"HOW SMART PHONES AFFECT SKIN CONDUCTANCE AND SOCIAL SUPPORT NETWORKS AMONG STUDENTS AT THE UNIVERSITY OF ALABAMA"

by

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ABSTRACT

Although smart phone technology has been around several years, researchers are just now beginning to understand the impact of constantly being linked in to a network of information exchanges between and among users. Because smart phone technology has become commonplace in many developed nations such as the United States, the need to identify and observe its biological, social, and cultural impact is crucial. This investigation offers a benchmark analysis of users' perceptions of their own attachment to their smart phone devices, as well as to what extent this attachment can be measured through sympathetic nervous system response.

Using skin conductance as a biomarker and a series of interviews including Cohen's Interpersonal Support Evaluation List (ISEL), it was determined that users do self-report a strong attachment to their devices. However, this attachment was not able to be captured through strict observation of skin conductance response alone during an experimental challenge when a text message was received. Rather, skin conductance level coupled with informants' interview responses yielded positive correlations between feeling anxious when the device is not nearby and with a perception that having a smart phone has dramatically changed the users' lives. Using the Kruskal-Wallis test as a non-parametric proxy for an Analysis of Variance, a significant association between the "anxious" statement and a high appraisal score on Cohen's ISEL was also determined. Lastly, a smaller group of informants underwent experience sampling interviews three times a week for seven days. Five categories of smart phone use were

determined: Social Media and Photo Sharing, News and Information, Organization, Entertainment, and Communication. Smart phone use throughout the week varied among the sample.

This study is a contribution to a small but growing body of literature on the biological, social, and cultural impacts of habitual smart phone use. It is hoped that researchers will benefit from this research by expanding on the observations made in this investigation in order to better understand the aggregate impact of technology on daily life.

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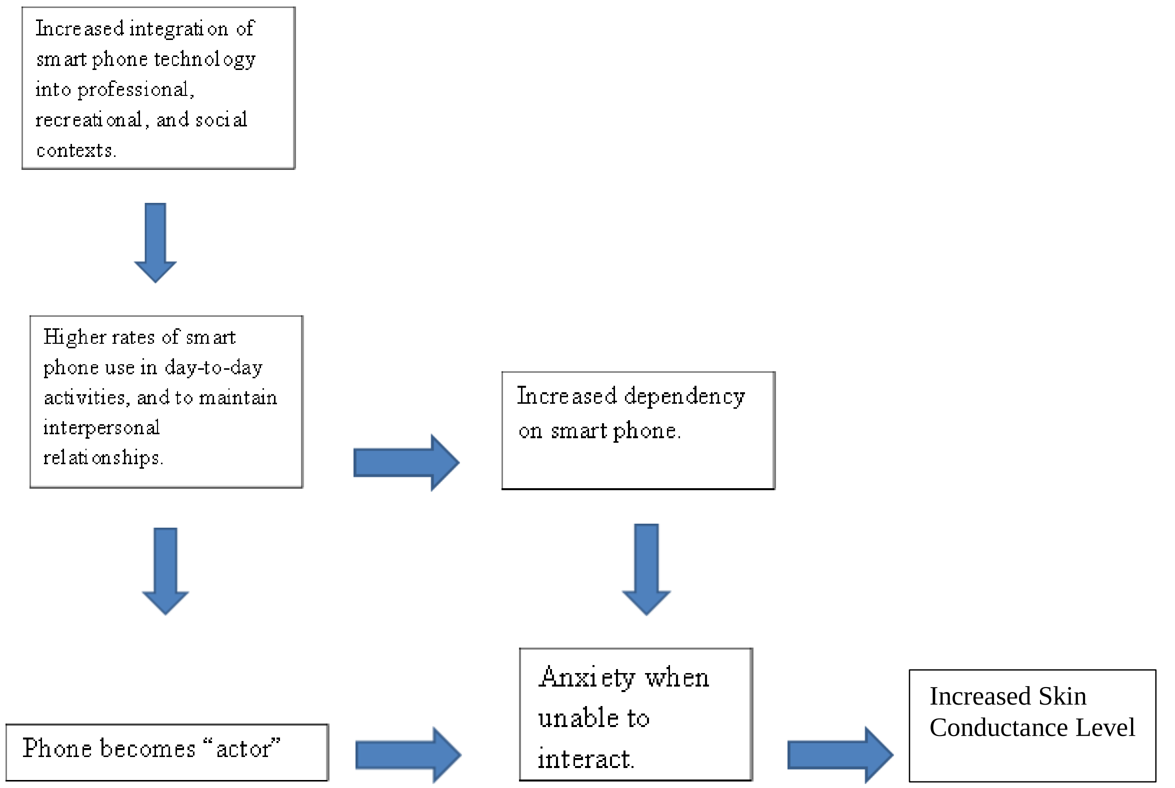
CHAPTER ONE: INTRODUCTION

In recent years, cellular phones have become more than just a means of communicating while on the go. Increasingly, cell phones are taking the places of personal data assistants (PDAs), cameras, gaming devices, and even computers. To put this in perspective, there are vastly more cell phones than people in the United States and each one is more powerful than a standard computer made in 1985. So-called "smart" phones provide constant access to different social networks, unprecedented amounts of information and entertainment like never before in human history. The concept of developmental plasticity (Gollin 1981) suggests that brain development can be physically affected, either positively or negatively, by different behaviors or environmental stimuli. Accordingly, habitual smart phone use has the potential to reshape not only behavioral and social norms, but the physical synapses within the brain itself. The link between shifts in cultural and behavioral norms and smart phone use has begun to be studied much more intently, but there is a need for more research such as Weiss and Samenow (2010) have called for. Additional studies (Kanehisa, 2009, 2012; Middleton et al, 2005, 2007; Namho, 2011) suggest a positive feedback loop resulting in a habitual need or desire to be constantly connected, or in sync, with various techno-social exchanges. This feeling can sometimes manifest psychologically in a phenomenon known colloquially as receiving a "phantom" text message—or, rather, imagining a vibration or audible notification indicating a text message when, in actuality, there is none. Cell phones have also been adopted as a means of play, a notion which has not been ignored by marketing firms (Davis & Chaudhri 2012). For example while eating or standing in a line alone, many users might find it comforting to pull out their phone and check their email, Facebook, or the same text messages they have already read. Whether the user is seeking to alleviate boredom, make a social statement (Abeele & Roe 2013), or avoid face-to-face interaction completely, he or she is engaging in play.

Stromberg et al (2007) describe smoking as a means to pivot around and occupy extrastructural space— physical spaces and social situations in which there is simply nothing practical to do at the moment. Smoking provides a pivot, or anchor to navigate this space and provide structure to an otherwise unstructured environment. Lynn (2012) has extended Stromberg et al's (2007) observation to smart phone use. Like smoking, smart phones could also provide a reprieve to a social situation or as an approach-avoidance mechanism--perhaps the greatest irony of smart phone use is that users sometimes might actually engage their phones to avoid social interactions. This project proposes that smart phones have a bridge between the social, virtual, and physical environments and the user, and asserts that the relationship between the smart phone and the user can be observed and quantified by measuring the user's autonomic stress response through fluctuations in skin conductivity reacting to a simulated stimulus from the smart phone. Furthermore, this investigation hypothesizes (i) that among college-aged individuals at The University of Alabama, informants' skin will have a positive skin conductance reaction when the informant is unable to access his or her smart phone in response to a simulated technological stimulus (e.g. a text message) compared to levels before the stimulus, and (ii) students with higher skin conductivity response levels will report deeper levels of attachment and involvement in their smart phones than those with lower skin conductivity levels. The data collection phase of this investigation consisted of both quantitative and qualitative data. Quantitative data were collected via a simulated stress response under laboratory conditions, and qualitative data collected consisted of pre-experiment interviews followed by ten informants undergoing daily ecological momentary assessment interviews for one week.

Model 1: Proposed Model of Smart Phone Attachment



The following discussions will draw from two anthropological and sociological theories: actor-network theory and play theory. Actor-network theory (Latour 1991, 1999, 2005) is a methodological approach to examining the relationships between human and nonhuman agents in which both actors are presumed to have equal degrees of agency in the relationship. Play theory (Stromberg 2012, Stromberg et al 2007) refers to the evolutionary and cognitive advantages of engaging in play activities. Actor-network theory is relevant to this investigation as it acknowledges an active, bidirectional relationship with technology. Play theory is relevant as it emphasizes evolutionary, biological, and social components of smart phone use among humans. Using these two theoretical frameworks, this investigation seeks to identify specifically how college students engage with their smart phones on a daily basis, and to what degree users become both biologically and socially attached to their devices.

CHAPTER TWO: LITERATURE REVIEW—THEORETICAL FRAMEWORK

The smart phone era began with the Ericsson R380 Smartphone in early 2000. Fourteen years of anthropological, psychological, and sociological research have not yet generated an extensive library of scholarly and peer reviewed articles. However, the past decade has seen increasing interest in the cultural, biological, and sociological implications of integrating smart phone technology into daily life. Additionally, two well-established anthropological theories (actor network theory and play theory) are particularly equipped and primed to evaluate the intersection of user and device. The following chapter will introduce the theoretical framework used to inform this investigation. Then, it will present examples of recent studies examining how smart phone users engage with their smart phones to navigate both their physical and social environments. It will conclude by noticing gaps in the literature and providing a deeper context for the present investigation.

Technological Determinism or Social Determinism

The cultural and sociological impacts of integrating smart phones into daily life are just a small argument in the larger debate between technological determinism versus social determinism. Sociologist Thorstein Veblen is credited with coining the term technological determinism, a point of view suggesting technology is the prime mover driving the organization of social structure, cultural values, and history. Proponents on the extreme end of the spectrum would suggest quite literally that technology is the sole prime mover behind cultural and historical processes. This point of view is perhaps best illustrated by Charles A. Beard (1927), a historian and contemporary of Veblen, “Technology marches in seven-league boots from one ruthless, revolutionary conquest to another, tearing down old factories and industries, flinging up new processes with terrifying rapidity." Other contemporaries such as William Ogburn further developed Veblen's assertion, arguing a slightly less extreme, though no less deterministic, stance which could be considered a form of *soft* determinism. Ogburn (1922) proposed a technology-driven theory of social change in which technology is still the prime mover of change, but the rate of change is tempered by social and cultural responses.

Particularly after the Second World War, pessimism about the wonders of technology began to give rise to technological determinism's antithesis--social determinism. This perspective argues that culture is not only largely autonomous from the influences of technology, but that culture actively and deliberately shapes technology. In other words, social circumstances guide and dictate socio-cultural decisions on which technologies will be adopted, and no technology can be considered to be an inevitable result on its own merit. Lelia Green (2002) coined the term *technoculture* as the integration and increasing reliance on new forms of communication technologies. This term, Green warns, refers only to concrete technologies assisting communication through which culture is built—including written language, but excluding spoken language. This seemingly narrow concept actually carries broad implications. From ancient cuneiform tablets organizing tithes and cattle transactions, to smart phones facilitating multi-billion dollar transactions, it is difficult to refute that increasing efficiency in communication transcending geographic and temporal limitations has been a prime mover throughout human history. The determinist would argue that creation of technologies spawning *technocultures* was inevitable--similar to infinite monkey theorem proposed by Emile Borel (1913) suggesting a room filled with chimpanzees and typewriters will eventually produce Shakespeare. However, critics such as Sarah Miller (1997) argue this sort of absolute technological determinism ignores the crucial element of human involvement shaping society.

Seemingly, there is little reconciliation between the two philosophies, as neither supports the neutrality of either technological innovation or human agency. Anthropology has attempted to offer various solutions to the dilemma, achieving varying degrees of success and coherence. The term "cultural materialism" was coined by Marvin Harris (1968) expanding upon on Marx's materialist model of a societal framework comprising of an infrastructure, structure, and a superstructure. Cultural materialism argues that the realm consisting of material realities (such as technological, economic, and demographic factors known as the infrastructure) shapes the other two levels (the structure and superstructure). Leslie White took cultural materialism further into the realm of technological determinism than perhaps Harris ever envisioned.

White (1959) describes culture as an "extrasomatic mechanism" comprising of a traditional organization of tools, customs, language, and beliefs. Furthermore, White claims, culture is a material "and therefore a thermodynamic system…an organization of things in motion, a process of energy transformations" (1959). Analogous to a biological system, cultural systems expend captured energy in "self-extension [and] self-maintenance." The cultural processes used to harness and redirect energy (hunting, making pottery, baking a wedding cake, sending a text message, etc.) can be described by the formula E X T > P. Energy (the ability to do work) combined with the technology to capture it yield some social, cultural, or biological product.

The military uses the term "force multiplier" referring to an attribute which makes a given unit more effective than it would be without said attribute. Modern communications have become so effective at being able to accurately and quickly relay information, that the majority of adults in the developed (and increasing portions of the developing) world can utilize these technologies to impose order on an otherwise chaotic environment. In effect, smart phones act as a force multiplier allowing individuals, as well as societies, to more efficiently feed off of negative entropy in order to expand maximum entropy potential (White 1959). White's most direct affirmation of his technological determinism is evidenced by the quote, "Man as an animal species, and consequently culture as a whole, is dependent upon the material, mechanical means of adjustment to the natural environment" (Bohannan and Glazer 1988).

If a materialist lens displays technological determinism, an idealist lens might be supportive of social determinism. Admittedly the idealist perspectives are less extreme and less obvious than the materialists, but important contributions to the debate do exist—such as structuralism. Structuralism is, in part, derived from the school of phenomenology (Sturrock 2003) and seeks to understand salient relationships between the mind, individuals, culture, and a collective consciousness. Levi-Strauss (1972) posits that "[cultural processes] are not deterministic of culture, but operate within a culture" (anthropology.ua.edu). Implicit in this definition is the suggestion that culture (and society) comprises of relationships with a degree of agentive negotiation among individuals, collectives, mental structures, and objects as well.

While a structuralist position does not adequately provide answers for (or even directly address) the debate between technological determinism or absolute agency, it can perhaps highlight the main overarching dilemma standing in the way of a solution. Levi-Strauss (1972) identifies binary oppositions prevalent within society as a means of discovering hidden rules of culture. Similarly, the debate of technological determinism versus social determinism is probably more accurately characterized by the following statement: either technology is responsible for everything, or it is responsible for nothing. Humans are either agents actively constructing reality or are victims of technology. Actor-network theory provides a suitable theological framework to move beyond this debate by suggesting that both human and non-human actors actively participate in, and contribute to, eco-social networks that comprise of different tools, technologies, environments, and social relations wherein agency is distributed evenly.

Actor-Network Theory

> Actor-network theory characteristically refuses or reworks what it takes to be formulaic oppositions between technology and society…Just as it declines the lures of technological determinism, or the notion that technology exerts an inescapably powerful shaping force on society, so too does actor-network theory demur from the countervailing reaction that society determines technology (Goggin 2006:11).

Actor-network theory is a product of early-1980s French post-structuralists Bruno Latour, Michel Callon, and English sociologist John Law. Notable works by Latour, the chief architect, on actor-network theory include *We Have Never Been Modern* (1993) in which he encourages empiricism and the use of the scientific method in order to rethink the human mental landscape. A more recent work, *Resembling the Social: An Introduction to Actor-Network Theory* (2005), delves into the ontological weight of actors' agency and motivations. Actor-network theory comfortably accommodates the idealist's focus on relationships between humans and technology, while elevating technology itself to the role of actor as a determinist might.

Actor-network theory (ANT) suggests that all actors have the same agentive value within a network of exchanges. An actor can be either human or non-human, and is only defined as "[something] around which space must bend, and make other elements dependent upon itself and translate their will into a language of its own" (Dudhwala 2009: 6). In other words, each actor is aggressively attempting to feed its own motivations, needs, and ambitions. Dudhwala continues to explain that an actor is measured and analyzed in terms of how strong an association it can make by interacting with other entities. Furthermore, actors necessarily leave traces, or changes, in either the physical or social environment, of unique relationships. By following the actor, these changes can be observed; therefore, actor-network theory stresses that the actions of an individual actor must be followed closely as "if an actor does not change anything, then there is nothing to be traced and therefore is not an actor at all" (Dudhwala 2009:6). It seems prudent to point out here that Latour and Callon never intended for actor-network theory to be employed as theory, but rather as method: "a way of being faithful to the insights of ethnomethodology (a method for understanding the social orders people use to make sense of the world) (Law 1999)." Latour (2005) goes as far to say that the term "actor-network theory" is itself "so awkward, so confusing, so meaningless that it deserves to be kept."

Nevertheless, Callon's (1986) study of scallops and fisherman of St. Brieuc Bay, shows how actor-network theory can highlight the blurry distinction between method and theory (Dudhwala 2009). His study follows the work of three scientists who hypothesize that Japanese farming technology (farming scallops in mesh nets to protect the larvae) can be implemented in France to counteract a declining scallop population due to over-fishing. The motivations of each actor in the scenario are obvious: the fishermen want a larger scallop population to harvest, the scallops want to continue to successfully reproduce, and the scientists want to understand better ways to protect the sustainability of scallop larvae (Dudhwala 2009).

The primary criticism of actor-network theory is the issue of non-human actors (inanimate objects) having agency. The opinion of this investigation is that, while non-human actors do not possess consciousness, certain objects (such as smart phones or cigarettes) do develop an agentive value in certain contexts. While this investigation does not suggest non-human actors possess ambition or desires, the archaeological record does yield at least one example of non-human actors being placed on an equal plane as human actors. Using a life-history view of inanimate objects known as new animism, Van Pool and Newsome (2012) argue that pottery among the Pueblo was literally thought to possess souls of their own born of the natural forces of the earth. Pottery experienced birth, life, and death and had individual personalities and even faces which manifest during the manufacturing (birth) process. In regards to the relationship between new animism and actor-network theory, pottery among the Pueblo was considered to have the same degree of agency as human actors. Van Pool and Newsome's research is important to recognize in the present investigation, as it provides a historical and archaeological precedent for nonhuman objects having an agentive value and playing an active role in complex social networks.

Play Theory

Play theory was pioneered, in part, by Pierre Bourdieu but has, more recently, been taken up by Stromberg (2012), Stromberg et al. (2007), and Lynn (2012) to name a few. Stromberg et al.'s (2007) article discusses low-level smoking among college students as a means of play. They define low-level smoking as consuming less than a pack of cigarettes a week, mostly reserved only for the weekends. The authors suggest that smoking occurs in three specific contexts: at parties, at times of stress, and at times of boredom. According to the article, smoking serves to provide structure in otherwise unstructured environments. Furthermore, Stromberg (2012) suggests that cigarette smoking is a form of role-playing which facilitates "social interaction, and particularly for manipulating their own social image in identity play." Lynn (2012) takes this a step further in relation to cell phones by saying that cell phones or cigarettes are used to fill interstitial spaces. In other words, they are used as a means to navigate or occupy otherwise unstructured space-i.e. space in which little effort or though is required to occupy it. The smart phone allows the user to appear busy, interesting, and anchored within the environment. Ignoring the obvious biologically addictive qualities of smoking, Stromberg, Stromberg & Nichter, and

Lynn's work in this area ties in closely with actor-network theory as cigarettes and those who smoke are all actors in a network of agentive exchange.

Play has long been accepted as a crucial activity in human development. The embodied capital hypothesis highlights the notion that childhood in particular is a time for learning and practicing cultural skills (Bogin 2010). Play is often the context in which this learning takes place. Play can also serve as a buffer to physical and mental health, though. However, there is a fine line between advantageous and disadvantageous play activities. Snodgrass et al (2011) refer to online games such as World of Warcraft as "a technology of absorption," identifying the deeply immersive characteristics of the massively multiplayer online gaming experience in particular. Not only do these games provide rich environments, compelling stories and missions, but they provide a social network too. These features collectively create a literal alternate world allowing for the potential to experience an altered state of consciousness while playing. In a similar vein, today's smart phones have a myriad of gaming and social applications, which are easy to use, immersive, and often free. Examples include programs such as Angry Birds, Candy Crush, Temple Run, Words With Friends and social networking sites such as Facebook and Twitter. These apps are designed as entertainment and many are so successful in doing so that they have the potential to lead to a dissociative state, particularly if the game is being used as a coping strategy to mitigate stress (Seligman 2005, Lynn 2005). Many of the games have their own unique repetitive music tracks, rhythmic controls, and attractive backgrounds which aid in lulling the user into a calm, reserved state of consciousness. However, as with World of Warcraft, many users become overly psycho-emotionally invested in the experience leading to the potential for violent outburst and loud exclamations when users do not accomplish their in-game goals.

Actor-network theory, Stromberg's theory of play, and Snodgrass et al.'s "technology of absorption" can perhaps best be summarized and characterized by the following excerpt from Stromberg (2012):

> …all human beings necessarily have a 'sense of agency,' an understanding that the actions they initiate and execute are linked to their projects, and that they understand other human beings in the same way. Understanding ourselves and others as agents—as creatures pursuing goals…[is] something essential to human social life…yet we know from ethnographic reports that people report lapses in the sense of agency, situations in which their choices seem to be being controlled by something beyond themselves (Stromberg 2012:317).

This project does not suggest all objects necessarily have a "sense of agency," but it does suggest that objects impose a form of unconscious persuasion over human actors. In this sense, the non-human objects become actors in a network of exchanges.

CHAPTER THREE: LITERATURE REVIEW—TECHNICAL LITERATURE

Mobile communication has been a recent topic of interest for anthropologists and sociologists. Miller et al. (2005) and Horst et al. (2011) have studied cell phones and the "digital divide" in developing countries such as Ghana, Jamaica, India, and the Dominican Republic. Horst and Miller's book *The Cell Phone: An Anthropology of Communication* (2006) examines the impact of mobile technologies on personal issues such as loneliness and depression, and how the cell phone has become central to establishing and maintaining interpersonal relationships. In *Global Mobile Media* (2011), Goggin argues that "the global mobile media could be a fertile garden for culture." Smart phone technologies in particular have provided unprecedented access to an exchange of information leading some observers to joke about how cell phones have become smarter than humans—a notion echoed in Evans-Pughe's article "Smart Human" (2012). Internet access coupled with text messaging has changed interpersonal relationships in regard to dating, too (Bergdall et al 2012; Weiss & Samenow, 2010). Instead of actually going out and meeting potential mates, it is now possible to meet, seduce, and even date from the couch or while driving to work. The speed and efficiency afforded by smart phones have created a culture of dependence on cell phones in creating and maintaining interpersonal relationships and social niches. Investigations sampling young Korean women have found a link between cell phone use and other cultural aspects such as perceived child-rearing methods (Kanehisa, 2008; 2009; Namho, 2011). In essence, smart phone technologies (internet, mobile email, and third-party-generated applications such as stock tickers) create a different, electronically-connected habitat—an ever-active network in which the user is in constant connection to every other individual user. Preceded by pagers, cell phones have created an "always on" environment which has transformed professional relationships as well by creating an imbalance between the workplace and other aspects of life including familial relationships (Turel & Serenko, 2010; Burke & Martinussen, 2004).

E. P. Thompson (1967) coined the term "time discipline" referring to the concept of time being regulated by industrial progress and capitalism—i.e. one's time can be valued monetarily and it can also be regulated. For example, if a man is hired to work in factory, he typically is assigned a particular shift beginning in the morning and ending in the late afternoon. For each hour the man works, he earns a specific amount of money for contributing his time. The laborer goes home and is considered "off the clock" and is not paid for this leisure time. This pattern of time and labour in exchange for a wage has been commonplace since the Industrial Revolution, in fact. However, cell phones—smart phones in particular due to their internet capabilities—create a dissonance between leisure time and work time as an employee can typically be reached outside of work at any time through a variety of means. Many companies even issue their employees pagers, cell phones, and laptops to ensure this capability. Catharine Middleton suggests that smart phones validate and reinforce cultures whose members are expected to be accessible outside of normal hours—effectively creating a sense of lack of control (2007; 2012). Middleton is suggesting that smart phones actually give the user less agency, a concept echoed by other studies as well (Cousin & Robey, 2005; Mazmanian, 2005; Middleton et al, 2005). Middleton's assertion resonates in light of Stromberg's (2012) discussion of lapses of agency involving low-level smoking. This has dramatic implications for straining interpersonal relationships; as workers become increasingly available for work-related tasks during leisure time, less time is available for face-to-face contact with friends and family. Other investigations have linked a lack of agency in the workplace to increased levels of stress and stress-related illnesses such as obesity, diabetes, cardiovascular disease, and depression (Sapolsky, 2004;

Wilkinson & Pickett, 2010). One might suggest that it is not much of a stretch to assume that the consequences of lack of agency in the workplace are analogous to lack of agency in a school setting, or even in individual relationships. Igarashi et al. (2005) conducted a longitudinal study of social network development via text messages and found that women are more likely than men to use cellphones to foster friendships and social networks. Keefer et al. (2012) found that some users grow attached to objects, including cell phones, as compensation for perceived unreliability in friends.

Skin Conductance

Skin conductance is known by a myriad of terms including galvanic skin response (GSR), electro-dermal response (EDR), psychogalvanic reflex (PGR), skin conductance response (SCR), and skin conductance level (SCL). This paper will use the terms skin conductance and galvanic skin response interchangeably to refer to a method of measuring the electrical conductance of the skin varying based on the degree of surface moisture present (i.e. sweat). Sweat is a product of activation of the sympathetic nervous system, and is an indication of psycho physiological stimulation. Made of water and electrolytes, sweat is a natural conductor of electrical current. Using sweat as a medium, it is possible to measure minute fluctuations of the natural electrical current running through synapses, to organs, to muscles, and finally to the epidermis. Skin conductance is traditionally measured on either the medial or distal 2D4D phalanges. A study by Payne and Dawson (2013) corroborates the claim that taking measures on the distal portion of the finger yields the most accurate results.

Galvanic skin response is most commonly displayed graphically as a continuous wave representing a temporal scale in which measurements are taken at pre-determined intervals

(Figure 1). Common intervals in the literature range from .04μS to .01μS (microseconds) (Braithwaite et al 2013). When stimuli tests are involved, a stimulus is administered to either positively or negatively influence a deviation from a baseline skin conductance level. The effect of the stimulus is measured in three phases: the latency phase (the time when the stimulus is administered and when its effects manifested), the rise time (the time it takes skin conductance to reach its maximum amplitude), and half-time recovery (the time it takes skin conductance to fall half-way from its maximum amplitude back to baseline).

Figure 1: An example of the components of SCR (Taken from Dawson et al., 2000)

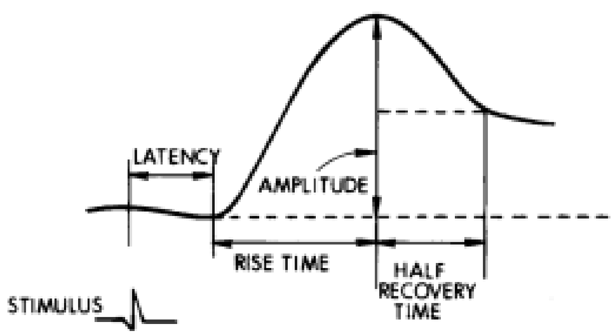


Figure 5. Graphical representation of principal EDA components.

Bach and Friston (2013) present three causal models for the study of skin conductance response (SCR): the peripheral model, the neural model, and the inversion scheme. The peripheral model most closely conforms to the present investigation, as it implies a linear relationship between sympathetic neural activity and skin conductance response. The neural model maps sympathetic responses to neural activity and can be divided into two subsequent models based on temporal assumptions. Through invasive measurements of actual neural activity, Bini et al (1980) and Macefield & Wallin (1996) have shown with some degree of certainty that neural activity is very discrete in nature, operating in .06 second bursts.

Uninformed causal modes make no a priori assumptions about when these bursts occur, whereas informed models do make temporal assumptions based on experimental design. The third model is a derivative of the previous two and can also be split into two categories. Probabilistic schemes attempt to optimize the amount of variance explained by the model. Galvanic skin response is by nature noisy. Artifacts such as movement, humidity, temperature, and even breathing can induce or amplify SCR activity. Probabilistic schemes attempt to correct for this noise statistically. Deterministic schemes also attempt to extract as much data from noise as possible through filtering techniques designed to recover phasic sympathetic neural activity.

One of the earliest documented instances of skin conductance being used to measure psychophysical arousal comes from Carl Jung's early word association studies (Jung 1906). Jung describes using a machine to measure changes in electrical resistance of the skin in relation to hearing a list of various words being read aloud. Words emotionally salient to the participant, elicited a biofeedback response. Since the 1970s, use of galvanic skin response has given way to more advanced and accurate means to measure psycho-physical and neural arousal such as electroencephalography (EEG) and magnetic resonance imaging (MRI). However, galvanic skin response studies appeal to anthropologists (specifically neuroanthropologists) for a number of reasons: they are cost effective, non-invasive, and the equipment can be transported and implemented in the field with minimal weight, space, or energy-use concerns. For example, Rebecca Seligman used galvanic skin response and heart rate to study dissociation events among *Candomblé* spirit-mediums in Brazil (Seligman 2005, 2010). Brown et al. (2009, 2011) and Sievert et al. (2007, 2010) used skin conductance in several cross cultural studies between women from Japan and the United States to document hot flashes. Of course, skin conductance applies to non anthropologists as well. Dixon et al. (2013) studied skin conductance reactivity in relation to slot-machine gambling and found that skin conductance responses for “near-jackpot misses” were similar to actual wins. In effect, the near-misses stimulate “appetitive components of the reward system to promote continued gabling” behaviors. Tuzeman et al. (2013) have indicated that galvanic skin response can be used as a quantitative diagnostic method for Frey Syndrome. El-Sheikh et al. (2007) have used skin conductance to study behavioral development among children in homes with marital conflict. Additionally, studies have shown that galvanic skin response can be used to diagnose and treat early forms of type II diabetes (Khalfallah et al. 2012, Freedman et al. (2014).

Ecological Momentary Assessment

Ecological momentary assessment (also referred to as experience sampling) is a data collection technique designed to capture an informant’s experience of a given phenomenon over time while avoiding recall bias. When trying to collect as much behavioral data as possible, it is necessary to collect several samples throughout the day, or even hourly in some cases. However, it is impossible for the researcher to be with the informant all day every day. In most instances, there are several informants participating in the investigation at once. Self-reporting is a technique that enlists the informant to report his or her own experiences over time. Then, the data are given to the investigator. Recall bias describes the possibility of an informant’s either selectively remembering (actively manipulating the data to project something other than the truth) or misremembering (thinking someone happened a certain way when, in actuality, it did not). Retrospective studies are particularly vulnerable to recall bias using a case-control design investigating etiology of certain phenomena (Kopec & Esdaile, 1990). Experience sampling involves the investigator’s contacting the informant at either random or semi-random intervals to administer a brief survey. This process is repeated until enough data have been collected to satisfy the research parameters.

The validity of ecological momentary assessment has been well established in the literature. Bernard (2011) explains that EMA has two primary advantages. First, it "combines the power of random spot checks with the relative ease" of having people self-report their own behavior. Second, with the aide of pagers or cell phones, the researcher can collect spot-observation data from several informants at once. Czikszentmihalyi and Larson (1987) have demonstrated that EMA is both a valid and reliable method for collecting longitudinal data through their study of individuals with mental disorders. Anthropologist Gary Chick (1994) utilized experience sampling to test Marx's theory that "automation would eliminate the need for skilled labor by turning complex tasks into a series of routine steps" that could be performed en masse by an unskilled labor force. Chick hypothesized that workers in a small machine-tooling company who worked with computer-controlled machines would find their job more boring than those working with traditional tools. Equipped with a beeper, each worker was beeped six times over a five-day week and asked to fill out a two-minute survey. The results proved to be mixed, finding that the computer-machine workers found their jobs more interesting, but that they had less control over the product than those working with manual tools. Myin-Germeys et al. (2009) describe the results of experience sampling as "the black box of daily life," as researchers are able to capture a complete and reliable record over given a period of time—making EMA a powerful tool for any social science investigation. For example, in attempting to make recommendations for hospital workplace reforms, Rutledge et al. (2009) used experience sampling techniques to compare daily work patterns to stress between nurses and doctors. This team was able to collect more than 9,500 random interval surveys with a 73.3% full completion rate, finding that longer hours and greater quality of sleep reduced work stress and memory fatigue.

Whereas pagers or personal phone calls were previously the only way to conduct experience sampling, these methods soon gave way to PDAs (personal data assistant); but often the participant retained a large portion if not all of the data until the end of the observation period. Increasingly, researchers are electing to collect random interval data using SMS (short message service). Conducting EMA sampling using SMS (i.e. text messages) has a few benefits over traditional paper surveys including space, weight, and cost in many instances. Immediate short message service data collection also makes it easier to directly identify non-responders, those who misunderstand the directions, interviews are typically quicker and more convenient, and there is no interview bias. Johansen and Wedderkopp (2010) demonstrated the effectiveness of SMS experience sampling when they compared data collected between two groups over 53 weeks: the first group participated in one phone interview asking them to recall the entire 53 weeks, and the second group participated in weekly interviews via SMS. Questions asked to the 31 SMS informants called for them to list any back pain over the past week and past month. Responses for the one-week and one-month recall were in high agreement between the phone interview and SMS, but in "very low agreement" for one-year recall. Berkman et al (2011) used SMS as well to document the first 21 days of cessation among smokers trying to quit. Text messages were sent eight times daily to measure cigarette count, mood, and cravings. The results clarified previously conflicting information between the bidirectional mood affecting craving, buffering mood relationship of smoking, but it also, according to the authors, validates the "rapid, real-time measurements" SMS experience sampling possesses.

Chick (1994) explains that one limitation of experience sampling is a result of its randomness—i.e. receiving null entries and gaps in the data over long periods of observation due to inconvenient interview intervals. In other instances, the investigator is also subject to error and lapses of responsibility in conducting the interview—especially considering how intensive daily interviews can be. The "last value carried forward technique" is an early method where the last missing value is replaced by the previously recorded value (Axén et al. 2012). For longer longitudinal studies, this method is acceptable but not without its own limitations as missing data are usually not random in nature. To address both of these limitations, some researchers have developed smart phone apps capable of sending a message prompting informants to complete the survey at predetermined intervals within the application (Runyan et al. 2013). While the app is free to participants, the software license for the researcher is not, which can limit its implementation to only large-scale investigations. A third limitation of experience sampling is that self-administered questionnaires can only be conducted by literate populations. Chick (1994) suggests that giving a non-literate informant a voice recorder is an easy way to circumvent this issue, though.

CHAPTER FOUR: RESEARCH SETTING AND METHODS

Tuscaloosa and The University of Alabama

All interviews for this investigation were conducted on the campus of The University of Alabama in Tuscaloosa, Alabama. With a population of over 93,000, Tuscaloosa is the largest city in Tuscaloosa County and the fifth-largest city in the state (U.S. Census Bureau, 2010). Tuscaloosa is known for many unique features and landmarks including the prehistoric Mississippian mound complex known as Moundville located approximately thirty-minutes south, the Black Warrior River whose waters are still used to ship coal and other natural resources, and The University of Alabama, which is the Flagship University for the State of Alabama. From 1826 to 1846, the city also served as the state capitol, which was then moved to Montgomery.

Chartered in 1831, The University of Alabama draws students and professionals from all over the country, offering opportunities both for employment and education. In 1837, the university was one of the first in the nation to offer engineering classes and is one of the few to maintain accreditation continuously since 1936 (UA.edu, 2013). In 1865, much of the campus was destroyed by Union troops during the Civil War who left only seven buildings standing. In 1871, the university boasted an enrollment of 107 students and established its own School of Law the following year. In 1892, the university assembled its first football team which would prove to be a lasting and endearing identity of the university for years to come. In 1921, the Medical College was moved from Mobile to the main campus in Tuscaloosa and in 1924 the Graduate School was officially established. (UA.edu, 2013). Today, the university supports several different colleges including schools of business, law, medicine, and dozens of post-graduate degrees.

In the 2012 academic year, enrollment reached an all-time high of 33,602 undergraduate, professional, and graduate students, continuing a trend of rapid year-to-year growth (UA.edu, 2013). 58% of students were in-state residents and 4% were international students from 68 different countries. 55% of students were female, 13% were African-American, and 28% belonged to either a sorority or fraternity. The college of Arts and Sciences hosted the most students at 28% of the student population, followed by the Business School with 21%, 9% in the College of Communications, 9% in Education, 12% in Engineering, 10% in Human Environmental Sciences, 2% in the Law School, 6% in the College of Nursing, and 2% in Social Work (UA.edu, 2013).

According to U.S. News and World Report, a commonly referenced website by college applicants, the cost of attendance per semester for the 2013-2014 school year was $9,200 for Alabama resident undergraduate students and $22,950 for out-of-state residents. Room and board fees were estimated to be $8,650 and books and supplies were estimated to be approximately $1,100 for one school year. Also in the 2013-2014 school year, approximately 55% of students applied for need-based financial merit. Forty-two percent of students received some kind of need-based financial aid, and 14% of students received aid fully covering expenses. For the 2011-2012 school year, 5,894 undergraduates received federal Pell grants with an average amount of aid received being $4,050 (National Center For Education Statistics 2014). For the 2012-2013 school year, the University’s acceptance rate was 53% with 25% of students having an ACT composite score higher than 30.

Sample Size and Recruitment

Informants consisted of both undergraduate and graduate students aged 18 and older who also own a smart phone. Informants were recruited on The University of Alabama campus by means of convenience and network sampling, as well as classroom recruitment presentations to achieve a total sample size of fifty. Sample size was derived from a power analysis using the statistical program G*Power 3.1. The basis for the effect size expected in a laboratory challenge designed to increase skin conductance was derived from two previous studies (Murray-Close 2011; El-Sheikh et al. 2007) indicating the need for a sample of 37 subjects for a paired samples t-test. This investigation, however, elected to sample 50 students' skin conductance responses as differences in lab settings could produce different effect sizes, and 50 informants should ensure a greater degree of reliability and validity in the data. However, due to catastrophic loss of data during collection, ninety-three informants were interviewed on general smart phone use as well as Cohen's 12-Item ISEL. Of these, 50 participated in the experimental portion measuring skin conductance level, and 10 of *these* informants were recruited for further ecological momentary assessment interviews which took place over the course of seven days.

The only criteria for participation in the study were 1) the informant must be a current student at The University of Alabama; 2) the informant must be at least 18 years old; and 3) the informant must own a smart phone. Informants were recruited under the premise that they were participating in a study attempting to link smart phone use patterns with memory recall, as knowledge of the true focus of the study (measuring skin conductance after receiving a text message they are unable to answer) would render the data collected rather meaningless. This necessary deception was approved by the University's Institutional Review Board, and informants were debriefed immediately afterwards and given the opportunity to withdraw from the study. In general, participants did not receive any compensation for participation; however some informants did earn extra credit for specific courses in Anthropology, Psychology, and Marketing at the discretion of the professor. Participation in the experimental portion lasted approximately 20 to 30 minutes; and participation in the experience sampling phase consisted of 21 short interviews conducted via text message over seven days.

Skin Conductance and Social Support Interviews

Interviews were scheduled during normal business hours Monday through Friday and took place in a private room within the Anthropology Department's Human Behavior and Evolution Research Group (HBERG) laboratory. The informant was first greeted and thanked for his or her participation and instructed to make himself or herself comfortable. After written consent was obtained, the informant was provided a fake departmental survey designed to collect his or her phone number subtly (see appendix). Then, the informant was interviewed about his or her personal smart phone use habits. Questions included what type of smart phone he or she owned and how long, whether or not his or her 3G/4G data plan was limited or unlimited, how and at what time of day he or she used his or her smart phone the most, with whom did communication occur most, what kinds of auditory and visual notifications were turned on at any given time, and what kinds of applications were installed and which were used most often (see appendix for full list of questions). Next, the informant was read the following four statements and asked to answer by indicating either agreement or disagreement using a four-point Likert scale: "Having a smart phone has dramatically changed my life," "I feel anxious if I do not have my phone with me at all times," "If I am talking to a friend in person (face-to-face) and I receive a text message, I immediately look at the text message," and "If I am talking to a friend in person (face-to-face) and I receive a phone call, I immediately answer the call."

During the initial interview, the informant was asked whether his or her text message and phone call notifications were generally set to vibrate, ring, or silent. This was asked to determine whether or not the informant's phone was currently primed to provide some sort of sensory response to a text message. If the informant indicated that the phone was generally set to silent, or if the primary investigator suspected that the phone might be on silent, the informant was then instructed to "turn on [his or her] text message notifications." This was rationalized to the informant by saying that the NeXus 4 communicates with the computer using a Bluetooth signal (which is true), which can interfere with the readings (not true). By turning the smart phone's notifications on, it allows us to mark "interferences" and exclude them from the data during analysis. The phone was then placed face down on the table at which the informant sat, next to the computer monitor, but still in reach of the informant. In a few instances, the informant kept his or her phone either in his or her lap or hand. These informants were allowed to retain possession of their phones, because pushing the issue to specifically place the phone on the table might have compromised the deception element of the experiment. Informants in these cases were reminded again to focus on the film as attentively as possible.

After insuring the smart phone's notifications were turned on, the primary investigator put on two latex free gloves and cleaned the informant's second and fourth phalanges with an alcohol cleansing wipe. The GSR leads attached to the NeXus 4 used to measure skin conductance were then prepped with a dime-sized amount of Ten20 Conductive neurodiagnostic electrode paste and attached to the participant's distal 2d4d phalanges. During this process, the informant was told that he or she was to watch a portion of a documentary titled *Do You Speak American?: Southerners* for seven minutes, and that he or she would be asked questions about the film afterwards. This video was chosen mostly for convenience's sake, but also because it provides a low-excitement proxy for a typical lecture a college student might experience at the

University of Alabama. The video was started at the 1:38 mark, after the introductory credits and title screens.

After two minutes of watching the documentary, a text message saying “Hey” was sent from the primary investigator’s phone to the informants—although in a few instances, AOL Instant Messenger was used to send the text message. AOL Instant Messenger was only used in circumstances in which using a cell phone to send the message would be either impossible (dead battery or poor-to-no reception) or impractical (risk of the informant recognizing the phone number). Because different phones have different signal strengths at different times due to various factors outside the experiment’s control, the time at which the informant’s phone actually reacted to the text message varied. The times at which the text message was sent, and then received (as indicated by auditory confirmation) were both recorded. As is the case with some smart phones such as the iPhone 4, iPhone 4s, and iPhone5, a reminder notification is sent at either one minute or two minutes later unless this function is explicitly deactivated. In such cases, the time of this event was recorded as well.

At the seven minute mark, as indicated through the Biotrace software, the documentary was paused and the GSR leads were removed from the informant’s fingers. The informant was then thoroughly debriefed and asked if he or she had any questions or concerns. The option to be withdrawn from the study was also presented at this time. The informant was then asked to complete Cohen’s 12-Item Interpersonal Support Evaluation List (ISEL) (Brummet et al 1998, Brummet et al 2006). This evaluation is a shortened version of the original 40-Point scale developed by Cohen & Wills (1985). There is also a scale developed specifically for college students, but was not used due to its length and because the 12-Point scale provides for more generalized comparisons to other adult populations. The 12-Point ISEL has three different subscales designed to measure three dimensions of perceived social support: 1) Appraisal Support, 2) Belonging Support, and 3) Tangible Support and are graded on a four-point Likert scale from definitely true (at 1) to definitely false (at 4).

To test whether or not skin conductance level was affected by the stimulus, observed counts were used in lieu of statistical tests. The skin conductance data and the results of the Likert scale questions pertaining to the informants' attachment to their smart phones were analyzed using a logistic regression analysis, as well as Pearson's correlation analysis. To test the relationships between the SCL and Cohen's ISEL, ANOVAs were performed for two of Cohen's interpersonal support categories following normal distributions, and the Kruskal-Wallis test was substituted for the third category not following a normal distribution.

Ecological Momentary Assessment

After the informants were debriefed they were given the opportunity to participate in week-long daily phone interviews known as ecological momentary assessment, or experience sampling. EMA is designed to capture daily ethnographic data while avoiding informant recall-bias. The primary aim of this phase was to understand to what degree students engaged with their smart phones on a day to day basis. These qualitative EMA data provided context for the skin conductance data and could be used to help develop future potential protocols observing the variation of daily use habits and psycho-physical variation in relation to smart phones. Without this portion of the investigation, the data collected during the first experimental phase of the project would lack empirical explanation. A total of 10 informants were recruited to participate in the experience sampling.

To gather this information, the investigators contacted the informant via text message to ask a series of questions aimed at collecting information about how smart phones play a role in the informants' daily lives (see appendix). Text messages were used instead of phone calls because text messaging is less invasive, and because the informant is more likely to respond at his or her earliest convenience to a text message than a phone call. Texting-times were divided into four 3-hour blocks over a twelve hour period and were amended according to each participant's sleep habits. The time of each interview was semi-random, accounting for each individual's class schedule. Informants were asked the following questions and asked to provide as much information as possible: 1) What are you doing right now/since the last interview, 2) how many times have you interacted with your phone since the last interview, and 3) list all of the applications that you have used since the last interview. Data were evaluated repeatedly in order to code the texts for themes and draw conclusions based on commonalities and disparities between individual users.

CHAPTER FIVE: RESULTS

The following chapter is divided into three sections. The first portion discusses demographics of the sample and general smart phone use patterns observed, as well as the results of Cohen's 12-Point Interpersonal Support Evaluation List (ISEL). The second section presents the results of quantitative analyses of the two primary research hypotheses, as well as further exploratory tests performed. The final section discusses the results of the ecological momentary assessment by identifying patterns of smart phone use over a seven-day period.

Demographic Information and Smart Phone Use Patterns

Of the 93 total informants interviewed, 79.6% were female (n=74) and 20.4% were male (n=19). The mean age of informants was 20 years old (sd=1.4 years) with the youngest informant being 18 years old and the oldest being 25 years old. Fifty-one percent (n=45) of informants reported having a limited 3g or 4g data plan, 46% (n=41) reported having an unlimited 3g or 4g data plan, and 2% (n=2) reported having no data plan at all. The average amount of time each informant owned his or her current smart phone model was 13.8 months (median 12 months, sd=9 months), with a cumulative 85% of informants having some sort of iPhone model smart phone. When asked the question "What is the one thing you use your smart phone most for?" 49.5 percent of informants responded with "texting," and another 8.7% responded with "talking on the phone." Fifty-four percent (n=48) of informants reported using their smart phones to communicate most with friends, with 39% being friends at school. Twenty-five percent (n=22) of informants reported using their smart phones most during evenings, while the next largest time period was "afternoons" at 24% (n=21) indicating that smart phones are being used most outside of regular school or business hours (Figure 1). When asked for what application each user employed his or her smart phone most, 49.5% (n=42) responded with “texting” (Table 2).

Table 1: What period in the day is phone use highest?

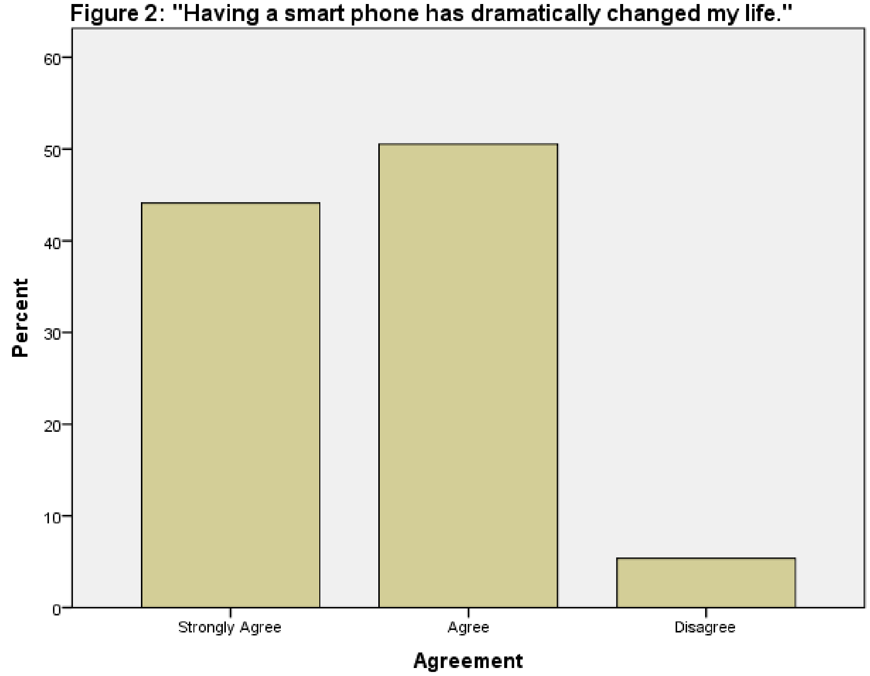
	Frequency	Percent
Before/After going to sleep	11	11.8
Lagtime (e.g. in between class, waiting in line, etc.)	8	8.6
During Meals	7	7.5
Waiting for Class	7	7.5
Afternoon	22	23.7
No Specific Time/All Day	7	7.5
Evenings	22	23.7
During Class	8	8.6
Missing	1	1.1
Total	93	100.0

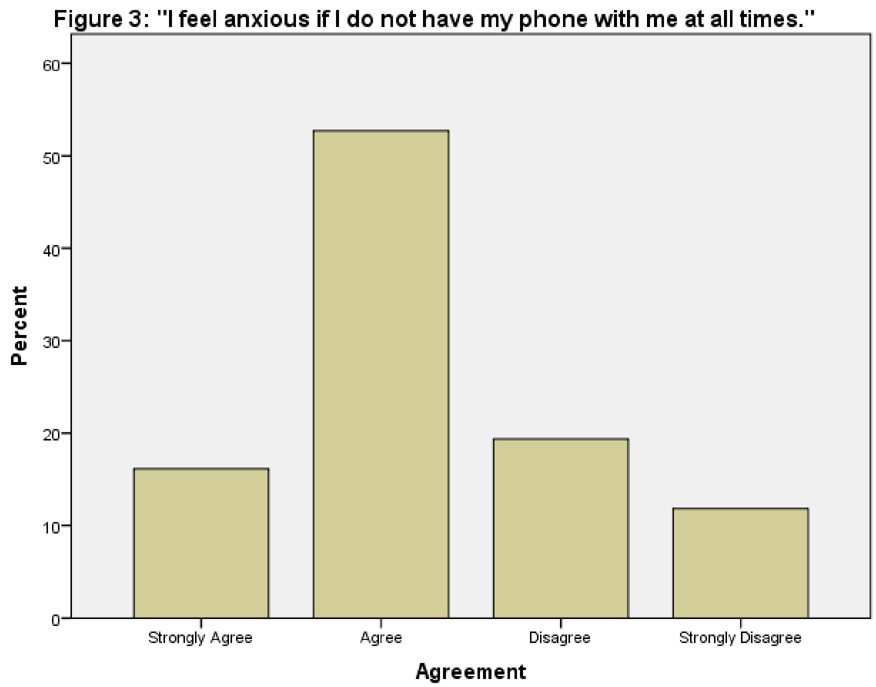
Table 2: What is phone used for most?

	Frequency	Percent
Texting	46	49.5
Talking	8	8.6
Surfing Web	7	7.5
Email	7	7.5
Pictures	1	1.1
Music	5	5.4
Social Media	10	10.8
“General Distraction”	2	2.2
Navigation	1	1.1
Sports	2	2.2
Reddit	1	1.1
Games	1	1.1
Telling Time	1	1.1
Missing	1	1.1
Total	93	100.0

During the initial interview, two statements designed to measure the user's attachment to his or her smart phone were read to the informant who was asked to respond to what degree he or she agreed with the statement by answering either "I strongly agree," "I agree," "I disagree," or "I strongly disagree." These statements were "Having a smart phone has dramatically changed my life" and "I feel anxious if I do not have my smart phone with me at all times." For the first statement, 44% (n=41) of informants responded "I strongly agree," 50% (n=47) responded "I agree," and 5% (n=5) responded "I disagree." For the second statement, 16% (n=15) responded "I strongly agree," 52% (n=49) responded "I agree," 19% (n=18) responded "I disagree," and "11% (n=11) responded "I strongly disagree."

Figure 2: "Having a smart phone has dramatically changed my life."





Cohen's 12-Item Interpersonal Support Evaluation List (ISEL)

The last portion of the interview consisted of asking the informant to complete Cohen's 12-Item ISEL. The informant was given the list to complete in private in an effort to elicit the most honest responses, as some of the questions can potentially be embarrassing to answer truthfully (See appendix). The twelve-item test is designed to test availability for three types of social support: appraisal (the perceived availability of someone to talk to about one's problems), tangible (the perceived ability to receive material aid), and belongingness (the perceived availability of people one can do things with). The informant was presented a statement (e.g. "I don't often get invited to do things with others") and asked to answer to what extent the given statement applies to him or herself by circling either "definitely false," "probably false," "probably true," or "definitely true." Each answer carries a specific weight on a scale from one to four, depending on the question. The highest possible score for each type of social support is 16, indicating a strong perception of support. The lowest possible score for each type is 4, indicating a low perception of social support.

Table 3: Cohen's 12 Item ISEL Results Summary For Each Category

	Appraisal Score	Belongingness Score	Tangible Score
N	93	93	93
Mean	14.80	13.58	13.81
Median	16.00	14.00	14.00
Mode	16	14[a]	15
Minimum	9	8	8
Maximum	16	16	16

a. Multiple modes exist. The smallest value is shown

The appraisal category received the highest mean score (14.80) for the sample, followed by the tangible (13.81) category and belongingness (13.58). The data indicate that all of the 93 informants reported strong perceptions of social support for each category, given the maximum score for each is 16. It is possible that several informants may have inflated their answers to portray themselves more favorably; however Cohen's ISEL has demonstrated reliability and validity across previous social support studies using a diverse participant pool (Cohen & Hoberman, 1983; Cohen & Wills, 1985).

Quantitative Analyses

Of the 50 informants whose skin conductance were measured, 90% (n=45) were female while only 10% (n=5) were male. The mean age of the sample was 20 years old (sd=1.4 years), the youngest informant was 18 years old, and the oldest was 24 years old. After all of the galvanic skin response data had been entered into SPSS, a frequency table was generated to determine whether or not informants experienced either a positive, negative, or neutral skin conductance reaction in response to the text message sent by the investigator. For each case, the first 30 seconds before and after the stimulus were isolated and two means were calculated for each informant. A 30 second interval was chosen due to the fact that, in the majority of cases, informants' skin conductance levels were significantly elevated above any observable baseline at the beginning of recording. This resulted in a near-constant, gradual decline in skin conductance throughout the majority of the recording session even after the stimulus was received. This indicates that baseline SCL had not yet been established at the time of the stimulus. Thirty seconds was found to be the threshold cut-off point for establishing any sort of change in tonic skin conductance. Of the 50 observed cases, only 38% (n=19) experienced a positive change in skin conductance over 30 seconds, while 62% (n=31) experienced a negative change in skin conductance. Among females, 40% (n=18) had a positive change in skin conductance while 60% n=27 had a negative reaction. Among males, 20% (n=1) experienced a positive change in skin conductance while 80% (n=4) experienced a negative change in skin conductance (Table 4).

Table 4: Skin Conductance Reaction By Gender

Sex			Frequency	Percent
Female	Valid	Positive	18	40.0
		Negative	27	60.0
		Total	45	100.0
Male	Valid	Positive	1	20.0
		Negative	4	80.0
		Total	5	100.0

In order to test the first research hypothesis stating students will have a positive skin conductance reaction when unable to access their phone in response to a simulated technological stimulus (e.g. a text message) compared to levels before the stimulus, no further statistical tests are necessary. The results displayed in the above frequency table (Table 5) do not support the first research hypothesis, suggesting that being unable to answer an unexpected text message does not initiate a significant positive change in skin conductance level.

Table 5: SCL Reactivity to Stimulus

		Frequency	Percent
Valid	Positive	19	20.4
	Negative	31	33.3
	Total	50	100.0

The second research hypothesis stating students with higher skin conductivity response levels will report deeper levels of attachment and involvement in their smart phones than those with lower skin conductivity levels was first tested by a logistic regression analysis. The regression model included the dichotomous pre/post 30-second reactivity score used to generate the previous frequency table as the outcome, and the predictors were dichotomous variables for the statements “Having a smart phone has dramatically changed my life,” “I feel anxious if I do not have my smart phone with me at all times,” and for the question “How distracting was it not being able to check your phone during the film?” Answers agreeing with the statement in any way were coded as “1” an answers disagreeing in any way were coded as “2.” According to the Omnibus Tests of Model Coefficients (Table 5)--which tests whether or not the model as a whole is significant-- we fail to reject the null hypothesis ($p > .05$, $p = .212$).

Table 6: Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	4.501	3	.212
	Block	4.501	3	.212
	Model	4.501	3	.212

In order to explore the data further for possible associations between skin conductance and informants' perceived attachment and involvement with their smart phones, Pearson's Correlation analysis was performed. Variables included in the model were the mean skin conductance level across the final two minutes of the recording session, total skin conductance level across the entire session, the dichotomous "change life" and "anxious" statements, as well as the "distract" question.

Table 7: Pearson's Correlation of Likert Statements with SCL

		Final two minute average	Total SCL Ave	Change Dichotomy	Anxious Dichotomy	Distract Dichotomy
Final two minute average	Pearson Correlation	1	.917**	.348*	-.091	-.082
	Sig. (2-tailed)		.000	.013	.530	.583
	N	50	50	50	50	47
Total SCL Ave	Pearson Correlation	.917**	1	.287*	-.113	-.195
	Sig. (2-tailed)	.000		.043	.434	.189
	N	50	50	50	50	47
Change Dichotomy	Pearson Correlation	.348*	.287*	1	.354**	-.044
	Sig. (2-tailed)	.013	.043		.000	.713
	N	50	50	93	93	73
Anxious Dichotomy	Pearson Correlation	-.091	-.113	.354**	1	-.021
	Sig. (2-tailed)	.530	.434	.000		.862
	N	50	50	93	93	73
Distract Dichotomy	Pearson Correlation	-.082	-.195	-.044	-.021	1
	Sig. (2-tailed)	.583	.189	.713	.862	
	N	47	47	73	73	73

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

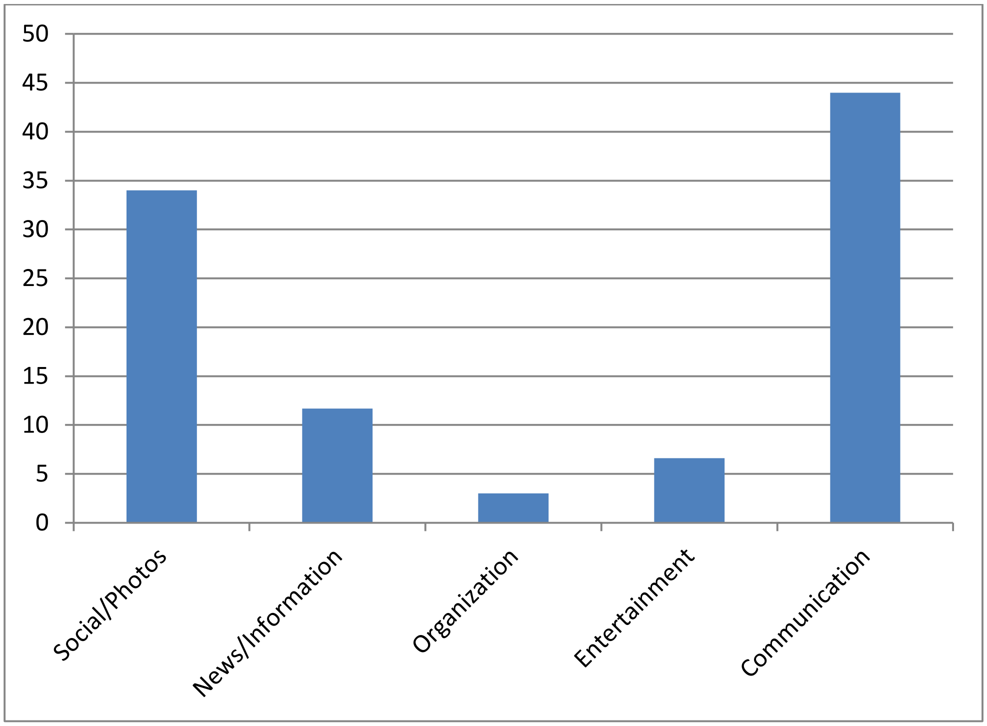
There were three weak significant correlations present in the model: between the "change life" statement and the final two minute SCL average (r= .348; $p > .05$, p =.013), between the "change life" statement and the total SCL average (r= .287; $p > .05$, p = .043), and between the "anxious" statement and the "change life" statement (r=.345; $p > .05$, p=.000). According to the results in Table 6, there does seem to be some degree of association between SCL and agreement with the statement "Having a smart phone has dramatically changed my life." Additionally, there is an association between feeling anxious without one's phone and believing that one's phone has a significant impact on one's life.

In order to address Cohen's 12-Item Interpersonal Support Evaluation List analyses of variance were conducted between "belongingness" and "tangible" scores with the "change life" dichotomy, as well as the "distract" dichotomy. The results of the ANOVA failed to reject the null hypothesis. Because the results "appraisal" (M=14.8) score do not follow a normal distribution, the Independent Samples Kruskal-Wallis test was substituted for ANOVA. The results indicate some degree of association between the "anxious" statement and a high "appraisal" score ($p > .05$, p = .021). Having a high appraisal score, according to Cohen, indicates the perceived availability of having someone with whom to talk to about one's problems. The results suggest that informants who are anxious about not having their phone near by could largely be using their smart phones to access social support systems in order to get advice, vent frustrations, or to simply discursively parse out a personal dilemma.

Ecological Momentary Assessment

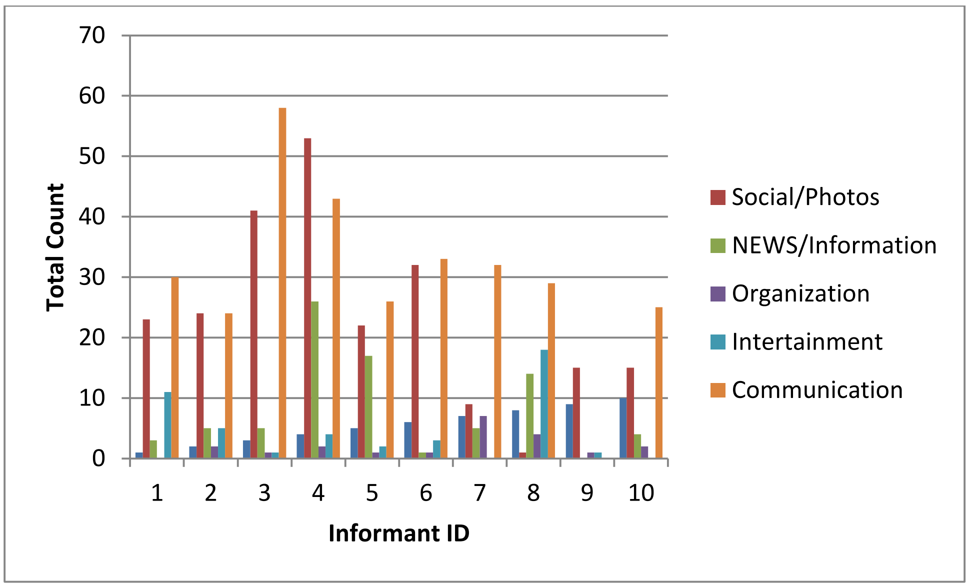
A total of ten informants volunteered to participate in the ecological momentary assessment interviews and were recruited through convenience sampling. The mean age of informants was 20.4 years old, nine of whom were female and one was male. Informants were asked three questions, three times a day for seven days total. The questions were: 1) What are you doing right now? 2) How many times have you used your phone in the last three hours/since the last interview? 3) Which apps have you used? Once all of the informants had completed the interviews, the data were transcribed and analyzed. Each informant's interview was read carefully several times in order to identify any patterns that emerged in terms of how smart phones were utilized throughout the day. The identified patterns were consolidated and coded into five categories: News/Information (e.g. news outlets, movie times, maps, etc.), Social Media and Photo Sharing (e.g. Facebook, Instagram, Snapchat, etc.), Organizing/Day-Planning (calendar, alarm, weather), Entertainment/Leisure (surfing the web, gaming, message boards, fantasy sports, etc.), and Communication (phone calls, texting, e-mail, etc.). Figure 4 displays the total percentages in which each category was coded. It is important to note that Twitter was coded as social media/photo sharing, as well as news/information as more people are increasingly turning to Twitter as a means of keeping up with the news. Additionally, Snapchat was coded as social media/photo sharing and communication, as it is essentially a picture text-messaging application.

Figure 4: EMA Category Response Rate



Forty-four percent of the total use was for communication purposes including text-messaging, phone calls, and emails. Thirty-four percent of total use was for social media and photo sharing, while the remaining 22% comprised news gathering, entertainment, and organization. These data corroborate the assertion made at the beginning of this paper that smart phones have become much more than just a means of mobile communication. While communication activities still make up a plurality representation of overall usage, they accounts for less than half of the total usage. The argument could be made that social media and photo-sharing are simply other forms of communication. However, one could counter by suggesting these applications represent a divorce from direct person-to-person communication to more of a semi-public forum for broadcasting information and communications. Nevertheless, in nearly every instance communication was the most reported use of smart phones. While nowhere near as high as social media and photo sharing or communication, many users report casually browsing their phones for news blurbs during lag times throughout the day. Finally, daily planning and organization were only reported as 4% of total smart phone usage among the sample.

Figure 5: EMA Total Responses by Informant



There was substantial variation from user to user as well (Figure 5). For example informant number four reported using the smart phone 128 times in one week, while informant number nine only reported using the smart phone 17 times in the same period. Additionally, informant number four reported using her phone 53 times for social media and photo sharing, while informant eight reported only using his phone once time for the same purpose. User number nine reports using the phone 0 times for communication, but only 15 times for social media and photo sharing. An inherent limitation of these data is that each informant's definition of a single instance of using his or her smart phone probably differs. In other words, one user might report each individual application used in a five minute period as individual instances of using the smart phone, whereas a different user might only report this as one event. This could potentially explain the large range among the sample, but certain patterns such as communication and social media and photo sharing being reported as the most used applications, while organizing/planning and leisure/entertainment being reported as the fewest applications remain constant across the sample.

CHAPTER SIX: DISCUSSION AND CONCLUSION

This project began as an attempt to develop a psycho somatic model to describe the experience of habitual smart phone use observed through behavioral patterns and biological feedback. Actor-network theory and play theory were the two chief theoretical frameworks providing structure to this investigation. It is uncertain whether or not the biofeedback results of this study alone affirm the suggestion that smart phones have assumed the role of actor within a techno-social network of exchanges. However, combined with ethnographic data collected one might infer certain relationships between device and user.

While the results did not directly support either of the intended research hypotheses established at the beginning of the investigation, a few salient observations have been made which do further our understanding of the impact of technology on everyday life among college students. The first of these observations is that, while it may not be possible to observe a physiological connection to habitual smart phone use, there is some sort of perceived attachment to one’s smart phone on the part of the user. This was evidenced primarily by the overwhelming percentage of informants who responded with agreement to both of the “change life” and “anxious” statements. The second observation to be made is that different users interact with their smart phones in different, yet patterned ways. The results of the experience sampling data indicated five general primary uses for smart phones whose use patterns mirror those collected during preliminary interviews. However, as the EMA data reported, some users are more involved with their smart phone than others in terms of how often the device is used. The third observation to be made is that some degree of deviation, though not a significant degree, from baseline skin conductance level was shown in 20.4% (n=19) cases. Additionally, in nearly every instance some sort of skin conductance reaction was observed, though in most cases it was not pronounced enough to result in a sustained elevation in skin conductance level. Nevertheless, one could argue that if one in every five participant's experience corroborates the proposed hypothesis, there are grounds for attempting the investigation a second time with refinements such as longer observation before and after the stimulus is provided for example.

Perhaps the most important observation to be made is that there were significant correlations between having a high skin conductance level and agreeing with the statement, "Having a smart phone has dramatically changed my life." Although the correlations were relatively weak, there are grounds to suggest that some psycho somatic connection between the user and smart phone does exist. One might assume that smart phones, with their myriad applications, could act as a buffer to high skin conductance, but these data suggest that smart phones might actually predict higher skin conductance. However another interpretation could be that users who feel as though the smart phone is an integral part of their lives might simply have more hectic lives. In this case, the phone actually would be buffering skin conductance by providing a means to organize and control one's social and professional environments. Seemingly no definitive conclusion can be reached between these two opposite interpretations of whether or not smart phones buffer or predict high skin conductance levels. Future investigations would be wise to provide a control group that retain use of their phones throughout the interview.

Actor-network theory and play theory were the two chief theoretical frameworks guiding this investigation. It is uncertain whether or not the biofeedback results of this study alone affirm the suggestion that smart phones have assumed the role of actor within a techno-social network of exchanges. However, combined with the ethnographic data that were collected, one might infer certain relationships between device and user perceived by the user. Namely, there is something to be said for the feeling that the smart phone has changed one's life and that a majority of informants reported feeling anxious when it is not within reach. In 2013 the Edison Research Group found that 52% of smart phone users always have their smart phone within arm's reach, and another 30% do so most of the time. Perhaps biological feedback is not the correct method of studying this phenomenon. Rather, a deep understanding of user's experiences with smart phones leading to a rich qualitative analysis could be. Within the context of play theory, the results of the experience sampling provide a qualitative baseline to this end. Informants report using their phones to communicate and most of the communication in the form of a text message. One might argue that this suggests that different forms of communication carry different weight--i.e. a text message might not be as considered to have the same importance as a phone call. However, informants also report using their phones for many less-traditional forms of communication, but communication nonetheless. Sharing photos through messaging applications such as Snapchat, posting an update social media such as Facebook and Twitter, and managing other social databases such as Pinterest or Instagram all facilitate exchanges within what Lelia Green (2002) refers to as a technocultural society in which communication technologies provide a lattice supporting the backbone of society.

Limitations

There are some limitations to this study that should not significantly detract from the results established in the previous chapter. The first limitation is concerned with the sample itself. While a power analysis suggests a minimum of 36 cases in order to have statistical power, 50 informants were recruited for the skin conductance portion of the investigation. It is worth noting here that the investigation suffered a catastrophic loss of data half-way through the project; this is why there are 93 cases of preliminary interviews as these data were not lost. Had all 93 informants' skin conductance data been preserved, the data would obviously be stronger.

Additionally, only 20% of the informants were male which raises the question of whether or not there is a differential gender-based experience of smart phone use. However, the time and money constraints of the project required indiscriminate recruitment of as many participants as possible in a short amount of time regardless of gender.

Inherent to any study involving deception is the risk of the informant either not being deceived or discovering the truth prematurely. This study was no different. One of the trickiest parts of the skin conductance experiment's protocol was ensuring the informant's phone's notifications were set to either ring or vibrate. Depending on the circumstances and the informant, the rationale to instruct the informant to turn on his or her ringer varied. Despite subtlety, several informants correctly guessed that the experiment involved the use of their phone. Informants who guessed this before, during, or immediately after the experiment were discounted from the analysis. However informants who, after being debriefed, expressed having suspicion about the phone being involved were counted in the analysis. Unfortunately, this is extremely difficult if not impossible to control for, as the circumstances of each interview necessarily vary to some degree.

Using skin conductance as a biomarker carries with it several limitations (Pflanzer 2014). Each person's tonic SCL will vary to some degree as one person's threshold for reactivity might be more or less sensitive than another person's. To attempt to account for this variation, the mean skin conductance level before and after the stimulus was analyzed instead of absolute skin conductance level. However, this was sometimes not enough of a correction to counteract some informants' natural SCL. For example, in many instances informants' SCL was relatively high at the beginning of the experiment, most likely due to being nervous. Additionally, it has been shown that watching a live screen (such as TV or a movie) will actually produce a calming effect

(Zillman 1991). Together, these two factors resulted in a steady decrease in skin conductance level throughout the entire experiment. It is possible that baseline was either never reached because SCL began so high in some informants, or that sub-baseline SCL was achieved due to the calming, hypnotic effect of focusing on a movie. Finally, several environmental factors such as surface moisture, humidity, temperature, and even some medications can influence SCL response (Pflanzer 2014).

Considering the experience sampling data, a few limitations are also worth mentioning. None of the informants' response rates were 100%. In one instance, an informant went away to a local lake, out of the range of cellular service, and could not use her phone for the better portion of two days. However, this was not the informant with the lowest amount of smart phone use. In other instances, informants were in class and could not respond immediately. In some cases, he or she would respond at the next available opportunity, but often the informant would also forget to respond. Another limitation is that informants' definitions of an isolated instance of using his or her smart phone could have differed within the sample, which could have skewed the reports of total smart phone use per person.

Suggestions for Future Investigations

While the methods chosen for this investigation were carefully thought out, a degree of modification to research aims as well as the protocol may yield better results. A larger sample size with attention paid to a more equal male to female ratio could lend itself to interesting gender-specific observations. Additionally, the inclusion of a control group of informants who are not primed with the stimulus, or who either do not own smart phones could also produce salient observations about smart phone use. In terms of changes to methodology, there are also a few modifications to be made. The most crucial change to the protocol would be to increase the total time of SCL observation to ensure that baseline has been reached before the stimulus is provided. Increasing the time before sending a stimulus to at least five minutes has the potential to change the results drastically. Additionally, through discussions with informants, there appears to be a greater response to phone calls rather than text messages. One might argue, however, that responding to a phone call is more of a startle response than a text message, and letting a phone ring is stressful enough to prompt a sympathetic nervous response in anyone regardless of psycho somatic attachment to the device. Under the best possible conditions, this investigation can draw from enough of a subject pool to observe a large, diverse sample and to observe informants not being able to access their smart phones for longer than a couple of minutes. Brief fluctuations in SCL in the context of not being able to answer one text message in a 20-30 minute period are telling, but extending this period to a full hour or hours would likely elicit a more prolonged SCL response.

Conclusions

In conclusion, neither of the two primary research hypotheses was directly supported according to frequency of events and logistic regression analyses. Upon further investigation of the data, Pearson's Correlation yielded three significant, although weak, correlations between the "change life" dichotomy statement and the final two minute SCL average, the total SCL average, and the "anxious" dichotomy statement. The results of the experience sampling yielded five main categorical responses to the question "which apps have you used in the last three hours/since the last interview:" social media and photo sharing, news and information, planning and organization, leisure and entertainment, and communication. Of these, communication accounted for 44% of the results followed by social media and photo sharing at 34%, news and information accounting for 12%, leisure and entertainment for seven percent, and planning and organization for three percent. These results suggest that habitual smart phone use has left many users feeling incomplete, or “naked,” without it nearby at all times as they provide the user near limitless access to information, entertainment, and communication through myriad media including text-messaging, email, video, and traditional voice calling. Smart phones, incorporating other tools such as social media and the internet, facilitate the formation and maintenance of interpersonal relationships and social support systems in a highly sophisticated socio-technological manner.

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<u>APPENDIX</u>

UNIVERSITY OF ALABAMA

HUMAN RESEARCH PROTECTION PROGRAM

Information Sheet for Participants in a Minimal Risk Non-Medical Study

Study title: How Smart Phones Affect Skin Conductance and Social Support Systems Among Students at The University of Alabama

Investigator's Name, Position, Faculty or Student Status Charles Ross Owens, M.A. student, Department of Anthropology

Institution if other than or collaborating with UA: N/A

I am being asked to take part in a research study.

This study is called **How Smart Phones Affect Skin Conductance Among Students at The University of Alabama.** The study is being done by Ross Owens who is a graduate student at the University of Alabama who is being supervised by professor Jason DeCaro of Anthropology at the University of Alabama.

What is being studied? "This study is being done to find out whether or not smart phone choices (e.g., iphone versus blackberry) affect memory recall, skin conductance (through the amount of sweat you produce), and social support among students at the University of Alabama."

Why is this study important or useful?

The results of this study will help researchers, students, and parents better understand how smart phone technologies impact aspects of daily life including routines, memory, as well as interpersonal and professional relationships with peers.

Why have I been asked to be in this study?

I have been asked to be in this study because 1) I am a student at The University of Alabama, and 2) I have a smart phone.

How many people will be in this study? 50

What will I be asked to do in this study?

If I meet the criteria and agree to be in this study, I will be asked to do these things: 1) come to the lab and watch a film called Do You Speak American for about seven minutes while the researchers monitor my skin conductance (through the amount of sweat you produce) 2) participate in a brief interview on how I normally use my cell phone and to what extent it has impacted your college life. If willing, I may be selected to participate in an additional portion of the investigation which will require me to participate in 3 short phone interviews daily for seven days—though, this portion is entirely optional. I will be asked questions pertaining to how you have used my smart phone that day (e.g. texting, GPS, Facebook, etc).

How much time will I spend being this study?

The lab portion of the investigation will last approximately 20 to 30 minutes; and the second ethnographic (and optional) portion will last seven days. The 21 phone interviews in this phase will last approximately 2 to 3 minutes each.

Will being in this study cost me anything?

The only cost to me from this study is your time.

Will I be compensated for being in this study?

I may receive compensation in the form of course credit for **______________**(course number) to be chosen by**_________**(the instructor) for my participation in the study. I will have other options for course credit provided to me, so this is not my only opportunity for credit.

Can the investigator take me out of this study?

The investigator may take me out of the study if I show signs of either physical or psychological impairment or suffering. I may also be excused from the study if something happens resulting in me no longer meeting the study requirements.

What are the risks (dangers or harms) to me if I am in this study?

The chief risk is that I may get tired from the interview, bored by the study activities, upset by thinking about your social relationships. In the event I wish to withdraw from the study, I may choose to do so at any time for any reason—I will not be asked for a reason, either. Additionally, the phone calls during the optional second phase of the investigation could be disruptive. I have the right to identify times when are not appropriate to call, and to ignore any call which comes at an inappropriate time.

What are the benefits (good things) that may happen if I am in this study?

I may feel good about knowing that you have helped in student-led research. I will also receive course credit chosen by the professor.

What are the benefits to science or society?

This study will benefit society understand the broader cultural impact of habitual cell phone use.

How will my privacy be protected?

My interview will take place in a private room with either the primary investigator or research assistant. I am not obligated to reveal any personal or private information during in person or phone interviews which may be uncomfortable or revealing. I may continue in the study without divulging private information and your status as a study participant will not be revealed by the investigators.

How will my confidentiality be protected?

I will be assigned a case Id number which will be used in lieu of your name. Any records containing identifying or personal information (including demographics) will be kept locked in a filing cabinet only accessible by me. Any digital records will be kept in a password protected computer file. Information which could potentially identify me such as my telephone number or email address will be deleted from the records as soon as I complete participation.

What are the alternatives to being in this study? Do I have other choices?

The alternative to being in this study is not to participate, I will be provided other extra credit opportunities in the course.

What are my rights as a participant in this study?

Taking part in this study is voluntary. It is your free choice. I can refuse to be in it at all. If I start the study, I can stop at any time. There will be no effect on my relations with the University of Alabama.

The University of Alabama Institutional Review Board ("the IRB") is the committee that protects the rights of people in research studies. The IRB may review study records from time to time to be sure that people in research studies are being treated fairly and that the study is being carried out as planned.

Who do I call if I have questions or problems?

If I have questions, concerns, or complaints about the study right now, please ask them. If I have questions, concerns, or complaints about the study later on, please

call Ross Owens (205-602-2902). If I have questions about your rights as a person in a research study, call Ms. Tanta Myles, the Research Compliance Officer of the University, at 205-348-8461 or toll-free at 1-877-820-3066.

You may also ask questions, make suggestions, or file complaints and concerns through the IRB Outreach website at http://osp.ua.edu/site/PRCO_Welcome.html or email the Research Compliance office at participantoutreach@bama.ua.edu.

After I participate, I am encouraged to complete the survey for research participants that is online at the outreach website or I may ask the investigator for a copy of it and mail it to the University Office for Research Compliance, Box 870127, 358 Rose Administration Building, Tuscaloosa, AL 35487-0127.

I have read this consent form. I have had a chance to ask questions. I agree to take part in it.

AAHRPP DOCUMENT #192

UNIVERSITY OF ALABAMA

HUMAN RESEARCH PROTECTION PROGRAM

Informed Consent for a Non-Medical Study

Study title: How Smart Phones Affect Skin Conductance and Social Support Systems Among Students at The University of Alabama

Investigator's Name, Position, Faculty or Student Status Charles Ross Owens, M.A. student, Department of Anthropology

Institution if other than or collaborating with UA: The University of Alabama Department of Anthropology

You are being asked to take part in a research study.

This study is called **How Smart Phones Affect Skin Conductance Among Students at The University of Alabama.** The study is being done by Ross Owens who is a graduate student at the University of Alabama who is being supervised by professor Jason DeCaro of Anthropology at the University of Alabama.

What is being studied?

This study is being done to find out whether or not smart phone choices (e.g. iphone versus blackberry) affect memory recall among students at The University of Alabama.

Why is this study important or useful?

The results of this study will help researchers, students, and parents better understand how smart phone technologies impact aspects of daily life including routines, memory, as well as interpersonal and professional relationships with peers.

Why have I been asked to be in this study?

You have been asked to be in this study because 1) you are a student at The University of Alabama, 2) you have a smart phone.

How many people will be in this study?

50+

What will I be asked to do in this study?

If you meet the criteria and agree to be in this study, you will be asked to do these things: 1) come to the lab and watch a movie for about seven minutes while we monitor your skin conductance 2) participate in a brief interview on how you normally use your cell phone and to what extent it has impacted your college life. If willing, you may be selected to participate in an additional portion of the investigation which will require you to participate in 3 short phone interviews daily for seven days—though, this portion is entirely optional.

How much time will I spend being this study?

The lab portion of the investigation will last approximately 20 to 30 minutes; and the second ethnographic (and optional) portion will last seven days. The 21 phone interviews in this phase will last approximately 2 to 3 minutes each.

Will being in this study cost me anything?

The only cost to you from this study is your time.

Will I be compensated for being in this study?

You will not be compensated for being in this study. If you were offered extra credit in a class for participating in research, that may be a benefit to you. However, that is offered by course instructors at their discretion, not by the investigators, and we cannot guarantee that you will receive such a benefit.

Can the investigator take me out of this study?

The investigator may take you out of the study if s/he feels that (the study is upsetting you, or something happens that means you no longer meet the study requirements.

What are the risks (dangers or harms) to me if I am in this study?

The chief risk is that you may get tired from the interview, bored by the study activities, upset by thinking about your family relationships. In the event you wish to withdraw from the study, you may choose to do so at any time for any reason—I will not ask you for a reason, either.

What are the benefits (good things) that may happen if I am in this study?

There are no direct benefits to you. Although you will not benefit personally from being in the study, you may feel good about knowing that you have helped in student-led research.

What are the benefits to science or society?

This study will society understand the broader cultural impact of habitual cell phone use.

How will my privacy be protected?

You will not be asked to identify yourself by name or by description or to identify anyone else by name or description. Your interview will take place in a private room with either the primary or secondary investigator.

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What are the alternatives to being in this study? Do I have other choices?

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What are my rights as a participant in this study?

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I have read this consent form. I have had a chance to ask questions. I agree to take part in it.

I will receive a copy of this consent form to keep.

____ ______________

Signature of Research Participant Date

____ ______________

Signature of Investigator Date

AAHRPP DOCUMENT #192

UNIVERSITY OF ALABAMA HUMAN RESEARCH PROTECTION PROGRAM

Informed Assent for a Non-Medical Study

Study title: How Smart Phones Affect Skin Conductance and Social Support Systems Among Students at The University of Alabama

Investigator's Name, Position, Faculty or Student Status Charles Ross Owens, M.A. student, Department of Anthropology

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I will receive a copy of this consent form to keep.

____ _______________

Signature of Research Participant Date

____ _______________

Signature of Investigator Date

Anthropology Departmental Research Survey

Freshman Sophomore Junior Senior Graduate Student

Age:_______________________________________

Major:______________________________________

E-Mail:_____________________________________

Phone Number:______________________________

Are you receiving course credit or extra credit for participation?

YES NO

Debriefing Script

Thank you for completing this portion of the investigation. The actual purpose of the investigation is to discern to what extent college students rely on their smart phones to engage with social support systems, and how habitual usage can result in a stress response which can be measured by the conductivity of your skin. We were not concerned about your ability to remember details from the video. Instead, we wanted to observe your stress response when you received a text message but had been told to ignore it. That is why we checked to make sure your volume was on, but left the phone out of reach. The text message you received during the video came from us. The reason we could not tell you this is that you would have known the text message was simulated when it came through, and it would not have created a response.

If you would like to continue with the investigation, you may choose to participate in experience sampling (also known as ecological momentary assessment). This is a data collection technique designed to gather information on how you interact with your smart phone on a daily basis. An investigator will contact you three times a day for a total of seven days in predetermined time frames (e.g. someone will contact you between 10 a.m. and noon, 3p.m. and 5p.m. and 7p.m. and 10 p.m.). During these phone calls you will be interviewed about your smart phone use for about 2 to 3 minutes.

Post Interview Questions

Gender:___________ _ Phone #______________

Age:______________ Credit:_______________

Freshman Sophomore Junior Senior Graduate

1) What kind cell phone do you have?

2) How long have you had that cell phone?

4) Do you have a data plan? NO Limited Unlimited

5) If you had to choose, what is the one thing that you most use your phone for?

6) When using your phone to communicate, with whom do you communicate the most?

7) At what part of the day do you use your phone the most or most regularly?

8) Is your phone usually on Silent Vibrate Ring ? (Optional: Is that what it is now?)

9) Do you have any social networking applications installed on your phone? Which do you use most?

a) Do you access social networking sites more on your computer or more on your phone?

10) Who are you more likely to respond to immediately (if you had a missed call, for example), your closest family member or your best friend?

To what extent do you agree or disagree with the following statements? Answer with Agree or Disagree, Strongly Agree or Strongly Disagree.

11) Having a smart phone has dramatically changed my life.

12) I feel anxious if I do not have my phone with me at all times.

13) If I am talking to a friend in person (face-to-face) and I receive a text message, I immediately look at the text message.

14) If I am talking to a friend in person (face-to-face) and I receive a phone call, I immediately answer the call.

15) What is something you like about smart phones and what is something you dislike?

16) How distracting from the video was it for you when your phone went off? (not at all distracting, a little distracting, moderately distracting, very distracting)

17) How frustrating was it for you being unable to check your phone immediately? (not at all frustrating, a little frustrating, moderately frustrating, very frustrating)

Comments:

Cohen's 12 Item Interpersonal Support Evaluation

Instructions: This scale is made up of a list of statements each of which may or may not be true about you. For each statement circle "definitely true" if you are sure it is true about you and "probably true" if you think it is true but are not absolutely certain. Similarly, you should circle "definitely false" if you are sure the statement is false and "probably false" if you think it is false but are not absolutely certain.

1. If I wanted to go on a trip for a day (for example, to the country or mountains), I would have a hard time finding someone to go with me.

a. definitely false b. probably false c. probably true d. definitely true

2. I feel that there is no one I can share my most private worries and fears with.

a. definitely false b. probably false c. probably true d. definitely true

3. If I were sick, I could easily find someone to help me with my daily chores.

a. definitely false b. probably false c. probably true d. definitely true

4. There is someone I can turn to for advice about handling problems with my family.

a. definitely false b. probably false c. probably true d. definitely true

5. If I decide one afternoon that I would like to go to a movie that evening, I could easily find someone to go with me.

a. definitely false b. probably false c. probably true d. definitely true

6. When I need suggestions on how to deal with a personal problem, I know someone I can

turn to.

a. definitely false b. probably false c. probably true d. definitely true

7. I don't often get invited to do things with others.

a. definitely false b. probably false c. probably true d. definitely true

8. If I had to go out of town for a few weeks, it would be difficult to find someone who would look after my house or apartment (the plants, pets, garden, etc.).

a. definitely false b. probably false c. probably true d. definitely true

9. If I wanted to have lunch with someone, I could easily find someone to join me.

a. definitely false b. probably false c. probably true d. definitely true

10. If I was stranded 10 miles from home, there is someone I could call who could come and get me.

a. definitely false b. probably false c. probably true d. definitely true

11. If a family crisis arose, it would be difficult to find someone who could give me good advice about how to handle it.

a. definitely false b. probably false c. probably true d. definitely true

12. If I needed some help in moving to a new house or apartment, I would have a hard time finding someone to help me.

a. definitely false b. probably false c. probably true d. definitely true

Ecological Momentary Assessment ID:

Time of Interview:

Interview Number:

1) What are you doing right now/since the last interview?

2) How many times have you used your phone in the last three hours/since the last interview?

3) List which applications you have used on your phone in the last three hours/since the last interview.

Office for Research

Institutional Review Board for the
Protection of Human Subjects

THE UNIVERSITY OF
ALABAMA
RESEARCH

July 17, 2013

Ross Owens
Department of Anthropology
College of Arts & Sciences
Box 870210

Re: IRB#: 13-OR-247-ME "How Smart Phones Affect Skin Conductance and Social Support Systems among Students at The University of Alabama"

Dear Mr. Owens:

The University of Alabama Institutional Review Board has granted approval for your proposed research.

Your application has been given expedited approval according to 45 CFR part 46. You have also been granted the requested waiver. Approval has been given under expedited review category 7 as outlined below:

(7) Research on individual or group characteristics or behavior (including, but not limited to, research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies

Your application will expire on July 16, 2014. If your research will continue beyond this date, complete the relevant portions of the IRB Renewal Application. If you wish to modify the application, complete the Modification of an Approved Protocol Form. Changes in this study cannot be initiated without IRB approval, except when necessary to eliminate apparent immediate hazards to participants. When the study closes, complete the appropriate portions of the IRB Request for Study Closure Form.

Please use reproductions of the IRB approved stamped consent forms to obtain consent from your participants.

Should you need to submit any further correspondence regarding this proposal, please include the above application number.

Good luck with your research.

Sincerely,

Carpantato T. Myles, MSM, CIM
Director & Research Compliance Officer
Office of Research Compliance
The University of Alabama

358 Rose Administration Building
Box 870127
Tuscaloosa, Alabama 35487-0127
(205) 348-8461
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