-cut. (Edelman & Tononi, 2000, p. 177)

Elsewhere they paint a picture of the brain as "one of the most remarkable structures to have emerged during evolution . . . [it is] special—its connectivity, dynamics, mode of functioning, and *relation to the body* and the world is like nothing else science has yet encountered (p. 37) (Emphasis added). Although Edelman and Tononi (2000) do not explicitly expose biology as a qualifying requisite to human consciousness and neurobiological ontology, it seems axiomatic in their writing. From this perspective, the dependence of conscious experience on unconscious functioning cannot be taken out of

the equation, and conscious experience cannot be removed from unconscious processes. Most importantly, from the standpoint of the unfolding understanding of the psyche developed in this dissertation, the biological nature of unconscious processes that affects consciousness also affects the nature of consciousness. Therefore, consciousness must be biological, while any other form of informational complexity and knowledge must not be considered consciousness.

For the purposes of investigating human conscious-unconscious-emotional interaction with informational-algorithmic technology, the absence of a biological requirement in a definition of consciousness is extremely troublesome. From a neuro-psychic perspective, it seems imperative that fundamental consideration be given to the *biologically evaluative* operators which science has not yet and may never fully understand nor artificially replicate. Neurobiological theorists such as Damasio, Panksepp, and Solms seem, at least, to have reached the point of recognition of a type of neuro-psychic biological phenomena at the threshold of unconscious processes and consciousness. Something akin to *biological* knowledge, motivation, and feelings direct us toward adaptive living. This is very much in line with depth psychological thinking of unconscious instinctual directedness, influencing feeling and meaning-oriented psychic life. The argument in this exploratory dissertation is in line with these theorists and regards a purely informational interpretation of consciousness as a subtle but major error in perception, psychological understanding, and likely leading to inaccurate conceptualizations of interactive algorithmic impact on the human psyche.

A new triplex making up psychic dynamics.

The following is a description of a proposed hypothetical progression of dynamics of the psyche in psychic-algorithmic interactions. As we have seen above in the discussion of unconscious-conscious dynamics, consciousness is unable to phenomenologically interpret experience without psychic-neuro-biological processes and precursors to emotionality. In the same vein, consciousness *cannot directly* interpret algorithmic behavior and interactions into human meaning. The interactivity with algorithmic entities, therefore, falls on unconscious processes first. However, unconscious, emotional, social, instinctive processes have never before encountered "artificial" entities that are psychically interactive, dynamic, and emotional-like, but *not* biological. Therefore, human unconscious, neurobiological, psychic processes have to make the best of it. It is hypothesized in this present exploration that, instinctually and evolutionarily, unconscious processes—somehow, through ill-equipped processes or ones that are completely new—sense the interactive artificial "algorithmic other" as other, either intra- or interpsychically. The interaction with "the algorithmic other" activates unconscious bio-psychic processes and associated data that are, then, passed on to more conscious emotional and idea-producing processes and experiences.

Hence, the unconscious makes due, as if these interactive entities are psychic, resulting in strange emotional manifestations that are, on the one hand, proxies for psychic-emotional information, but, on the other hand, are not adequate substitutes. This is seen in the computer-as-social-beings experiments (Nass et al., 1994) described in Chapter 2. Therefore, it is hypothesized here that without input from differentiating consciousness, within the spectrum of unconscious to emotional-feeling processes, *the*

psyche erroneously senses in algorithmic interactivity life where there is no life, a psyche where there is no psyche. Hence, it is upon information or "knowledge" from these strange unconscious and emotional-feeling processes that consciousness becomes activated and begins to interpret and interact. Consciousness, however, does not interact directly and immediately with the technology itself, but with the emotional information as the psychic-neurobiological products of associated unconscious processes. Therefore, on top of the artificial-versus-psychic error of unconscious and emotional processes, *consciousness mistakenly interprets the interaction as one directly and simply with the technology*. Hence, the deep and dangerous paradox is now front and center: (1) not only can these artificially psychic entities not be processed primarily through the very consciousness that gave them animation; (2) they are not recognized as impacting the psyche unconsciously; while, (3) unconscious and emotional processes sense them instinctively and through feeling, not artificially as they are, but as something else.

In describing the potentially radical changes advanced technology may incur upon the human environment, experience, and species, Greenfield (2009) expresses that

> information technology, nanotechnology and biotechnology are blurring or even breaching every dichotomy that has until now transcended any particular culture, and held firm for every human society: the real versus the unreal; the old versus the young; the self versus the outside world. (p. 12)

From Greenfield's picture of the eminent human-technology hybridization as something so different and foreign to the human species, it can be extrapolated that these changes may become incomprehensible to human conscious understanding and change the human organism all together. Supporting this conclusion further, in the statement above, Greenfield identifies a total revamping of the "dichotomy" (p. 12) of the current human

condition. As we have seen, it is precisely the positioning and defining of opposites that is the domain of human consciousness as it differentiates the world and itself. By conceptualizing a transformation of "dichotomy" (p. 12), Greenfield is attuned to interactive technology's effects on the human being by nothing less than an eradication of current human neurobiological-symbolic *relational differences* within our psychic selves, between others, and the elements in the world. Greenfield's statement of the positioning of human-technology phenomena definitively supports the above argument that although created by differentiating consciousness, interactive algorithmic technology does not primarily belong in the sphere of conscious interactions. At the same time, algorithmic technology invades the current human world, changing all the rules of consciousness, rendering it severely weakened, if not powerless, in its discriminating capacities, while affecting unconscious processes and emotionality in new and yet completely unknown ways.

Goleman (2005) frames emotional and intellectual, unconscious and conscious dynamics in the following way: "ordinarily the complementarity of limbic system and neocortex, amygdala and prefrontal lobes, means each is a full partner in mental life. When these partners interact well, emotional intelligence rises—as does intellectual ability" (p. 28). Furthermore, he suggests that when emotional and intellectual processes clash with each other in mutually exclusive ways, psychological adaptability and capabilities of achievement in society become significantly compromised. It is the premise of this dissertation that in context of interactive computerized technology, the degree of "complementarity" (Goleman, 2005, p. 28) of the emotional unconscious and

rational conscious duplex no longer makes up the whole of the psyche. The unconscious-conscious-technology triplex forms the new human reality.

However, this expansion does not follow the bio-organic rules of the psyche, which evolved since the inception of the human species. Precisely because algorithmic digital technology is not of nature and not biological, the "complementarity" between the three spheres of reality becomes highly questionable and mysterious at best. One of Jung's (1935/1985a) key concepts of unconscious-conscious dynamics is that of a "compensatory" (p. 11) relationship between them—one "balanced by" (p. 11) the other in the process of psychic growth and adaptability. In depth psychological terms, then, such intrapsychic compensatory phenomena must be reconsidered with the introduction of interactive digital algorithmic technology. The psyche must now contend with interrelationships of unconscious, conscious, *and* dynamic input from digital algorithmic entities. But, as we have seen, the psyche has formed into its current dynamic processes of unconscious biological, emotional, and symbolically oriented consciousness in its evolution through thousands and thousands of years. In contrast, algorithmic entities have been introduced into dynamics with the biological psyche within an evolutionary millisecond. Therefore, impacting the psyche in significant and unknown ways, these resemble brand new organisms and organs; however, they are far from "organic" and, by definition, artificial, *not biologically alive*. In a great and incomprehensible contradiction, they are *not* psychic entities themselves, but, at the same time, are unconsciously reacted to as though they were.

Of course, both differentiating "primary conscious" (Edelman & Tononi, 2000, p. 103) and "higher order consciousness" (p. 103) play a part in human-algorithmic

interactions as these situate a person in sensory reality and enable one to formulate specific experiences through language. However, predominantly more directly and fundamentally, the experience of interaction takes place in the realms of unconscious phenomena. Digital algorithmic technology is a new entity in the world, never before seen within evolutionary *and* individual development of unconscious-conscious dynamics, likely altering them forever. In the next chapter we will further explore these ideas related to the new sphere of psychic conscious-unconscious-digital reality and make use of specific algorithmic technology as examples.

Chapter 5
Illustrations of Complex Psychic-Digital Interactions, in the Form of Recommendation Systems

In the last chapter of this dissertation, before the concluding remarks, a cursory glance at types of digital-algorithmic technology that psychologically fit into a more general category of recommendation systems will be considered. Using several depth psychological constructs supporting the theoretical conclusions of the previous chapter, these examples are included as topics that deserve further exploration when assessing digital/algorithmic impacts on the evolutionary-biological-emotional psyche. Each section should be regarded as an introduction to possible expanded theoretical developments and investigations.

Summary of the New Evolutionary Unconscious-Conscious-Digital Technology Triplex of Psyche

Successful artificiality.

As proposed in the previous chapters, we seem to be at a pivotal point in human psychology. A strange and poignant juxtaposition seems to be emerging within our contemporary psychic makeup where technology is ever increasingly and pervasively intertwined with human experiences and psychic-neurobiological-emotional processes. At the end of last chapter, it was proposed that the current dynamic between the human psyche and complex digital/algorithmic information technology may represent nothing less than a species-level, evolutionary change of the biologically rooted psyche. The introduction of highly sophisticated interactive computing into the meaning-oriented, biologically based, living psyche represents a reconfiguration of the nature of unconscious-conscious dynamics that have evolved over thousands of years. The intense

and complex impact of digital technology, therefore, can be viewed as newly forming a *psychic triplex* composed of *unconscious-conscious-algorithmic* dynamic interaction, with emotions serving as connective bio-affective processes. These three spheres of psychic influence can also be seen respectively as (1) life-nature that is in raw and instinctive form; (2) life-nature that has become self-aware; and (3) the *artificial non-life* that has become both life-*like* and self-aware-*like*.

Hence, a new psychic-algorithmic reality is beginning to re-morph the human being and psyche. Furthermore, as digital technology becomes even more sophisticated, the perception of its artificial quality diminishes. An interesting phenomenological "fact" about artificiality, therefore, becomes exposed: something artificial that is recognized as such, loses its artificiality, because it is understood as an artifact in its own right, whereas the more something is *successfully artificial*, the more it *cannot be recognized* as artificial. Interestingly, a similar logical and experiential twist serves as basis for depth psychology's special regard toward unconscious psychic elements and contents. This is the paradoxical elusiveness of unconscious phenomena delineated in the previous chapter: as soon as it becomes conscious, it ceases to be unconscious. In this same inverse relationship, something becomes more artificial when it is experienced as the real thing. This is the case with complex interacting technology. As alluded to in the previous chapter, in its artificiality, algorithmic technology is not biologically emotional, yet it is perceived bio-affectively. This reveals a "successful" artificiality in that much of the psyche's reaction within human-digital interactions is *unconscious* and *emotional*. While, indeed, we may be living at the precise time and place of the "robotic moment" (Turkle, 2011, p. 9); perhaps, in the context of this exploration, we are more aptly living

the "interactive digital moment," the genesis of the evolutionary phase of psyche-algorithmic hybridization, and in the era of the collapsing nature-artificial divide.

Experienced first unconsciously.

As mentioned in the previous chapter, the ideas developed here sit contextually opposite from beliefs that the interface between human and digital technology is one within the realm of consciousness. Such conceptualizations tend to underestimate the significance of biological unconscious involvement in human-digital dynamics within psyche-digital interactions. However, the premise presented in this study is that the advancement of interactive informational technology represents, first and foremost, the expansion of and changes in the realm of *unconscious* dynamics of a kind previously unknown; while *conscious* experiences are impacted only as *secondary* phenomena. At the same time, through digital technology's increased complexity and interactivity, its mechanics, mathematics, and logic can no longer be precisely understood and predicted by consciously thinking, feeling, and perceiving human minds, both scientifically and experientially (Bernstein, 1982; Pariser, 2011; Turkle, 2005).

Never Before Seen Algorithmic Advancement

"Big data" technological revolution.

In the past decade, a special algorithmic and computing approach has been developed and employed at levels of complexity and scale never before attained. This new paradigm of information technology has been made possible by a combination of advancements in hardware capabilities, innovative software and database techniques, expanded information capture, and an emphasis on the value of statistics. This new

informational power and capability has loosely been referred to as “big data,” generally conveying the previously unachievable computation of massive amounts of data into meaningful result sets (Dean & Ghemawat, 2008; Mayer-Schönberger & Cukier, 2013; Shankland, 2008; Villars, Olofson, & Eastwood, 2011).

The size, scope, detail, and diversity of data that is algorithmically analyzed, along with the speed in which this is done, allows statistical correlations to be potentially revealed about virtually every dynamic process that can be measured. This, of course, also applies to behavioral and psychologically significant data. As the measuring and data capture becomes more finely grained, invisible correlations between different data increasingly present themselves. This new algorithmic paradigm is nothing less than the invention of an informational microscope and telescope combined. The use of “big data” is, in fact, much more than a new tool or instrument of vast new capabilities. Through various algorithmic means, statistical computation can be designed to achieve machine learning (Alpaydin, 2004). As computerized algorithmic systems gain more accurate data on measured dynamics and associated systems, and apply algorithmic and statistical models, they can become increasingly predictive of data patterns. They then become more advanced in interactive and environmental adaptability, autonomy, and further learning. However, such new correlative power also brings with it new challenges and problems to analytical technologies. For instance, “big data” approaches may introduce issues of relationships that present themselves as more causal then they actually are (Marcus & Davis, 2014). Associated issues include those arising from a tendency for this data computing technology to be self-referential in data processing and less effective in identifying significant phenomena based on what may seem as only anomalies.

Big data informational prowess in computation and *interactivity* takes place at the core of today's human-digital relationships and, by manifolds, magnifies the effects on the evolutionary psyche. Big data applications are currently at the crux of the entire digital landscape of our computerized and networked human activity and lives (Bryant, Katz, & Lazowska, 2008). Applications such as Internet search engines, social media platforms, digital advertising, consumer marketing, forensic systems, as well as medical health diagnostic tools, are just the tip of the iceberg (Bryant et al., 2008). Although big data approaches both challenge and introduce new problems to knowledge and science (Boyd & Crawford, 2011), big data applications are revolutionizing human endeavor (Brown, Chui, & Manyika, 2011; Mayer-Schönberger & Cukier, 2013). Development and deployments are at rapid pace, along with the establishment of higher education programs specifically geared to expanding skill sets and professional development in this area (Miller, 2013). Big data applications increasingly focus on domain-specific areas of industry and human behavior and used for such purposes as predicting future events and behavior, risk management, individualized and population-based persuasion, and assisting human decision-making (Hardy, 2014).

Big data and associated algorithmic intelligences are almost always at least in part invisible and unconscious, increasingly affecting every person currently living in a digitally advanced society. As mentioned in previous chapters, one area of big data innovation is that of recommendation systems that compute massive amounts of data in the attempt to provide insight for people making work-related or personal decisions. In the rest of the chapter, ideas about and experiences with recommendations systems will be explored as illustrations of digital-algorithmic advancement impacting the conscious-

unconscious emotional psyche. An important side note relates to the degree of perceived and experienced embodiment of such data-based digital-algorithmic systems. This may make for important expanded investigation, because it may significantly differ from the embodied representation of entities like robots. In other words, the concrete materialization and physical interactivity of such "big data" and recommendation systems may be understood as requiring only minimal "embodiment," while still being impactful on biological-emotional-feeling-symbolic levels. This further highlights the strangeness of interactions with these systems' psychic artificiality and how qualitatively different they may be from nondigital objects.

Recommendation systems.

Picking up from the descriptions of recommendation systems in Chapters 2 and 3, in the following, we look at this technology as representing a new category of interactive algorithmic and data-centric technology. In the context of this writing, recommendation systems will be considered *psychologically*; and, therefore, will be understood much more broadly than through strictly technological applications and design points of view. As mentioned in Chapter 2, in very general terms, recommendation systems use digital and algorithmic technology that provide suggestions to the human about subject matter-specific decisions that, by definition, compare potential values of competing possibilities. When looked at in human terms, these are akin to "good," "bad," "better," or "worse" and are at the core of all human emotions and feelings, as we have seem from both neuro-scientific theories and depth psychology. Therefore, recommendation systems, as recommenders and evaluators of value *must* interface with human emotional-feeling as well as neuro-bio-psychic precursor processes.

Although still in their technological infancy, digital recommendation systems exist today and are used extensively (Ricci & Shapira, 2011). Such technologies—complex, sophisticated, and interactive—come in many different shapes and sizes, standing alone or integrated in various ways within other technologies. Recommendation functionality may easily describe applications that we know in other terms, such as search engines; computer games; applications for work effectiveness, efficiency, and human performance; and most, if not all, expert systems. All of these categories of technologies are in constant flux as pointed out by Deterding, Dixon, Khaled, & Nacke (2011) regarding the various uses of game technology. As mentioned, all such definitions of technology will be considered using a psychological lens. In this context, therefore, recommendation systems are seen as any computerized interactive systems that engage with an individual by calculating and presenting personally relevant data for decision-making. Such interactions may *seem* straightforward, objective, and rational; however, as we will continue to see, it is anything but straightforward, as much more occurs emotionally and unconsciously. Psychologically speaking, key characteristics for recommendation systems and interactions with them are (1) interactivity; (2) the system's delivery of personally relevant new information; (3) a human response that consciously or unconsciously carries emotional valence; and (4) the system's ability to be reflected upon through associated conscious experience and idea construction.

The feeling imperative vis-à-vis recommendation systems.

The emotional-evaluative aspect, making up part of the nexus of unconscious and conscious processes, brings to mind Damasio's (2010) neurobiological emotional-feeling phenomena that occur at every level of instinctive adaptive life. It is also reminiscent of

Solms and Panksepp's (2012) emphasis on affective conscious subjective experiences, discussed in the previous chapter. From commensurate depth psychological understanding, Jung (1921/1976) argues that the primary aim of the psychic *feeling* function is *evaluation.* As we have seen from Neumann (1949/1973b), the living dynamic based on the valuing principle of emotions is deeply ingrained into the evolutionary psyche as the self-aware consciousness constantly struggles through ambivalences between its own self-determination and nature's domination. These ambivalences are the competing emotional valences that characterize coping with reality and manifest into specific adaptive behaviors through both unconscious and conscious processes of psyche. For Neumann (1952/1989), the self-aware conscious aspect of the psyche is always in a delicate, vulnerable, and relational balance vis-à-vis the instinctive unconscious psyche with its "extraneous knowledge" (p. 6). This is also seen in all everyday decision-making. For Damasio (2010), a biological self is processed through emotions-adaptability pathways as an organism confronts its environment and, through "feeling" (p. 76), evaluates its own biological states and responses.

As we have seen, Neumann, Damasio, and Solms and Panksepp understand these relationships as rooted fundamentally in nature and biology. At the base of their conceptualizations are relational and evaluative processes. With recommendation systems, which, by design, present the human with information directly impacting emotional value, the psyche is confronted with the imperative to evaluate and relate to these interactive and informational entities. But as we have stressed, these psyche-engaging, emotional-feeling provoking digital/algorithmic entities are not of biological nature. They are definitively artificial. That is, although algorithmic recommendation

systems are digital—without direct biological-emotional-psychic knowledge—they still have a neurobiological gateway into the human psyche. Therefore, it stands to reason that since they deliver emotionally valued content, they are perceived emotionally. However, as discussed in the previous chapter and as will be seen in the next section, it is also likely that this basic level of emotionality of the interaction is unconsciously triggered *as if* these digital systems presented biological psychic knowledge. But this "as if" artificial phenomenon of digital/algorithmic entities *changes the entire dynamics* and "playing field" of the emotional-psychic human being. As a consequence of the possible evolutionary alteration of the human psyche as it unconsciously becomes impacted and changed, the psychology of relationships is also undergoing unchartered changes.

"Emotionally designed" recommendation systems.

In their article "Enriching User Profiling with Affective Features for the Improvement of Multimodal Recommendation Systems," Arapakis, Moshfeghi, Joho, Ren, Hannah, and Jose (2009) evaluate several technological approaches to recommendation systems. These include capturing users' emotional states related to their experience with online material via self-reported descriptions as well as emotion-recognition software that evaluated changes in user facial expressions of emotions of sadness, happiness, anxiety, surprise, irritation, contempt, pleasure, and despair. The authors' main focus was to test new algorithms and technological modality that directly process users' emotions as feedback for the system to determine user preferences and, in turn, create a recommendation profile for the individual. The data related to emotion was processed using algorithms that attempted to categorize and rank online video content that would be interesting for the user.

Among other findings, this study demonstrated empirically that users "gave a higher rating" (Arapakis et al., 2009, p. 5) to recommendations based on emotionally attuned data and algorithms as compared to algorithms that only took into account user clicking behavior. This article exemplifies what can be interpreted as the emerging role and functionality of recommendations systems, not as empirical evidence of informational effectiveness, but as stimulating interactive *emotionality and feeling*. The article reveals how interactive software is tested and designed to interact with people based on categorizing and measuring *emotional states* and *feeding these back to algorithms*, which, in turn, recommend, and continue to measure user response within an on-going feedback loop.

In another article revealing significant insights about the trend in recommendation system design, Knijnenburg et al. (2012) outline and advocate a highly complex but well-formulated approach to measuring and interfacing with what can be understood as features of human emotionally interrelated experiences with the recommendation system itself. Their article references and organizes design and functionality ideas around many social psychology established theories and findings. In describing their proposed algorithmic framework, they delineate and specifically attempt to measure both objective and subjective experiences. Their framework, made up of multiple aspects of experience, includes "objective system aspects" (p. 7), "subjective system aspects" (p. 7), "personal and situational characteristics" (p. 8), as well as "attitude and behavior" (p. 8). Their emphasis on designing for "subjective system aspects . . . which represent user's perception of the objective system" (p. 8) remarkably seems as an attempt to measure and interact with the dichotomous and often conflicting objective-subjective perspectives

within the psyche. These are reminiscent of those described by depth psychological thinkers, as seen in previous chapters through among others, von Franz's (1992b), Romanyshyn's (1989), and Neumann's (1949/1973b) works.

It is clear that, increasingly, recommendation system designers and developers are attempting to build algorithmic systems that interact in rich, psychically animated ways, using constructs and measurements of users' objective *and* subject experiences. Indeed, this is an interesting and paradoxical twist on the nature and relationship of objective and subjective phenomena: subjective experiences are objectified through data and measurement, while, at the same time, objective measures are contextualized within individual subjective experiences. In this way, data, statistical functions, and digital interactive entities become mixtures of algorithmically "interpreted" objective and subjective information. Objectifying subject experience and making objective perception subjectively meaningful can be seen as one of the fundamental functions of the psyche: the psyche functions as both differentiator *and* integrator of aspects of experience. We see this in processes of coping with opposites such as emotional ambiences (Neumann, 1949/1973b), attaining meaning from the paradoxical nature of symbols (Jacobi, 1959), and the dialectic dynamics between unconscious-conscious processes (C. G. Jung, 1946/1985b).

Through interactive programs designed to function artificially-psychically, the entire cyclical relationship between human reactions and software recommendations becomes based on measures of categorized representation of emotions and satisfaction *processed digitally-algorithmically* on the part of the recommendation system. Hence, the relationship between human and digital system *crosses the boundary* of human

experience, thought, and feelings, on the one side; and digitally binary processes and constructed categories, on the other side. In the next sections of this chapter, we look at psychically-digitally *liminal* experiences as well as deeply "interpersonal" dynamics that may be at play. It is hoped that exploring the selected psychically-impactful digital applications interactions with digital/algorithmic technology will be illustrated as influencing conscious-unconscious dynamics, occurring first through unconscious-technology dynamics and then, secondarily, consciously.

Search Engines as Psychically Interactive and Subliminally Altering

Internet search engines have become everyday tools for nearly everyone, providing a window into the world via information. Internet search engines are based on complex digital "big data" algorithmic technology and processes (Dean & Ghemawat, 2008). In addition, they can be viewed as types of recommendation systems. Using specific algorithms, search engines are supplying what are, in effect, recommendations of web pages or web resources related to users' input. Therefore, to use a search engine is not merely to search, but to interact with algorithms that recommend web content. This difference alone changes what it means to engage in this psychically impactful and culturally pervasive activity. In a significant way, interacting with a search engine is a type of *dialogue* as the user articulates queries in a specifically personal way through language, while algorithmic processes calculate results in their own very specific ways. This interaction is not, however, usually recognized by the human as a dialogue between the two, nor can the human perceive "the other" from an algorithmic perspective.

In his book *The Filter Bubble*, Eli Pariser (2011) exposes possible and potential dark and limiting sides of this cultural phenomenon. Pariser points out that certain search

engines are programmed to provide advertising through which the search engine company generates revenue. Therefore, part of their algorithmic goal is to entice users to continue using and to return to using the search engine again in the future. Pariser also describes what may be a psychological phenomenon related to motivation: people enjoy being agreed with. With that in mind, Pariser suggests that it is possible that some search engines' algorithmic logic is designed to provide search results that tend to reflect the users' already formed opinions, in order to furnish users with emotionally valued experience of results agreeing with own opinions. In this way, they are motivated to continue or return to using the search engine to receive more of this good feeling.

To "know" how to subtly "agree" with the user's points of view, according to Pariser, search engines learn about the user through algorithmic processes and computational data. The search engine's results are delivered according to user-specific data in a way that at least subtly slants toward the user's already established beliefs related to a specific given inquiry; providing the user some form of conscious or subliminal happiness in this experience. The user now subconsciously values returning to the system, motivated, not purely by receiving objective data, but by the possible future positive feelings of having their beliefs agreed with.

In this way, according to Pariser, one becomes more exposed to search item results (recommendations) having content consistent with one's already formulated world views and, consequently, less exposed to diverse ideas. Therefore, Pariser contends, as a society, by using and relying on information-filtering algorithms for our data and knowledge, we may become more biased, less aware of different ideas, and more inflexible about our own opinions. Pariser seems to be pinpointing and describing a

fundamental characteristic of human-algorithm interaction: *it is by and large an unconscious but impactful process* and touches deep emotions and feelings of which we are not consciously aware.

This points to the powerful impact of digitally/algorithmically stimulating the user's subliminal yet active unconscious or even conscious narcissistic delights. It reveals the potential of stimulating various other emotional enticements as well. As we have seen from the complexity of "big data" applications, the precise method of computation is dynamic, based on statistical configurations of data and interactive feedback. In this way, much "big data" functionality can be seen as actual manifestation of real time "machine learning." For instance, as we have seen in the above example, through complex statistical "big data" algorithmic calculations, a search engine may "learn" of an individual's preconceived opinions and interact accordingly to meet algorithmic goals. Therefore, pathways to the goal of having users return to use the search engine are algorithmically executed via complex and changing ways, likely far from precise and exact human control. Pariser explores economic and political motivations for search results/recommendation bias and how vulnerable we are as users when we unwittingly play into profit-oriented or mission-based designs of corporations and organizations able to manipulate search/recommendation algorithms. But the "motivations" of algorithmic systems may come in all shapes and sizes, certainly not only economic and political ones. Algorithmic processes have potentially infinitely variable programmed goals and purposes, as each goal and associated algorithmic activity alters the user's knowledge via the specific results, both consciously and unconsciously. It is

an interaction that even in the smallest way, significantly yet subliminally, influences one's view of the world through digital information.

Such unconscious effects on perception and bias and, consequently, on conscious points of view seem reminiscent of hypnosis. In commenting on hypnosis, Freud (1922/1965) states that "the ego takes a perception for real if its reality is vouched for by the mental agency which ordinarily discharges the duty of testing the reality of things" (1922/1965, p. 59). Here Freud uses "mental agency" as that of the person hypnotizing. For the psyche interacting with digital-algorithmic intelligence, the search engine, as digital window into the world, very likely acts as such a "mental agency" of "reality." Freud further associates hypnotic phenomena with particular dynamics of experiencing both love and group dynamics. Interestingly, an association between such algorithmic-subliminal phenomena and the experience of love and "group formation" (S. Freud, 1922/1965, p. 59) may be an important link to what Turkle (2011) has pointed out as the surprising ease in which people allow themselves to become in love with interactive technology.

Digital/algorithmic tentacles into psyche.

A user most likely is not experientially aware of a search engine's "point of view." Hence, the cognitive and emotional impact and experience of interacting with the search engine may be significantly unrecognized as well. Furthermore, as has been suggested above, no human can *emotionally* understand the essence of algorithmic interactive processes. This is due to a fundamental incongruence between the nature of the bio-emotional-evaluative-psyche versus digital/algorithmic goals and associated computation and action. As concluded in the previous chapter, these techno-

informational-digital-algorithmic interactive entities are neither bio-emotional nor conscious. Quite the opposite: *these can be seen as strange unconscious digital/algorithmic functionality that interact with our own unconscious emotional processes.* In the psyche-to-algorithm-back-to-psyche dynamics, we see something akin to the following train of influences: human activity trigger digital/algorithmic intelligence responses, which are consumed by unconscious processes; that form as emotional value and feeling. Conscious differentiation of the experience into ideas and images follows and possible further cycles of dynamic human-digital interactivity perpetuates. *We see here how the nonbiological digital algorithm has latched onto and hybridized the biological psyche to form a bio-psychic-algorithmic complex, evolutionarily never before seen.* In this example of search engine technologies that are currently in hyperbolic use in our everyday society, the nature of the psyche and its unconscious-conscious transformational organizations, directions, and motivations, now connects to "digital/algorithmic unconscious" as new critical pathways within psychic processes, *otherwise* rooted in biological nature.

Pervasively Subliminal

This section uses search engines as example, but other pervasive technology—social media applications and platforms, for instance—can be characterized in very similar ways by such subliminal interactivity and influences manifest. In each case, the algorithmically directed and digitally interactive psychic orientation organizes around specific principles—capitalistic or otherwise—through a new bio-psychic-digital-mathematical complexity. Hence, digitally activated algorithms produce neuro-psychic influences upon unconscious processes and consciousness.

Gamification and the Quantified Self: Not Quite Transitional Phenomena, Objects, nor Play

Gamification and quantified-self applications.

There are movements of thought and endeavor related to making particular human activity mediated by computer-aided games, in order to increase creativity, motivation, and productivity (Deterding et al., 2011). It is an approach that has received much attention in the last several years and has been generally referred to as "gamification." It attempts to restructure challenging human activity into some form of computerized games. The term *gamification*, first coined by Nick Pelling (Marczewski, 2013), is generally applied to designing computer interfaces to be experienced in more engaging and effective fashion. A similar but significantly different concept of "gameful design" frames the innovative use and design of games toward achieving goals that are meaningful outside the criteria of just the game itself (Deterding et al., 2011). Although these distinctions are important and have significant ramifications on human-digital/algorithmic progression overall, here these will be categorized together. Although the line of design and technological demarcation is significant; in this current study, these together furnish illustrative value of psyche-digital interactions. For this reason, the term *gamification* or *gamified applications/technology* will be used stylistically to convey the general psychic-digital/algorithmic game experience. This includes both those designed for more engaging software user experiences and computer-mediated games designed to facilitate real world achievement. Gamified applications, then, attempt to translate human goals into goals within frameworks of digitally mediated games. These can be collaborative and in social, multiplayer networked modality or as computerized game

formats in which one plays against the computer or oneself by measuring success in terms of game structure and metrics.

Another growing human-techno field is the "quantified self" (Wolf, Carmichael, & Kelly, 2010) movement in which computerized devices, networks, Internet, and computational frameworks are developed to assist a user in measuring himself or herself in various specific activities towards self-improvement (Singer, 2011). Gamification and quantified self-applications are similar in that they both create a framework of measurement related to certain goals and achievements. Interestingly, they can be seen as opposites as well, like the two sides of the same coin: gamified applications create new or rarified alternative environments to human endeavor and associated criteria and measurements, whereas quantified-self applications establish frameworks of measurement that attempt to measure reality as accurately as possible. Both are intended for facilitating human improvement and achievement. The data-oriented, quantitative measurement for both these categories vary within a range from simple to highly complex designs and implementations. Both tend to leverage "big data" technology approaches in attempting to empower data and information through finely grained and expansive measurement and computing power. It can be argued that, just as search engines are recommendation systems for Internet resources; in effect, gamified and quantified-self applications are recommendation systems for achievement-oriented progress. As we have seen with search engines in the section above, these measuring and information-delivering applications interact with the human bio-emotional-cognitive psyche, which engages interaction on both conscious and unconscious levels. Telling is

Marczewski's (2013) statement, implicitly addressed to gamification designers and implementers:

> you are not relying solely on incentives and you are certainly not relying on money. You are using behavior that is *engrained in human nature from birth*. We like to play. Using gamification to *encourage feelings* of pride and meaning in your work force will do far more for their productivity than offering them money for doing more. (p. 9) (Emphasis added)

Clearly, compared to search engines, the design and functionality of these are much more explicitly oriented toward human emotional, cognitive, and, often times, physical engagement. Referring to such digital/algorithmic game approaches, McGonigal (2011) states that as "alternate reality games" (p. 125), these are purposed to be "games you play to get more out of your real life, as opposed to games you play to escape it . . . to participate as fully in our everyday lives as we do in our game lives" (p. 125). Such game and quantification endeavors may be overly optimistic in terms of promoting human improvement, or they may indeed be powerful facilitators and represent innovative human-computer collaboration (Thompson, 2013), persuasive technology (Fogg, 2003), and computer-assisted achievement strategies. In many current gamified applications, real-world achievement criteria are transformed into game processes and game-specific measurements of success and failure. They establish *an alternative experiential and evaluative framework* in which the human engages him/herself and attempts to achieve.

However, in the context of this psychological study, if taken too far from the bio-psychic core of the human being, after initial success, gamification projects may, indeed, find themselves in a state of counterproductive facilitation of human psychic potential. It is theorized here that if gamification is taken to an extreme, it may impose a heavy toll in

the aforementioned never-before seen hybridization of the bio-psyche with digital/algorithmic intelligence. With gamification, the human biological psyche situates itself in an algorithmic framework and interactive environment and engages with digital/algorithmic elements. But in the context of intra- and interpersonal dynamics, these interactive algorithmic/data entities are not true substitutes for any biologically based unconscious or consciousness "knowledge" that is biologically-evaluating. As the nonbiological "psychic" algorithmic application and the bio-psyche, itself, mutually influence each other, it can be imagined that what is created is nothing less than an *artificial* "dual union" (Neumann, 1976, p. 17) of human-techno complexity, in which life forces and relational bonds are boxed into digital/algorithmic categories and confines.

This bio-to-non-bio incongruence serves as background to the following depth psychological assessment of gamification, revolving around Winnicott's (2005) understanding of "Playing and Reality," the title of his book. In the following sections, the argument will be made that if allowed to excessively define the psychic milieu, both gamification and quantified-self applications will become less creatively-directed and achievement-promoting and more psychically limiting. This is precisely because the nonbiological nature of digital/algorithmic intelligence cannot "know" nor "replicate" the *biological-psychic instinct of play*.

Transitional phenomena and objects, play and creativity.

Winnicott (2005) introduces and describes "transitional phenomena" (p. 5) and "transitional objects" (p. 5) within the realm of human psychic dynamics. These are emotional-symbolic instincts and experiences that facilitate growing and developing relationships and have their roots in initial relational processes in childhood, when

psychically and emotionally transitioning into a world of one's self and others. Transitional phenomena illustrate the "tendency on the part of the infant to weave other-than-me objects into the personal pattern" (p. 5), beginning from approximately four to twelve months. A transitional object is some physical object that is strongly emotionally related to by the child and "becomes vitally important to the infant [for example] for use at the time of going to sleep, and is a defense against anxiety" (p. 5). This can be something like a favorite toy or blanket. Such positive emotional and symbolic value of the transitional object can be understood as serving as an emotional safety net that allows the child to dabble in emotional experiences separated from mother or caregiver.

A transitional object helps expand emotionality into a widening relationship with the world. Initially the infant's psychic relation mostly, if not exclusively, takes the form of engagement with his or her mother or primary caregiver. A transitional object helps transform this single relationship into the child's expanding emotional repertoire toward other people and aspects of his or her enlarging world. For instance, by attaching to a blanket—a transitional object—and symbolizing it with emotional meaning and engagement that are both similar and different from those of its mother, the child begins to apply important relationship-building emotions to new things and people. In this case, the blanket serves as an emotional surrogate for mother and, at the same time, is a psychically valued object in its own right as a "'not-me' possession" (Winnicott, 2005, p. 5). Such transitional objects allow the child to transition from an emotionally fixed dependence on caregiver to developing increasingly psychically independent points of view and other relationships. Hence, transitional phenomena signal "an intermediate

state between a baby's inability and his growing ability to recognize and accept reality" (p. 3). Speaking of such early psychical changes, Winnocott states that

> the object is a symbol of the union of the baby and the mother (or part of the mother). This symbol . . . is at the place in space and time where and when the mother is in transition from being (in the baby's mind) merged in with the infant and alternatively being experienced as an object to be perceived rather than conceived of. The use of an object symbolizes the union of two now separate things, baby and mother, *at the point in time and space of the initiation of their state of separateness*. (p. 130)

A transitional object, then, becomes an emotional bridge between the all-giving and nourishing mother and the infant-becoming-toddler, who begins to experiment and develop the hints of independence. Therefore, through emotionally charged symbolic processes, the child's psyche makes use of the transitional object to represent *both* relationships at the same time, while separating them. As will be touched upon in a subsequent section, this type of symbolic engaging with opposites *together* is something uniquely of the biological, symbolically oriented psyche, unattainable by digital/algorithmic processes.

More generally, such transitional emotional processes are foundational to all interpersonal development, developing relationship to self, as well as how people engage within the world. According to Winnicott, these psychic processes occur in adults in all sorts of changing interpersonal relationships, creative endeavors, and emotional/psychic growth. These constructs, which very accurately capture real life and clinical observation, describe the unfolding of part of the phenomena of adaptation and development of the bio-feeling-psyche described in Chapter 4. Transitional phenomena and objects facilitate changes in relational psychic reality, allowing for psychic movement away from and through fixed relational extremes and emotions. According to

Winnicott, they are facilitated by fantasy and imagination through the psychic process of *play*. In play, mentalization and positive emotionality allow the child to engage in a psychic-living world that is made-up of people, things, and emotionality that *transcend the limits of logical categories and fixed relationships*. In play, "paradox is involved which needs to be accepted, tolerated, and not resolved" (p. 71). This is something that digital/algorithmic functionality cannot do, based on definitive logic and categories. We see this in the psyche's transitional object that, at the same time, is part mother/care-taker/all-encompassing protector and part that which belongs to the child who is becoming his or her own person-psyche. This is transitional phenomena's "essential feature . . . *the paradox and the acceptance of paradox*" (p. 71). Hence, transitional phenomena span between and through stages of psychic development that, in various incarnations, continue throughout life during the psyche's transitions, growth, creative expression, and healing. Winnicott emphasizes this by stating that "creativity belongs to the approach of the individual with external reality" (p. 91).

Significantly, Winnicott makes clear that "when symbolism is employed, the infant is already clearly distinguishing between fantasy and fact, between inner objects and external objects, between primary creativity and perception" (2005, p. 5). Therefore, transitional phenomena can be understood in analytical psychological terms as the development of the psyche living in and through symbols. Furthermore, in psychic-symbolic space, mutually exclusive emotional opposites can be transformed. That is to say, through the symbolically oriented psyche and its ambivalences, emotional opposites can *coexist, synthesize, and transform* into creative new psychic realities. The symbolic-psyche transforms feelings and meaning through unconscious-conscious dynamics and

interpersonal relationships. Through symbolic processes, then, the conceptualized "ego-self axis" (Neumann, 1952/1989, p. 34) becomes activated in the service of adaptability, creativity, and relational growth. The unconscious "extraneous knowledge" (p. 6) related to self, other, and world is allowed to percolate, ferment, and become directive toward conscious consumption and expression. This, in turn, can manifest as new emotional-feeling experiences, relationships, and creativity, expressed in the symbolic language of the psyche.

As mentioned above, Winnicott (2005) considers "play" (p. 7) a psychic engagement within transitional phenomenon that is critical to psychic growth and the movement of emotions-in-transition toward and through creativity and relatedness with other and self. The importance of the function of play that Winnicott describes for children, he also applies to adult lives. Therefore, the capacity for play, for both child and adult, cannot be overstated as a positive state of emotionality for bio-psychic growth. Strongly hinting at the biological, instinctual connection, Winnicott states that the creativity that he is describing associated to transitional phenomena and play "is universal . . . [and] belongs to being alive . . . [and] . . . presumably . . . to the aliveness of some animals as well" (p. 91). Indeed, supporting the argument that play is biologically instinctive, from the evolutionary-neuro-biological-emotional perspective, Siviy and Panksepp (2011) show that play is fundamental to all mammals; while Panksepp (2007) states that "the urge to play is a neurological drive—an insistent emotional motivation" (p. 58).

The digital/algorithmic limitation.

Play, therefore, involves transitional phenomena: it is part one thing or person and part another. As stated above, it is symbolic psychic activation and engagement with world and self, from which newly shaped relationships, creativity, and self-agency emerge. At the core of play is the quality of engaged opposites, one thing *and* the other. As we have seen from Neumann (1949/1973b), this is the quality and reality of the symbolically oriented psyche and its processing transformative ambivalences. We see this theme unfolding—of the psychic symbolic engagement of the opposites—throughout this dissertation, and will encounter it again when looking at recommendation systems and the phenomena of opposites within a symbol, later in this chapter. Biologically and psychically *living in* and *between* the opposites and the associated creative processes *cannot* be attained by digital/algorithmic intelligence, activity, or framework, as we are now seeing over and over. Algorithmic activity is made of measurements, mathematics, statistics, and logical definitions. Embedded in digital media, the algorithm becomes empowered with interactivity that, as we have seen, is deeply psychically triggering. The digital algorithm can certainly flip from one thing to its opposite. This, in fact, is something it excels at. After all, digitalization is founded on a basic opposite of "on" or "off," ones and zeroes, just two basic values, two opposites.

However, the digital algorithm *cannot be both opposites at the same time*. This is part of the specialness of the biological-emotional-symbolizing psyche. Through ambivalences, where emotional opposites entangle and *play,* psychic development and growth proceeds and unfolds. Hence, an overly "gamified" or exceedingly algorithmic

computerized environment cannot be psychic play, per se. There is a world of difference between a game and play, a distinction between a specific framework versus emotional-psychic movement. Without the psychic-bio-emotional processes of the synthesis of opposites in transitional symbolic space, a game is without play. And a game without play is just another emotionally drained reality without creativity; just like the reality that had been perceived as needing alteration in the first place through gamification. What applies to gamification seems equally to apply to quantified-self applications as game frameworks modeled on "the game" of concrete reality.

Games without play are, of course, part of the vulnerability of modern living, such as going through the motions of what feels like meaningless lives, boring jobs, and unfulfilling relationships. These can very much benefit from an activation of instinctual-psychic-symbolic relational play, in appropriate forms. But digital/algorithmic games without play may not only quickly lose their novelty and become just a replacement for regular reality; they may actually fix their new gamified reality even more into place leaving *less* room for psychic "transition." This is precisely because, as has been theorized, similar to the search engines' "hypnotizing" effects, these applications' algorithmic interactivity unconsciously engage the psyche in ways that trigger it by nonbiological-nonsymbolic data. These may subliminally "trick" the unconscious in consuming information that is not oriented toward biological-psychic value. In turn, consciousness gets "misfed" and the unconscious-conscious connectivity becomes less dynamic, less transitional and less symbolically transformative. Yet, at the same time, these algorithmic applications may *seem* highly psychically transformative. This may be illusionary, as the transformative criteria is based on that of the algorithmic game, *not* on

deep emotionally based human growth and development, which is measured by the still unknown, perhaps unknowable, biological-value system of the human psyche.

Time will tell if many of these human-digital applications and collaborations will pan out positively in their stated goals and associated designs. It is possible that many will indeed prove themselves ineffective, instead of becoming substantive pro-psyche change-agents overtime. Cognizant of a need for changing application design approach, Siegel and Beck (2014) outline a "theory of slow change interaction design" (p. 30) that they hope will result in technology built to help achieve "attitudinal and behavioral changes that are difficult to initiate and sustain" (p. 30). From the perspective of this dissertation, their hope and efforts seem to coincide with a more depth psychologically minded perspective. Such approaches suggest the possibility of future application design that is more emotionally attuned in its interactivity, taking into account the psyche's own bio-emotional-symbolic and transformative processes, without forcing it into artificial non-bio-emotional algorithmic frameworks that limit psychic self-growth and adaptation.

Psychic-Algorithmic Hybridization and the Reconfiguration of Relatedness

Strange human reactions to recommendation systems as emotionally and symbolically organized entities.

Han and Karypis (2005) state that "recommender systems are personalized information filtering technology used to either predict whether a particular user will *like* a particular item . . . or to identify a set of N items that will be of interest to a certain user" (p. 446) (emphasis added). In one of the first papers that considers the human experience in interactions with recommendation systems, Swearingen and Sinha (2001) present the following: several programming approaches to recommendation technology; a

description and comparison of several recommendation systems available commercially at the time, including Amazon.com's book recommendations and Reel.com's movie suggestion; and, the findings of their study based on what their sample of users liked and disliked about interactions with different recommendation systems. The researchers employed participant questionnaires and interviews related to interacting with recommendation systems, in order to capture data about associated user experiences. They observed that from the perspective of the user, books and movie recommendation systems attempt to do what has traditionally been the role of friends. They conclude that, although users preferred getting recommendations from their friends, they still found the recommendations of the systems valuable for multiple reasons, including having recommendations expand beyond the circle of knowledge to which they and their friends were limited.

In a related article titled "Comparing Recommendations Made by Online Systems and Friends," Sinha and Swearingen (2001) state that

> a common way for people to decide what books to read is to ask friends and acquaintances for recommendations. The logic behind this time-tested method is that one shares tastes in books, movies, music etc., with one's friends. As such, items that appeal to them (friends) might appeal to me. Online Recommender Systems (RS) attempt to create a technological proxy for this social filtering process. (Introduction section, para. 1)

Interpreted from a depth psychological perspective, the researchers are using the emotional-symbolic experience and value of the role of friend as comparative construct to a psychic interactive experience with recommendation systems. For instance, they indicate that one of the goals of their experiment relates to studying user experience with recommendation systems by "analysis focused on comparing the quality of the recommendations made by friends and by RS" (Comparing Recommendations made by

Online RS and by Friends section, para. 1). They conclude that "though users preferred recommendations made by friends, they expressed a high level of overall satisfaction with online RS" (Discussion and design recommendations section, para. 1). Here the word "satisfaction" directly brings into play the emotional evaluative feelings that we have seen from Damasio, Jung, Solms and Pankseep, and others in previous chapters. In their study, Sinha and Swearingen conclude that users found recommendations from the systems useful in ways friends cannot be, for instance, providing information outside of the field of friends' knowledge. This can be interpreted as recommendation systems providing friend-*like* usefulness and even exceeding friend capability, in something akin to *super-friend-like* fashion. This is quite significant in continuing to illuminate the human-algorithmic paradigm-shifting psychic relationship.

Taking this study, itself, "as a cultural artifact that can be interpreted" (Cushman, 1995, p. 7) in uncovering the new human-algorithm reality, it is possible to imagine this study in light of the Turing Test that we saw in Chapter 1. Turing's conceptualization is a thought experiment of testing a machine for the degree in which it is perceived as human. Sinha's and Swearingen's study is an actual exploration of similarities between experiencing and appreciating algorithmic input and that of humans, in this case, friends. It is reminiscent of the Turing Test which tests for the perception of human-like entities in the nonhuman. But more relevant to this dissertation's exploration, Sinha's and Swearingen's study and associated article attempt to gain and articulate insights about algorithmic functioning as they propagate *emotional-symbolic* interactive images and experiences. In other words, as the Turing Test is for machine-as-human, this study is for algorithmic action-as-emotional/symbolic/psychic.

Understanding recommendations systems through the degrees by which they evoke similarity and experience of *friends* seems a remarkable departure from the psychic-emotional-symbolic reality of the predigital era. Indeed, it can interpreted that this illustrative study focuses on measuring machine/software/algorithmic logic and action as psychically emotionally symbolic in significance and form. Recommendation systems—nonhuman, non-biologically-psychic—are compared to something so emotionally based and possibly inter-"personally" intimate as friend. This is quite revealing of the alteration of psychic reality in the "cultural matrix" (Cushman, 1995, p. 17) of our increasingly algorithmically affected, digitally mediated lives: although not described explicitly as such, in both these studies, the algorithmic recommendation systems are viewed through the symbolic construct of friend and, therefore, as *relationally* through experience of emotional *value*. Here Fogg's (2003) persuasive technology concepts, outlined in Chapter 2, can be seen as unfolding through vast and deep experiences of friends.

As will be discussed at the end of this chapter, friend is a very complex emotional-experiential symbol, which seems to have much force in human-algorithm interactions and at the same time impactful upon the evolution of the psyche, per Chapter 4's discussion.

Stranger than complexes.

From these studies, the experience of using recommendation systems to expand one's sphere of knowledge more than what is available from one's human friends also hints at much psychic happenings as background to these conscious experiences. These can be viewed as the *artificial* version of emotional-feeling processes and a connection to

artificial "extraneous knowledge" (Neumann, 1952/1989, p. 6) sources—artificial in that they are not biologically based and, therefore, as argued in the previous chapter, not truly psychic or emotional; and, in this way, ever so *strange.* In other words, the information from the digital/algorithmic system acts *as though* part of the psyche itself. The "big data"-based recommendation system's dynamic and personally relevant information can be seen as functioning, in effect, as a psychic complex, no different than an unconscious complex autonomously active within the psyche. Looked at neurobiologically, it may be functioning as lower level psychic input that, through unconscious neurological pathways, provides experiential data to consciousness which, in turn, organizes it into value-oriented ideas, in the case of these studies, something like friend.

However, whether seen as artificial unconscious complexes or psychic data, these analogies, as powerful as they may be, fail as comparatives, precisely because of the artificiality of these interactive entities. It is easy to imagine that the psyche is "tricked" into activating unconscious processes that relate to the personal preference-relevant interactive system. As artificial and algorithmic as they are, the emotional unconscious nevertheless perceives and consumes the dynamic of information delivery on the part of the system as emotionally meaningful, value-oriented, and potentially understood through ideas. In this way, it would be elegant to explore and analyze interactive algorithmic information—like those of recommendation systems—as analogous to psychological constructs, whether from depth, social, neurobiological, or any psychological perspective. Existing theoretical definitions of and about the intra- and interpersonal psyche will indeed produce interesting, intricate, significant insights about human-algorithmic interactions. *But these do not go far enough*, stopping short of investigating the

expansive, *never before experienced* human psychic dynamics and their associated strangeness.

Here Turkle's (2004) challenge to psychology becomes exceedingly clear and poignant. She states that we need to understand the psyche in ways never seen before its engagement with interactive computerized technology. She suggests that the psyche has never manifested in these ways previously and that learning more about the psyche in interactions with digital entities will teach us aspects we have never known about the psyche. In addition, per the theoretical point of view of this dissertation, a challenge to psychology is to understand more clearly how the psyche is *changing* as a result of algorithmic interactions. For instance, one of the major principles this theoretical dissertation attempts to draw out is that the psyche is at its root evolutionarily biological. Before interactive algorithmic intelligence, the need for making this differentiation did not exist or was barely at the threshold of being significant. Furthermore, in the spirit of Turkle's challenge, it is suggested here as part of the main position of this dissertation, that existing theories about human-to-human relationships—as intriguing, clinically and socially helpful, and seemingly accurate when applied to human-algorithmic interactions—may, in fact, mask the subtle but psychically impactful categorical differences between the bio-psyche and non-bio, digital/algorithmic intelligence, as they both latch on to and trigger each other.

Changes in the dynamics of opposites, the psychically symbolic, and biologically evaluative.

As our digital/algorithmic technology advances, the existence of *new* emotional-biological-psychic relationships between humans and digitally based technologies are

becoming stranger and stranger, especially as they are hardly recognized as such. If a user or consumer of recommendation data experiences emotions—happy, sad, angry, and so forth—this would be consistent with expected psychic unconscious-conscious, emotional-rational processes. This is true of any engagement with the world: we experience it both emotionally and rationally, through a nexus of unconscious and conscious processes. These are inner psychic processes that are part of interacting with the nonliving world. But Sinha's and Swearingen's (2001) study helps reveal the experience of interacting with recommendation systems as somehow different in very significant ways. Their studies strongly hint at the possibility of such experiences characterized within a continuum of *digital/algorithmic friendship*. It is strangely both almost intuitive and, at the same time, mind-boggling that: the human reaction to interactive algorithmic recommendation systems can in any way shape or form be described, let alone measured, within the sphere of one of the deepest human emotional relationships.

Hence we see *artificial interpersonal relationships* triggering emotional symbolic processes in users through interactions with recommendation systems. A recommendation system *friend* can be interpreted as being *experienced as if another psyche, categorized in human emotional form or image.* In this last section of this chapter and dissertation, additional insight on this phenomenon of impulse to imagine another in the interactive algorithmic system will be viewed from the symbolic perspective of the nature of the notion of friend (per the example above). According to depth psychological thinking, each emotionally charged symbol contains within it the continuum of manifestations between the symbol's extremes of meaning (Jacobi, 1959).

Hence, psychically impactful symbols are always constructed of paradox. In this way, a friend can be seen as part of the friend-enemy symbolic construct from which an emotionally meaningful experience manifests symbolically. Indeed, all deeply emotional symbols contain opposites, paradoxes, and ambivalences. We have seen this in Neumann's (1949/1973b) early human ambivalences vis-à-vis Mother Earth; in his description of mother-child relationships in which the yearning for bonding exists simultaneously with the instinct, on the part of the child, for separation; and in Winnicott's (2005) "transitional phenomena" (p. 5) and psychic space of play. Related to symbols' opposites, Jacobi (1959) states that a psychically transformative "process represents a dialectical interaction between the contents of the unconscious and of consciousness; symbols provide the necessary bridges, linking and reconciling the often seemingly irreconcilable contradictions between the two 'sides'" (p. 115). Elsewhere she states that the "mediating, bridge-building quality of the symbol may be regarded as one of the most ingenious and significant devices of the psychic economy" (p. 98) and adds that "it constitutes the only truly natural and health-giving counterweight to the inherent dissociability of the psyche" (p. 98)

The concept and symbol of friend is no exception. To be clear, the idea of friend and the unconscious and emotional scaffolding that supports this consciously differentiated experience is just one possibility within multitudes of emotional processes and ideas that may form through human-algorithmic interactions. Here we concern ourselves with just this one case as example of how deeply emotionally impactful and altering human-algorithmic interaction may be.

The experience of the algorithmic system as friend is further highlighted by looking at friend as an archetypal notion within and throughout all of humanity—pointing directly to a massive chasm between the "animated algorithm" and conscious experience. It is the psychic and emotionally complex experience of friendship resulting from what otherwise seems to be a simple data-information delivery system. This leap from informational technology to friend begs the question of what can possibly be occurring in the emotional "black box" between the informational "input" from the recommendation system and bio-value-symbolic-meaning experienced by the human. Indeed, it exposes the algorithm-unconscious-conscious dynamic: a conscious subjective experience forms based on unconscious processes that seem to include imperceptible emotionality. It seems that the conscious subjective experience of recommendation systems equaling friend is the simple reaction of the system user regarding the system. However, what seems to be so very obvious is easily missed, both on the part of the user and as one looking at it from the side: the logical absurdity that a computer/algorithmic system is a friend. The expression of this experience and the attempt by the researchers of the above mentioned study to measure this seems to either represent an erroneous way of using the word *friend* or a new definition of it—perhaps the new human-algorithmic-psychic hybridized definition. This incongruence reveals algorithmic technology's stealthy hooks into the human psyche. This is the reflection of the epicenter of the hybridization between interactive digitalized algorithmic data and bio-emotional information. It represents a departure in the evolutionary direction of the psyche, a restructuring, reconfiguration, and redefinition of the biological unconscious-conscious human being. Hence, the seemingly unfathomable leap from analytical data to friend.

As a final reflection on this psychic-emotional symbol, a friend is one of the deepest, most complex constructs of human experience. The meaning of friend is positioned on the threshold of human relationships, not constellating at birth like that of mother-child; but certainly a core meaningful experience that has played an emotional and directive role throughout all of civilization. The idea of friend is central to the formation of relationships within the continuum of enemies and allies, from the deepest of longings for companionship to the structure and makeup of social fabric, large or small. Friendship, it can be argued, represents one of *the* social-emotional-psychic archetypes. A friend has infinite faces, motivations, uses, ways of caring and being cared for—while, at the same time, of course, a friend is *someone* very specific. Most significantly—and, as described above about all psychically meaningful symbols—to understand the notion of friend as a dynamic symbol of a specific kind of relationship, the notion of its opposite must be understood as well, along with its multitudes of variations. Humanity is built on changes in friendships including those which become enmity. Hence, we can appreciate the immense significance of the *strangeness* of the emotional-symbolic recommendation system as "friend." The psychic-algorithmic "friendship" is now a representative of the new unknown course of human emotionality and meaning. Indeed, it is on a trajectory that will possibly reconfigure not only the definition of friend, for example, but the nature of psychic symbols themselves.

Chapter 6
Closing Remarks

Summary Overview

This dissertation attempted to convey several important psychological aspects of the increasingly pervasive human interactions with digital/algorithmic technology. In the first chapter, the historical and intellectual shift of the computer and computerization was touched upon. Here the level of technology's interactivity was presented as never attained prior to the development of the computer, and since has advanced in lightening pace. The computerized era was framed in the context of an historical line of demarcation between the predigital and digital age. This chapter concluded by showing that as digital information becomes increasingly interactive and pervasive in society, it is more emotionally and psychically impactful, in many ways that are not easily recognizable.

In the second chapter, computerization and digital interactive technology was introduced from a psychological perspective. Through social psychological experimentation, remarkable, automatic, unconscious reactions to computers have been discovered. Research has shown that people engage with interactive technology through *unconscious social* frameworks of behavior. Implications of this discovery are vast and extremely important for the field of psychology and every field impacted by digital technology. Many research projects continue to explore the various aspects in which human-computer interactive phenomena are oddly characterized by the same complex and complicated social psychological interactions between people. This chapter emphasized the discovery of computers as "social actors" (Nass et al., 1994, p. 75) and technology as persuasion agents, a depth psychological historical viewpoint and

questions about relationships between the psyche and technology, as well as a call for further advancement of depth psychological theories that better explain human-technology interactions and relationships.

It was suggested that these perspectives, including neuroscience, all point to the potential for collaboratively reaching deeper understanding of emotional phenomena in human-technology interactions. In addition, within this chapter, depth psychological ideas were specifically introduced as possible complements and correlates to social psychology's human-computer phenomenological discoveries. These ideas included archetypes as social blueprints for all interactions; unconscious projections that intermix spiritual inclinations with materialistic perspectives, which together may influence experiences of inanimate aliveness; and the psyche's evaluating function of feeling which may play a very significant part in human-computer interactions that are emotionally based and experienced as interrelated. The last section of this chapter introduced a category of interactive algorithmic technology, referred to as recommendation systems, specifically designed to provide emotional value by delivering information as suggestions for increasing positive emotionality of the user. It was hypothesized that these systems directly interact with personal-value-oriented feelings of the user and, therefore, an emotional-feeling relationship maybe experienced or perceived by the human, possibly in important unconscious ways. Then the central research question for the rest of the dissertation was posed: how does the feeling-oriented psyche relate to and how is it impacted by interactions with algorithmic technology in general and, in particular, with recommendation systems?

The next chapter focused on methodology of the research. This delineated a theoretically based hermeneutical and depth psychological approach looking at the qualities of the human psyche within interactions with digital technology. Here the methodology of research was explained as having roots in hermeneutic philosophy and a goal of interpretive exploration. Also proposed was a relationship between hermeneutic research and depth psychology research. Although traditionally phenomenological hermeneutics does not make room for the conceptualization of the unconscious, which is fundamental to depth psychology theory, it was suggested that these two approaches can be used together to interpret phenomena. Sources of interpretation included depth psychological writhing and theory, scientific theoretical constructs, human-computer interaction research, and cultural commentary, along with other contemporary artifacts such as technology design. It was pointed out that depth psychological research can be seen as open to information and insights from all other perspectives, and therefore, the art of hermeneutics—of interpretation—is an extremely valuable tool for depth psychological exploration. In addition to exploring and gaining understanding of the topic using the interpretive method of depth psychologically oriented hermeneutics; this study may also serve as illustration of implementing this method of interpreting text, culture, and technology in order to illuminate aspects of the contemporary psyche. Finally, in this chapter, the researcher's own person perspectives, background, and possible biases were touched upon.

The fourth chapter served as vehicle for the hermeneutic, depth psychological research. The theoretical principle that was developed through a depth psychological perspective along with neurobiological findings and hypotheses is that the human psyche

is an evolutionary biological and symbol-oriented phenomenon. These ideas were further developed by contextualizing emotions and feelings into the unconscious-conscious dynamic of the evolutionary bio-symbolic psyche. In the last section of this chapter, the biological psyche was juxtaposed with algorithmic interactive technology. These were shown to be different systems based on fundamentally incongruent value-systems. Psychic values are instinctive, biological, evolutionarily adaptive, and symbolic. Digitally interactive algorithmic values are computational, and *artificially* psychic. Finally, this incongruence between psyche and digital/algorithmic technology, in the context of rapidly increasing and pervasive human-algorithmic interactions, was discussed as impacting the structure of the psyche itself. It was proposed that digital/algorithmic intelligence's hybridizing with the psyche alters the core makeup of psyche, by impacting the unconscious-conscious dynamics and structures that had evolutionarily developed from the beginning of the human species into the modern human.

Furthermore, in this chapter, it was suggested that most of the bio-psychic and emotional experience of human-algorithmic interaction is unconscious, while, at the same time, conscious experience lacks the perspective to understand that these interactions are the product of strange emotionality triggered by nonemotional entities. In this way, interactive algorithmic technology, in its increasingly ubiquitous participation in the details of our society and each of our lives, latches onto and influences unconscious processes and subsequently the experiences and ideas of consciousness. Because this hybridization takes place between such incongruent systems—the bio-psyche and digital/algorithmic processes—synthesis can only form something new. It was

conjectured at the end of this chapter that the new psyche is really a psyche that is significantly influenced by digital/algorithmic technology. The change is on an evolutionary scale, given that never before has the biological value-oriented, emotional, and symbolic psyche had to contend with nonbiological autonomous entities interacting through the psyche's emotional unconscious-conscious dynamics. Therefore, this chapter concluded that the unconscious-conscious structure of the psyche—having evolved for thousands of years—in an evolutionary flash is altering into a new unconscious-conscious-digital/algorithmic structure, representing nothing less than a species-scale evolutionary change.

In the last chapter, specific examples of recommendation systems—seen as such through a psychological lens—served as sources of interpretation and vehicles to explore depth psychological constructs in the context of human-digital technology interactions. The juxtaposition of the biological psyche vis-à-vis artificial interactive algorithmic technology developed in the previous chapter was further interpreted through examples of recommendation systems. It was suggested that many sophisticated and complex human-interfacing algorithmic technology, in effect, are recommendation systems. Those conceptually surveyed here were Internet search engines, gamification and quantified-self applications, and recommendation systems, per se. These systems provide information that directly influence the psychic functioning of evaluation and decision-making processes.

This chapter suggested that these systems all directly connect to dynamic unconscious-emotional-symbolic-conscious processes and, by way of interacting, create new algorithmically influenced processes. These interactive algorithmic influences, as

subtle as they may be, may change the entire emotional-symbolic-psychic field of development. This is specifically so as algorithmic intelligences function computationally and *not* through biologically based emotional processes. In contrast, the psyche, through ambivalences and transformation of emotional-symbolic positioning of opposites, develops intrapsychically and relationally. The chapter concluded with the idea that digital/algorithmic systems significantly change the otherwise bio-symbolic psyche by, among other ways, decreasing the repertoire of the psychic engagement of opposites via emotional-symbolic processes. In effect, this alludes to the possible monumental deviation from the path of unconscious-conscious evolution of the psyche in the way it processes and self-expresses through symbol, both on the species-scale and for individuals. The new bio-psyche-with-digitalized-algorithm hybridization may indeed be the altering of emotional-symbolic processes in evolutionary terms.

Fundamental Principles Developed in this Theoretical Exploration

The most important conceptual stand of this dissertation relates to the intertwining of the incongruous biological psyche and nonbiological digital algorithm. The human psyche is at its root biological and evolutionary. It functions through divergent interrelated and interdependent levels of: unconscious processes, feeling-oriented and symbolically structured emotionality, and conscious differentiation and idea formation. At the same time, digital/algorithmic technology is not at its root biological. Although it can increasingly come close to mimicking biological complexity through highly sophisticated computerized technology advancement, it is conjectured in this exploration that it is not *of* biology, and, therefore, does not have biological evolutionary properties. The directedness of biological "intelligence"—based on evolutionary biological

evaluation and adaptability at the organ and organism levels—remains at the heart of much current scientific research and, at its very core, may prove forever elusive. At a minimum, it can be hypothesized that the biological-symbolic psyche has unconscious goals that are not commensurate, by nature, with those that are algorithmic. At the same time, we are seeing how algorithmic interactivity triggers automatic emotions and feeling-evaluative processes and experiences. These seem to occur first unconsciously, then emotionally, and then through consciously differentiated and formulated ideas. It is clear, even from an anecdotal cultural perspective, that the intertwining between the human psyche and interactive algorithmic systems is a phenomenon of prodigious force.

These together paint a picture of a human psychic-digital algorithmic hybridization. Psychic impact, both conscious and unconscious, from and through interactions and engagements with the physical inanimate world are an integral part of the psyche as phenomenon throughout human history and prehistory. Therefore, it may be concluded that algorithmic technology is no different; like interactions with dolls, automatons, or cars or prehistoric temple-caves—technology of any kind. It is true that algorithmic systems are artifacts and as such are psychically charging and impactful. However, it is the position of this dissertation that *algorithmic technology made interactive through digitalization is by degrees interactively more complex and sophisticated in its mimicry and artificiality of psychic engagement*, whether purposefully design as such or not. Yet this quantitative leap of interactivity and complexity manifests in a qualitative difference that may change the entire way the psyche functions, by unconsciously incorporating digital/algorithmic information into its unconscious-conscious processes. It is important to keep in mind that this present exploration looks at

artificiality *not* as how close technology may be experienced as human, but as *psychical artificiality* in that digital/algorithmic informational interactivity, in any form, triggers responses from the psyche by way of biological-emotional-symbolic, largely unconscious, phenomena. These new dynamics may represent the restructuring the human psyche at its most fundamental core characterized by evolutionary-emotional-symbolic properties.

Theoretical Conclusion Highlight and Important Distinction

This exploration started with describing discoveries about unconscious phenomena between humans and interactive technology that point to human relationships with computing technologies as highly correlated with the complexities of unconscious and conscious dynamics between people. It must be pointed out that researchers in social psychology focusing on human-computing technology continue to contribute to a paradigm shift of understanding that is of utmost importance related to the psyche in our contemporary digital/algorithmic lives. These conclusions are still widely misunderstood, if not mostly unrecognized. At the risk of hyperbole, these discoveries are Copernican in significance.

However, as highlighted in Chapter 5, it is important to distinguish between the theoretical conclusions of this dissertation and those rooted in the eye-opening premise of human psychological reactions to computer technology as social. Again, the contribution of that research and insight cannot be over emphasized. In the social psychology studies like those discussed in this dissertation, research attempts to understand the degree to which people interact with computers in similar ways as they do with people. Yet there is a nuanced but extremely significant differentiation between this movement of thought

and the one developed here. In this dissertation, an *additional* proposition is made: that the psyche-algorithmic interactive interface is actually ever so different from anything psychically or physically encountered before, and that the effects of this new phenomena are equally unknown and unpredictable. Making these all the more unknown is that this difference may be manifesting through multiple levels of unconscious processes. At the heart of core changes of the human psyche via algorithmic interactivity is the biological-to-nonbiological interface. This discrepancy between types of interactive entities—the psyche and the digital algorithm—may be masked by consciousness' lack of awareness of deeper unconscious dynamics; but also may be covered-up by "computers-as-people" theories, if taken exclusively too far. Therefore, in addition to looking at how computers are unconsciously regarded as though they are social, more investigation needs to focus on how people are becoming more "digitally algorithmic," in the subtlest, but perhaps most significant of ways.

Clarification of Developed Theory

Throughout the exploration, the ideas moved toward understanding the psyche as biological and evolutionary, partly unconscious, emotional-feeling-oriented, symbolically activated, and composed of a differentiating consciousness. This characterization of the psyche was positioned in counterdistinction with digital/algorithmic entities' nonbiological makeup. The incongruence of biological values and motivations versus algorithmic computerized value and goals was presented as problematic, strange at best, when in interdependent relationships with one another. Such interactions were described as psyche-altering, for example, in possible hypnotic states of interactions with recommendation systems, limited emotional possibly of synthesis of the opposites, and

redefining emotional-psychic symbolic processes. It was therefore concluded that such changes evidenced possible fundamental alteration of the psyche. Because the psyche is evolutionary, it followed that these changes are evolutionary as well. Furthermore, it was suggested that because digital algorithmic technology is not biologically based, a type of hybridization between the two represents a departure from biological evolution of the psyche. This may seem to be a grand proposition, but one that needs to be considered and calls for further exploration.

However, it may be argued, to the contrary, that all psychic changes of this scale are evolutionary. After all, development of consciousness as a differentiated part of the psyche, both structurally and experientially, can be viewed as an evolutionary departure. In this sense, it may be argued that the phenomena of psyche-algorithmic hybridization is evolutionary itself and that it belongs to the psyche's initiating its own changing through its innovations and interactions. From this train of thought, it may be stated that the bio-evolutionary process of the psyche includes algorithmic alteration. The premise developed in this dissertation does not attempt to argue with such a position. In fact, there is fundamental agreement. It is a departure from evolution, not the end of it. However, embedded in the conclusions of this exploration is the strong suggestion that we further explore this possible new evolutionary direction and become as aware of it as possible.

Importance to Clinical Psychology and Hope for Further Research

The importance of clinicians gaining more insight about human-computing technology interactions and relationships cannot be overstated. These are psychical, emotional, feeling-oriented, and relationally based phenomena. But more than that, they

have the potential to significantly alter these very characteristics of psychic processes and experiences. As phenomena and experience, these are pervasive, if not yet ubiquitous, in our digitally impacted lives. Most significantly, in their full force and impact, these are barely conscious. Therefore, human-algorithmic interactions and relationships are emotional and psychically etiologically related to overall and often specific emotional and relational distresses, coping, and challenges to growth encountered in clinical treatment.

In addition, it is the premise of this dissertation, and part of its approach, that not only can clinical psychologist gain from understanding the emotional-psychological impacts and dynamics of human-computer technology interactions, but that clinicians will also gain much by understanding the technology itself. This may include design frameworks, algorithmic approaches, technological issues along with cultural-economic forces behind technology innovation and market deployment. Such exposure and gained knowledge may be analogous to learning about a patient's socio-economical-cultural-religious background and customs, in order to apply psychological context to treatment. In the case of the digital/algorithmic technology in which our lives are immersed, however, this applies to all of our backgrounds and customs, although we, as a society, may be much in the dark about it ourselves. Clinical psychologists must understand this psychic-social-cultural-technological landscape in order to better understand and help its inhabitants.

The implications for clinical practice are as vast and deep as they are subtle and barely conscious. One overarching alteration of the clinical landscape may be imagined in how metaphor and the symbolic are experienced by a patient and how these are

understood by the clinician. As we have seen in the previous chapter, the psyche-digital hybridization may indeed be an alteration of what is psychically symbolic. For instance, "virtual" experiences with digital/algorithmic interactive entities are both virtual and not virtual. This is conveyed in the paradoxical notion of "virtual reality" which carries with it a lived experience of both virtual and reality at the same time (Biocca & Levy, 1995). Seen as an abstract notion of paradox is one thing, but living within such a concrete framework and environment is truly a psyche-challenging paradigm-shift. We are increasingly forced to live inside and in relationship with the virtual-reality contradiction and merger, as it is ever-changing in unpredictable ways into psychically unknown territory. Therefore, the grounding in which the psyche differentiates between and integrates symbol and concrete reality becomes less understandable and much less consciously accessible. This applies to psychotherapeutic clinicians as well, both in how they are psychically impacted by technology in their own life and in how they understand their patients' emotional and relational experiences. One possible repercussion of this psychic environmental change may come in the form of more pervasive "borderline" experiences that manifest in the blurring of the *threshold between virtual and reality*. Emotional experiences may become more murky, fuzzy, and under symbolic/feeling/emotional frameworks previously unknown and unimaginable. Unconscious and acted-out projections and introjections may be seen and experienced in mind-bending forms.

Indeed, as a society, we may all be becoming susceptible to these new yet psychically undefined "borders" and "border-crossings" between digital reality and nondigital reality. Clinicians, therefore, must be all the more careful and open-minded

about what they observe. This is a tremendous challenge for clinicians because as difficult as it is to understand and give the symbolic and emotional psyche its due, in the digital age, nothing may be as it seems: what may seem as clearly metaphoric may be concrete; while seemingly concrete may be metaphoric. As we have seen, the program ELIZA seemingly spontaneously evoked intimate experiences in the 1960s; the sky is the limit in new manifestation of relationships with digital/algorithmic technology far more advanced and advancing in exponential pace into the future. The clinician must understand that relationships with digital entities, visible or not, are as real as they are strange. These necessitate Herculean efforts on the part of the clinician to stay dedicated to the processes of the symbolic-emotional-feeling-relational psyche in a wilderness of contradictions and unknown properties of a new reality.

In contribution to this purpose, it is hoped that this dissertation provides insights to further understanding of this psychic-algorithmic digital landscape-in-formation and has furnished a helpful perspective in approaching the subject. Out of this exploration, research topics are plenty. In particular, implications of the biological with nonbiological interactive, interfacing, and interdepended dynamics should be explored. Emotional and psychically symbolic experiences need be at the center of such explorations from interdisciplinary fields such as social and depth psychologies, biology and neuroscience, economic theory, technology design, and software/hardware development, among others. From the technological development side, such a perspective of psychic-algorithmic dynamics may hopefully help guide advancements toward applications and functionality that support psychic processes and growth in deep and meaningful ways.

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