

The Pennsylvania State University

The Graduate School

College of the Liberal Arts

**USING THE STATE NEED FOR AFFILIATION TO PREDICT PERCEPTIONS  
OF TOUCH AS A PERSONAL SPACE INTERACTION OR INVASION**

A Thesis in

Psychology

by

Matthew J. Zawadzki

© 2009 Matthew J. Zawadzki

Submitted in Partial Fulfillment  
of the Requirements  
for the Degree of

Master of Science

May 2009

The Thesis of Matthew J. Zawadzki was reviewed and approved\* by the following:

Stephanie Shields  
Professor of Psychology and Women Studies  
Thesis Advisor

Karen Gasper  
Associate Professor of Psychology

David A. Rosenbaum  
Distinguished Professor of Psychology

Melvin M. Mark  
Interim Department Head  
Professor of Psychology

\*Signatures are on file in the Graduate School

## Abstract

The current study sought to clear up some of the inherent ambiguity of touch's meaning by examining the extent to which a person's state need for affiliation (SN-Aff) explains differences in perceptions of a touch. Humans have competing needs for affiliation (n-Aff) and personal space (Burgoon, 1978) and people use personal space and the n-Aff to navigate and moderate social interactions (Altman 1975, 1993). I propose that because touch constrains personal space, response to touch depends upon the touched person's SN-Aff. In a high-impact behavioral study, a confederate touched, leaned close to or got the attention of a participant (n=262) after the participant's SN-Aff was measured. A series of self-report and behavioral dependent variables assessed the effect of the touch, lean or shuffle. I predicted that the higher a participant's SN-Aff the more positively they would interpret the interface, and more positive reactions would follow as a result; the lower a participant's SN-Aff the more negatively they would interpret the interface, and more negative reactions would follow as a result. The pattern of results supported the predictions for the self-report variables, such that a participant's SN-Aff influenced the participants' ratings of the valence of the interface. Ratings of the interface in turn affected ratings of the confederate's personality, reported desires to interact with the confederate in the short- and long-term, and desire to escape the situation, and reported mood. Results suggest that while the physical act of a touch may be ambiguous, understanding a person's SN-Aff needs may predict a person's reactions to that ambiguous touch.

## TABLE OF CONTENTS

List of Tables.....	vii
List of Figures.....	viii
Introduction.....	1
Overview.....	2
Competing Needs in Human Interactions.....	3
Personal Space.....	3
Need for Affiliation (n-Aff).....	4
How the Needs for Personal Space and Affiliation Compete.....	6
When Competing Needs are Met or Unmet.....	7
Personal Space Invasions.....	7
Personal Space Interactions.....	9
The Competing Needs and Nonverbal Communication.....	11
How Touch Differs from Close Proximity.....	11
Touch as an Invasion or Interaction.....	12
The Present Study.....	14
Overview of design.....	14
Improvements on Previous Studies.....	15
Hypotheses.....	16
Main Study.....	20
Overview.....	20
Participants.....	20
Initial Sample.....	20
Data Cleaning.....	20
Final Sample.....	21
Materials.....	22
The first packet.....	22
The second packet.....	24
The third packet.....	25
Experimenter and Confederate Forms.....	27
Procedure.....	28
Overview.....	28
Experimenter and Confederate Training.....	28
Experimental Procedure.....	29
Results.....	35
Manipulation Checks.....	35
Comparing the Interface Groups.....	35
The Affiliation Prime.....	36
State Need to Affiliate Questionnaire.....	36
H1a: High SN-Aff = Personal Space Interactions.....	38
H1b: Low SN-Aff = Personal Space Invasions.....	38
H2a: High SN-Aff will moderate Interface.....	38
H2b: Low SN-Aff will moderate Interface.....	40
H3a: Perceived as Interactions = Positive Effect of Interface.....	40

Self-Report DVs.....	41
Behavioral DVs.....	42
H3b: Perceived as Invasions = Negative Effects of Interface.....	44
Self-Report DVs.....	44
Behavioral DVs.....	45
Exploratory Analyses.....	46
Exploratory Gender Hypothesis 1.....	46
Exploratory Gender Hypothesis 2: Men Who Perceive Flirting Perceive More Positively.....	48
Exploratory Gender Hypothesis 3: Women Who Perceive Annoying Perceive More Negatively.....	49
Anti-Touch Bias.....	49
Alternative Explanations.....	50
Noticing the Interface.....	50
Discussion.....	53
Summary of Results and Interpretations.....	53
The role of SN-Aff as a Moderator for Interactions.....	53
The role of SN-Aff as a Moderator for Invasions.....	54
Perceiving the Interface as a Positive Interaction and Positive Effects.....	54
Perceiving the Interface as a Negative Invasion and Negative Effects.....	55
The Effects of Gender and the Implied Effects of Status.....	56
Limitations of Study.....	57
Small Effect Sizes.....	57
Problems with Dependent Variables.....	59
Strength of the Interface.....	61
Ineffectiveness of the prime.....	61
Alternative Explanations.....	62
Future Directions.....	63
Conclusions.....	64
References.....	66
Appendix A: Demographic Questionnaire.....	74
Appendix B: Affiliation Prime.....	75
Appendix C: Pre-testing Affiliation Prime.....	77
Appendix D: Big Five Inventory (BFI) Personality Inventory.....	81
Appendix E: State Need to Affiliate Questionnaire.....	82
Appendix F: SNAQ Creation and Validation.....	83
Appendix G: Desire to Affiliate in Short-term and Escape Measure.....	91
Appendix H: Attention to Detail Task.....	92
Appendix I: Confederate's Positive/Negative Personality Attribute.....	93
Appendix J: Desire to Affiliate in the Long-term.....	94
Appendix K: Perceived Motivations for the Interface.....	95
Appendix L: Mood Inventory.....	96
Appendix M: Manipulation Check and Perception of Interface as Positive/Negative.....	97
Appendix N: Experimenter Response Form.....	98
Appendix O: Confederate Response Form.....	100
Appendix P: Training Protocol.....	101

Appendix Q: Debriefing Form.....103

## LIST OF TABLES

Table 1. Glossary of Relevant Terms Used in this Paper.....	3
Table 2. Overview of Key Variables Measured/Manipulated During Study.....	22
Table 3. Correlations of All Variables Measured in Study.....	37
Table 4. Interaction for Hypothesis 1a.....	39
Table 5. Self-Report Dependent Variables for Perceived Interface as an Interaction.....	42
Table 6. Self-Report Dependent Variables for Perceived Interface as an Invasion.....	45
Table 7. Ratings of the Positive Attributes of Interface using Gender*Interface Condition.....	47
Table 8. Ratings of the Positive and Negative Attributions of the Actual or Imagine Interface.....	50
Table 9. Self-Reported Desire to Escape for Alternative Hypothesis of Noticing the Interface.....	51
Table 10. Responded to Confederate or Not Testing Alternative Hypothesis of Noticing Interface.....	52
Table 11. Initial pools of items for SNAQ.....	85
Table 12. Additional items for SNAQ.....	86
Table 13. Correlations of n-Aff measures, personality traits, and mood with SNAQ.....	88

**LIST OF FIGURES**

Figure 1. Model of Judgment of Nonverbal Interfaces.....	13
Figure 2. Diagram of Experimental Room Layout.....	31
Figure 3. Diagrams of Experimental Conditions.....	32



## Introduction

*“Touch is a signal in the communication process that, above all other communication channels, most directly and immediately escalates the balance of intimacy...To let another touch us is to drop that final and most formidable barrier to intimacy.”*

Thayer (1986, p.8)

Touch is an integral part of communication, yet is poorly understood. The same touch administered in the same way to the same person can mean vastly different things from one moment to the next (Hertenstein et al., 2006). For example, an initial congratulatory pat on the shoulder may make someone feel accomplished, yet continued pats may get annoying. In other words, the context of a touch influences that touch’s meaning as much as the physical stimulation of the skin. As a result, ambiguity in meaning is described as an inherent element of tactile communication (Johnson & Edwards, 1991), with no practical theories or models offered to understand how a given person will respond to a given touch in a given situation. My goal in the present study is test whether a person’s state need for affiliation (SN-Aff) moderates how touches are received (See Table 1 for a definition of SN-Aff and other relevant terms used in this paper).

In order to understand reactions to touch, I apply theoretical and empirical work about how humans interact that proposes that humans have competing needs for personal space and affiliation (e.g., Burgoon, 1978) to the domain of touch. In addition, I draw from privacy regulation theory that states that these competing needs allow an individual to use the physical environment to regulate optimum levels of social interaction (Altman, 1993). As the epigraph describes, these theories relate strongly to touch because every enactment of a touch affects both

the need for personal space and for affiliation (i.e., touches physically take away an individual's personal space, and they alert the individual to the presence of another). I propose that by understanding the extent to which these needs are met, it is possible to predict how touches will be received. Moreover, because touches physically do not allow the need for personal space to be met, I propose that what determines the reaction to a touch is a person's SN-Aff.

### *Overview*

In this paper, I first examine the needs for personal space and affiliation with an emphasis on how these needs are either unmet (i.e., a personal space invasion) or are met (i.e., a personal space interaction). Next, I focus on two different types of spatial interfaces, touch and close proximity, which interact with personal space and affiliation in varying degrees. While comparing these spatial interfaces, I discuss how SN-Aff is linked with a person's reaction to touch, but not necessarily close proximity. Throughout I discuss the potential impact of gender on the results presented and for my predictions, particularly because research suggests that men and women perceive and maintain personal space in different ways (e.g., Hall, 1984).<sup>1</sup> Finally, I present a high impact behavioral study in which I (1) compare touch to close proximity (a close lean) and a control condition that does not affect personal space (a shuffle in one's seat that gets the attention of the other person), and (2) examine the extent to which SN-Aff (a measured variable) is a moderator in predicting how these interfaces are perceived.

---

<sup>1</sup> I use gender as a starting point to discuss the potential effects of status on the results found, a point I take up in the discussion of this paper.

Table 1: Glossary of Relevant Terms Used in this Paper

Term	Working Definition
State Need for Affiliation (SN-Aff)	The situational and context specific measurement of a person's current desire to be around other people and interact with them.
Spatial Interface	<p>A face-to-face nonverbal communication act that occurs between two people. Whereas nonverbal communication acts such as shrugs or blushes are communication acts about oneself, spatial interfaces refer to nonverbal communications that involve the physical area surrounding the two people communicating, such as touches, leans or attention-getting behavior.</p> <p>Furthermore, spatial interface refer to the communication act itself irrespective of how it relates to the recipient of the behavior. This means that every spatial interface does not have an inherently attached positive or negative valence, but rather allows for the possibility for each nonverbal behavior to be perceived as positive or negative.</p>
Personal Space Invasion	The perception of a spatial interface as negative. This negative perception is hypothesized to be based on a person's low state need for affiliation and high need for personal space.
Personal Space Interaction	The perception of a spatial interface as positive. This positive perception is hypothesized to be based on a person's high state need for affiliation and low need for personal space.

### Competing Needs in Human Interactions

*Personal Space.* Personal space is “the area individuals actively maintain around themselves into which others cannot intrude without causing discomfort” (Hayduk, 1978, p. 118). This area is an invisible, adjustable bubble of space that protects a person from physical and emotional threats (e.g., Burgoon & Jones, 1976; Burgoon et al., 1989). This amount of space is established based on a combination of psychological needs, biological needs, and cultural norms of acceptable distances for communication. For example, younger adults require less personal space than do older adults, and women tend to establish smaller personal space bubbles than men (across a variety of ages and professions, but usually white participants)

(Andersen and Leibowitz, 1978; Larsen and LeRoux, 1984; Hall, 1984). In addition, more individualistic or independent cultures tend to have larger personal space circles than collectivistic or interdependent cultures (Remland et al., 1995; Rustemli, 1986). Furthermore, personal space varies according to the context of the interface and individual preferences such as threat threshold (i.e., the distance that an interactant experiences physical and psychological discomfort in the presence of another; Burgoon, 1978). In other words, this spatial requirement is not a static quantity or distance a person needs in order to maintain a certain comfort level, but rather it is a dynamic, ever changing space, a space that while always changing in size is based on different surroundings and is always with an individual regardless of the context (e.g., Hayduk, 1994).

The earliest empirical work on personal space demonstrated that when invasions of personal space occur, a person will seek to reestablish their space (Katz, 1937), indicating that personal space is important and necessary to an individual. Based on this early finding, personal space has since been described as a human need (e.g., Burgoon, 1978), and something that people try to control and defend (Taylor & Lanni, 1981). Many theories have proposed that personal space offers a chance for an individual to protect oneself. Most notably, privacy regulation theory states that humans seek an optimum level of social interaction and use the physical environment to maintain personal space as a way to control this optimum level of social interaction (Altman, 1993). In sum, the need for personal space represents people's need to distance themselves from others and be distinct in the environment.

*Need for Affiliation (n-Aff)*. The n-Aff is often conceptualized as the motive to seek out the company of others (e.g., O'Connor & Rosenblood, 1996). It is described as a basic human need to interact with other people (e.g., Burgoon, 1978), and often functions irrespective of the

feelings towards those other people (e.g., Zimbardo & Formica, 1963). Similar to personal space, the n-Aff is influenced by a combination of psychological needs, biological needs, and cultural norms of acceptable ways for individuals to interact. For example, women (again across different ages and professions, but usually white participants) tend to have general patterns where they affiliate and are motivated to affiliate more than men (e.g., Hill, 1987b), a difference which is interpreted as reflecting gender role norms (Wong & Csikszentmihalyi, 1991). Contextual cues can also influence an individual's n-Aff. For example, classic work on the n-Aff demonstrated that in high stress situations (i.e., participants were expected to receive a shock), participants wished to spend time with others facing a similar fate compared to a control condition (Schachter, 1959). More modern work demonstrates that after a mortality salience prime, people have an increased desire to affiliate with others compared to those who do not receive the prime (Wisman & Koole, 2003). Since n-Aff can vary based on contextual cues, I describe a person's current motive to seek out the company of others as her/his state need for affiliation (SN-Aff).<sup>2</sup>

Privacy regulation theory (also used to explain the need for personal space) proposes to explain this basic biological drive. It states that during any interaction a person has an optimal level of privacy, which they regulate by being more open towards others (increased affiliation), or by being more closed towards others (increased personal space) (Altman, 1975). In other

---

<sup>2</sup> Though the n-Aff has been shown to vary based on contextual cues, it has traditionally been measured and conceptualized as a trait (e.g., Hill, 1987b). The justification for describing n-Aff as a trait is that individuals have general patterns of affiliation that do not vary significantly from one day to the next (e.g., Hill, 1987b; Wong & Csikszentmihalyi, 1991). A common metaphor is that people have a set amount of social "calories" they need to take in each day, and will adjust their subsequent interfaces based on the extent to which previous interfaces satisfied their social diet (Latané & Werner, 1978; Tortora & Evans, 1986). Yet, based on this reasoning, a person who normally has a high n-Aff, but has already engaged in a large extent of interfaces, may at the moment have a low "current n-Aff" – what I term the state need for affiliation (SN-Aff). In other words, a study relying on this trait measure (n-Aff) to predict behavior may not get reliable results because it does not factor in previous experience throughout the day. As a result, a secondary aim of this paper is to develop a questionnaire to tap into this situationally influenced n-Aff, which is measured as the SN-Aff (see Appendix F). This questionnaire will then serve as the measure of SN-Aff that I propose moderates perceptions of touch.

words, as person's need for self-protection and privacy lessens, their motivation to interact with others will increase.<sup>3</sup> In sum, the need for affiliation represents people's need to be close to others, and interact with those people in the present environment.

#### How the Needs for Personal Space and Affiliation Compete

Building from privacy regulation theory, it is clear to see how the needs for personal space and affiliation compete. Personal space in its most fundamental conceptualization is the maintenance of distance from others, whereas affiliation is motivation to be close. At any given moment, a person may have a greater desire to be close or apart, may feel safe or threatened but the degree to which these needs are met will always vary and work in opposition. The result is that both needs cannot be satisfied at once (Argyle & Dean, 1965; Burgoon, 1978). Furthermore, since these needs are opposed to each other and cannot both be met at once, an individual must balance the extent to which they focus on satisfying one need or the other. In other words, a person will either be focused on satisfying their need for personal space or SN-Aff.

The fact that both needs cannot be met at once is especially relevant to touch. With most interactions, understanding how a person reacts to the environment will involve an understanding of which of the competing needs is predominant (Burgoon, Walther, & Baesler, 1992). With touch, however, because the tactile stimulation takes place on the skin, no distance separates the toucher from the touched. This means that a person loses the ability to maintain personal space when touched. While space can be created after the touch by moving away, the touch cause the "balance of intimacy" to be escalated (Thayer, 1986).

Thus, I propose that how a person reacts to a touch will be dependent on that person's SN-Aff. In other words, because a person who was touched did not have the ability to control

---

<sup>3</sup> It is important to note that the research discussed and proposed model concern in-person interfaces, and does not address the impact that communicating through various technologies (e.g., e-mail, skype) would have on personal space needs.

the extent to which their need for personal space was met, what is left is the extent to which they feel the touch met their competing SN-Aff. For example, if the person has a low SN-Aff, they would look to increase their personal space (as privacy regulation theory would propose).

Because the touch would not allow for the increase in personal space or would disrupt their existing amount of space, the person would be bothered greatly by the touch since the person's need was not met.<sup>4</sup> If a person had a high SN-Aff they would be looking to meet that need and would react to a touch positively because the touch was an affiliative gesture and would increase the possibility for more affiliation to occur. Understanding whether these needs are met or not is important because a person's affective state will be more positive when their competing needs are met than when they not met (Burgoon, Walther, & Baesler, 1992). In the next sections, I describe the results of having these competing needs met or left unsatisfied.<sup>5</sup>

When Competing Needs are Met or Unmet

*Personal Space Invasions.* A person can limit social interfaces by increasing personal space. When it is not possible to increase personal space, a person perceives the interface as an invasion (Evans & Wener, 2007). Important to this conception of an invasion is that there is no absolute amount of distance indicative of when an invasion occurs. Rather, when an interaction exceeds one's desire for personal space, a personal space invasion is experienced, meaning no direct contact is necessary to perceive it as an invasion. As such, touching and close proximity have the potential to be perceived as personal space invasions.

---

<sup>4</sup> I make the assumption that all touches are equipotential having the ability to be perceived as positive or negative (Herterstein et al. 2006). Thus while some touches have a greater tendency to be perceived either as positive or negative (e.g., a touch on the shoulder is much more likely to be perceived as positive than a pat on the bottom), I propose that a person's current state, especially their SN-Aff, moderates when a touch is perceived as positive or negative.

<sup>5</sup> Most of the research has examined these needs from the standpoint of personal space, and whether the personal space requirements of the individual were sufficient or not. In this way, the SN-Aff is indirectly considered as SN-Aff interacts with what those personal space requirements are.

Gender differences are observed in how much personal space one requires and how other others interact with this space, but these gender differences may be linked to status. For example, men in the contemporary U.S. establish larger personal space requirements compared to women (Hall, 1984), and tend to position themselves in ways to distance themselves from women in interactions (Lott 1987, 1989). Yet even with smaller personal space circles, in many domains where status positions are inherent (e.g., most workplace environments), women tend to experience significantly more invasions of space than men (e.g., Uggem & Blackstone, 2004). Henley (1977) proposed that men engage in more interfaces that can invade personal space, such as touch, compared to women, and that is because men in the contemporary United States enjoy more status. Research has since backed Henley's (1977) observation that status may be the crucial factor. For example, people rate individuals who touch another person as having higher status and more dominance than the recipient of the touch (Major & Heslin, 1982). Furthermore, people of high status are more likely to touch a conversational partner on the arm or shoulder (i.e., a spontaneous type of touch that requires more behavioral freedom), whereas lower status people are most likely to touch using a handshake (Hall, 1996). No significant differences in touching patterns are observed for people of equal status. Thus, while gender may serve as a proxy for who is likely to invade the space of others or have their space invaded, status is the defining factor.

Regardless of who the invader is, personal space invasions have negative consequences. Individuals are more likely to partake in escape behaviors after invasions (Middlemist, Knowles, & Matter, 1976). Specifically, individuals tend to move away from the invader (e.g., Evans & Howard, 1973; Rustemli, 1986) or engage in compensatory behavior that minimizes closeness (e.g., Baum, Harpin, & Vallins, 1975; Harris, Luginbuhl, & Fishbein, 1978). Invasions also



affect future interactions as invaded individuals become less likely to invade the personal space of another, even in a charity situation where closeness would be required to help another person (e.g., Konechni et al., 1975). Personal space invasions can also have severe effects on stress and anxiety levels (Evans & Wener, 2007) and impair performance in a variety of ways (e.g., in academic performance, Aiello et al., 1977; in following a simple shopping list, Worchell and Yohai, 1979). In sum, these assorted negative effects show that regardless of how the outcome is measured, reactions to a personal space invasion influence the invadee's ability and desire to affiliate with the invader and with other people in subsequent interactions.

*Personal Space Interactions.* Not every touch or crowding experience is a personal space invasion. In fact, research has found that closer proximity when working next to a person in a working environment can be more facilitative for performance for older people (aged 60-87,  $M=70.8$ ) compared to younger people (aged 18-31,  $M=20.4$ ) (Smith et al., 1981). In addition, compared to men, women (presumably white though unreported in the study) report themselves as more effective in close proximities at work (Aiello et al., 1977). Turning to touch, brief enactments of touch on the shoulder led to increased response rates on a survey (Hornik, 1987), and increased likelihood for participants to lend change to an experimenter needing to make a telephone call (Kleinke, 1977; 1980).

In all these cases, personal space played a role in the situation, yet participants did not perceive the spatial interface as an invasion. In these situations, participants mentally prepared or expected a reduction in personal space. For example, the older people reported looking forward to their work environments as a chance to interact with other people, a chance they did not get in their retirement community (Smith et al., 1981). In the touch studies, only participants who had already agreed to interact in a one-on-one style with the experimenter were touched

(self-selecting out approximately 24% of possible participants). Since these participants agreed to the study before the enactment of the spatial interface, it is likely that these participants had a higher SN-Aff than those who refused to participate making them more open to the interaction. In addition, many emotions, such as fear and happiness, influence an individual to seek comfort and closer proximity with other people, for example by sitting closer to another person, leaning in, or outstretching their arms (Remland et al., 1995). In all these cases, mental preparation and expectation moderated outcomes of the interface: the participants looked at the interface as an opportunity for affiliation and thus perceived the spatial interfaces positively when they occurred.

Gender and status also play a role in this mental preparation. In the touch studies, more participants replied to the survey when the request was made by a female experimenter (Hornik, 1987). Participants reported that these experimenters were “not so important” in response to how much authority the experimenters were perceived as having, meaning that participants perceived themselves as having close to equal status with the experimenters. Other research indicates that in the United States when people are familiar with each other (e.g., romantic partners) or have equal status, touch by females to other females and from females to males is more prevalent than touch between males (Major, 1981; Stier & Hall, 1984). Furthermore, using only female researchers in studies examining possible power moves (such as touch) increases the comfort of participants by reducing possible ascribed status differences between men and women (Heslin, Nguyen, & Nguyen, 1983). In other words, when preparing for an interface, an understanding of the status of participants in a situation affects how that interface is perceived.

Yet, many interfaces in real life occur in situations where mental preparations for the interface are not possible, but where the perception of the interface is still positive. In a recent

study, spontaneous touches on either the back or the arm of a participant by an experimenter while explaining directions resulted in more positive ratings of the experimenter by the participant than an untouched control condition (Zawadzki, 2007). In this study, unlike the other studies described, participants did not expect to interact with the experimenter, and verbal interface was limited to the experimenter giving directions to the participant.<sup>6</sup> I propose that SN-Aff was high among these participants (as is a general pattern for participants in this sample, see Appendix F) which led to them being more likely to perceive a touch as positive.

#### The Competing Needs and Nonverbal Communication

*How Touch Differs from Close Proximity.* Touch is a distinctive way to interface with someone's personal space. Through touch, all semblance of space separating one person from another is gone. The skin on both the toucher and touched is stimulated, and the brain at some level is made aware of the presence of another. By directly stimulating the skin, touch "forces" a person to deal with the touch by either allowing it to continue, to modify the interface, or to end it. Close proximity is also a signal of social awareness, yet a certain amount of physical space always exists between the individuals with this interface (e.g., when leaning over close to somebody to get their attention). With close proximity, unlike with touch, a person has an increased possibility to control their personal space requirements. For example, if a person draws near to an individual, the individual can move away to prevent an invasion, something that could not happen with touch. Thus, a person has more of an ability to balance the extent to which their competing needs for personal space and affiliation are met, likely resulting in a greater array of reactions (from negative to neutral to positive).

---

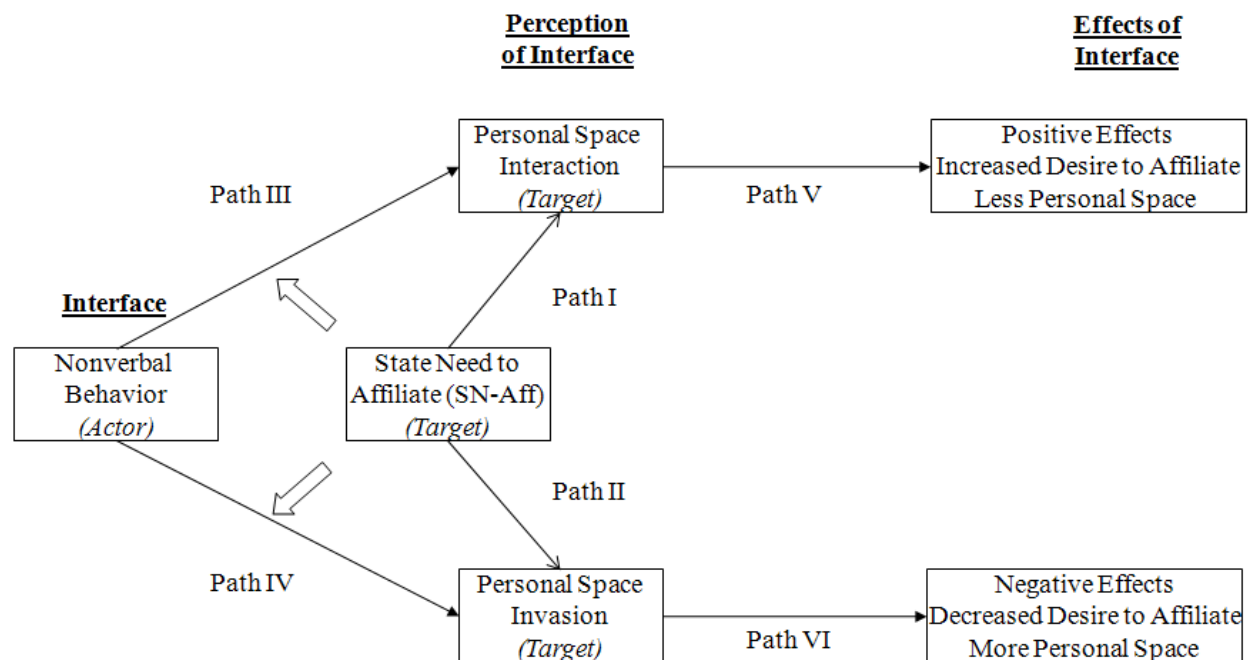
<sup>6</sup>As described in Appendix F where I created and validated a scale to measure SN-Aff, participants sampled from the same population sampled for the present study tended to have a moderate bias towards a higher SN-Aff. Thus, though I did not measure SN-Aff in this study, it is likely that the majority of the participants were more positively inclined to receive the touch.

Research lends initial support to the idea that SN-Aff moderates reactions to touch. In general, people are social creatures, and have a default state desire to want to interact with others (Burgoon, 1978). Being positively touched makes the touchee more socially minded. For example, participants briefly touched in an earlier part of a study were more likely to agree to a subsequent part where they would be hugging strangers (Larson & Lowe, 1990). In other words, there is the correlation that people are generally in more social moods (read high SN-Aff) and react more positively to touch. In professional settings, where SN-Aff is generally lower than in social settings, perceptions of touches are more likely to be negative. For example, sexual harassment literature has clearly shown that inappropriate and unwelcome touches are reported as among the most harassing behaviors that can occur in the workplace (Dougherty et al., 1996; Marks & Nelson, 1993). In addition, research lends support to the idea that close proximity with a stranger is likely to produce a more mixed response to close proximity. Initial feelings of mild discomfort are aroused when first closely encountering anything new (Zajonc, 2001), but repeated exposures to a stranger increases liking of that individual (Moreland & Beach, 1992). In cases where there is heavy overcrowding, the results are mixed. In tightly confined spaces, such as a subway car (Evans & Wener, 2007) or a lavatory (Rustemli, 1988), the overcrowding produced the negative results. Yet, participants had minimal negative reaction to moderate crowding in a library or airport (Rice & Dyson, 2006). In other words, it appears that in places where a person is able to manage and control their personal space, the negative reactions to close proximity were minimal, but when the ability to manage personal space was limited (e.g., a crowded subway car), more negative reactions resulted.

*Touch as an Invasion or Interaction.* I have argued above that a person's need for personal space and affiliation function as competing needs. Touch affects both needs

simultaneously: by removing the personal space of the person touched, and by signaling some kind of social awareness (Burgoon 1978, Altman, 1975). Thus, as Figure 1 illustrates, I predict a main effect of SN-Aff on perception of the interface: when SN-Aff is high, a person should have a greater propensity to view a touch as positive (Path I), and when SN-Aff is low, a person should have a greater propensity to view a touch as negative (Path II).

Figure 1: Model of Judgment of Nonverbal Interfaces



Notes: 1) the figure is a representation of the different individual predictions to be tested, not a single multilevel model to be tested; 2) skinny arrows represent predictions for main effects, and fat arrows represent predictions for interaction effects; and 3) path numbers represent specific predictions corresponding to text.

I also propose that the SN-Aff will moderate how the interface is perceived. Because of touch's unique relationship with personal space and affiliation, SN-Aff should be a stronger predictor for perceptions of touch compared to other spatial interfaces that also are affected by the need for personal space. For touches, as SN-Aff increases, so should the positive reaction to the touches (path III), and in turn as SN-Aff decreases, the negative reaction to the touches

should increase (path IV). I propose that because for touches the focus is to what extent a person is able to satisfy their SN-Aff, participants will perceive touches as either more positive or negative compared to other interfaces that also have the focus on whether the need for personal space was satisfied. For close proximity interfaces, operationalized in this study as leaning towards a target, the competing needs of personal space and SN-Aff are both relevant. Thus, for close proximity, even if a person has a high SN-Aff, the close lean will still leave some space between the interactants. The balance of intimacy may not be escalated as the target could ignore the lean, or could perceive the lean as not being affiliative leaving the high SN-Aff unsatisfied.

Finally, I predict a main effect of the perception of the interface on the effects of the interface. When the interface is perceived positively, participants will report positive effects such as greater desire to affiliate with the confederate and more positive mood (path V). When the interface is perceived negatively, participants will report more negative effects such as a lessened desire to affiliated with the confederate and more negative moods (path VI).

## The Present Study

*Overview of design.* The present study created a common interaction likely to occur between strangers. A female confederate interfaced with the personal space of the participant in one of two ways: touching or close proximity (i.e., leaning close to the participant). There was also a control condition (i.e., shuffling in confederate's chair) in which there was no increase in physical closeness between the participant and confederate, but where the participant was alerted to the presence of the confederate. A behavioral measure of personal space preference was used to determine if an individual preferred an increased or decreased distance with the confederate

after the interface. In addition, I measured the immediate and anticipated longer-term effects of personal space invasions, including participants' ratings of the confederate personality, their desire to interact with the confederate in the future, and their self-reported mood. Participants also rated the perceived motivations of the confederate for the interface.

*Improvements on Previous Studies.* In the present study, an ambiguous reason for the interface was given, compared to many previous studies in which a specific request followed the spatial interface. For example, a participant was touched on the shoulder and then asked if they would be willing to participate in a survey (Hornik, 1987). This request following the interface allowed a person to explain the reason for the interface as a momentary incident, and not have to consider whether the interface was an invasion or interaction. While these situations are important, they contextualize the touch for recipient. As a result, the present study tested a scenario that allowed more than one interpretation of the interface.<sup>7</sup> In particular, this study examined if touched participants compared to non-touched participants make different attributions of the confederate's motivation.

Furthermore, while previous studies have examined some effects of personal space invasions and interactions, they generally have only examined a single dimension of behavioral response that a touch and non-touch interface can cause. By only studying a single dimension, important information about reactions to touch may be lost. For example, because people tend to have an anti-touch bias in the United States (Hertenstein et al., 2006), self-report measures assessing perceptions of touch may be biased, calling for behavioral measures to help understand

---

<sup>7</sup> In fact, I speculate that based on the design of the study, participants should be more inclined to interpret the interface as negative than positive. In short, a confederate interfaced with a participant when they were both instructed to work by themselves on a survey packet. The social norms of the situation prescribe participants to work in silence and not interact with each other. As a result, this interface likely would be perceived as unexpected and an interruption, with an initial inclination to treat the interface as negative. After the interface, participants would have to decide whether this initial inclination is appropriate or whether they should consider that the interface was positive.

reactions. In order to capture the multiple dimensions affected by personal space invasions and interactions, the present study included measures of the following: the aftereffects of stress, desire to interact in the short-term, desire to escape the situation, rating of confederate's positive and negative personality attributes, desire to interact in the long-term, personal space requirements in a subsequent interaction, self-reported mood of the participant, and perceived motivations of the confederate.

Finally, many previous studies have either neglected or been unable to rule out that trait variables of participants may be the reason for the significant effects. For example, with the field studies, it is possible that a certain type of individual goes to the mall and/or stops to hear a pitch about trying a sample food item. Research has shown that people high in neuroticism are hypervigilant to threat cues (Turner et al., 2003), and have high social anxiety which helps explain lower ratings given to an experimenter after a touch (Wilhelm et al., 2001; Zawadzki, 2007). Also, people who are more open to new experiences are more likely to look at a potential situation as positive and are less resistant to change (e.g., Judge, et al., 1999), which is important to note because participants who expect a pleasant interaction, as indicated by openness to a future interaction, prefer less personal space (Feroletto and Gounard, 1975). Therefore, the present study includes a measure of the Big Five personality traits (John & Srivastava, 1992).<sup>8</sup>

*Hypotheses.* The first hypothesis predicts the main effect of the state need to affiliate (SN-Aff) on perception of the interface. SN-Aff is a person's current motive to seek out the company of individuals and to interact with them, with higher SN-Aff indicating higher motives

---

<sup>8</sup> The BFI also supported the cover story of the study where participants were led to believe that their personality characteristics and attention to detail was being measured. The State Need for Affiliation Questionnaire (SNAQ) followed the BFI appearing as an additional measure of personality, rather than the main variable of interest in the study.



to interact with people. I expect that these interfaces will be perceived either positively if the participant's SN-Aff is high, or negatively if the participant's SN-Aff is low.

*1a. If participants have a high SN-Aff then they will be more likely to perceive an interface as a personal space interaction than participants with a low SN-Aff (path 1 in Figure 1).*

*1b. If participants have a low SN-Aff, then they will be more likely to perceive an interface as a personal space invasion than participants with a high SN-Aff (path 2 in Figure 1).*

The second hypothesis predicts the interaction of SN-Aff and the interface condition in predicting perceptions of the interface. Touch, lean, and shuffle conditions vary in how directly they involve personal space. I expect that because of the directness of the interface and the extent to which the interface interacts with the personal space of the participant, touches will be either the most positive or negative, depending on SN-Aff.

*2a. If participants have a high SN-Aff, then touch interfaces will be perceived as more positive compared to lean and shuffle interfaces (path 3 in Figure 1).*

*2b. If participants have a low SN-Aff, then touch interfaces will be perceived as more negative compared to lean and shuffle interfaces (path 4 in Figure 1).*

The third hypothesis predicts whether perceiving the interface as positive or negative predicts the outcome measures. I expect that perception of the interface will predict the results of the interface across all of the dependent variables. If the participant perceives the interface as positive, I predict everything involved with the interface will be rated as more positive as well, including ratings of the confederate, the desire of the participant to interact with the confederate

in the perceived short and long term, and the perceived motivation of the confederate for the interface.

*3a. If participants perceive an interface as a personal space interaction, then they will report more positive effects of the interface than participants who perceive the interface as a personal space invasion (path 5 in Figure 1).*

*3b. If participants perceive an interface as a personal space invasion, then they will report more negative effects of the interface than participants who perceive the interface as a personal space interaction (path 6 in Figure 1).*

The previous literature is not clear as to how the gender of participants will matter in the study. Because status is important in considering reactions to touch, I used female confederates with the assumption that participants would perceive them as having equal status. As a result, using gender as a proxy for status would not be relevant. In addition, I designed the study to give the confederate little to no time to interact with the participant before the interface. Participants should not be mentally preparing themselves for an interface, and thus should not be focused on qualities of the confederate (such as gender) that may influence how the interface would be perceived. As an exploratory hypothesis, I expect that the gender of the participants will only affect results under certain conditions. I propose that gender will matter if participants perceive that the confederate was trying to be positive towards them (e.g., trying to flirt). Specifically, I propose that men will react more positively to the interface than women. Furthermore, if participants believe that the confederate was trying to be negative to them (e.g., trying to annoy), women will react more negatively to the interface than men. I make this prediction because women tend to perceive touch from women as positive, whereas men's

reaction to a women's touch is mixed (e.g., Fisher and Gallant, 1990). Thus, when a woman perceives motivations as negative, her perception is that the touch violates norms of the situation so she will perceive the interaction as more negative than a man who views the touch as conforming to norms.

*Exploratory Gender Hypothesis 1. If gender is included as an exploratory variable in the previous four hypotheses, then no significant effects of gender will emerge.*

*Exploratory Gender Hypothesis 2. If men perceive the confederate as trying to flirt with them, then they will perceive the interface more positively than women.*

*Exploratory Gender Hypothesis 3. If women perceive the confederate as trying to annoy them, they will perceive the interface more negatively than men.*

## Method

### *Overview*

This high-impact behavioral study was proposed as was a 3 (Interface Condition: Touch vs. Lean vs. Shuffle) x 3 (Affiliation Prime: High vs. Neutral vs. Low) between-subjects design with gender as an exploratory variable. . Participants were primed in one of three affiliation conditions and then a confederate briefly interfaced with the participants' personal space by touching, leaning or shuffling to gain the attention of the participant. Though as will be discussed the prime was ineffective as a manipulation, and people were grouped into high and low affiliation conditions based on a measurement of their SN-Aff, resulting in a 3(Interface Condition) x 2 (Affiliation: High vs. Low) between-subjects design. A set of self-report and behavioral dependent variables assessed the effect of the personal space interface on the participant's reaction to the situation and the confederate.

### *Participants*

*Initial Sample.* Two-hundred sixty Penn State students were recruited from the undergraduate subject pool and received course credit for their participation. The sample consisted of 126 women and 136 men (aged 18-28,  $M=18.93$ ). The majority of participants self-identified as White, Caucasian (84.4%), followed by Asian-American (4.9%), African-American (4.6%), and Latino/a (1.5%). Participants were randomly assigned to interface condition (88 in the touch group, 88 in the lean group, and 86 in the shuffle group).

*Data Cleaning.* From this initial sample, the data were cleaned based on feedback provided by the participant, the confederate, and the experimenter. Only those conditions that were executed according to the procedure described below were included in analyses. This decision was made to ensure that all sessions could be compared to one another. For example, it

is unclear how looking or smiling at the participant while touching him or her might have affected the results. As a result, 5 participants were flagged because the confederate had a problem executing the assigned condition (e.g., the participant stood up before the touch could be executed), 2 participants were flagged because the confederate executed more than one condition (e.g., while leaning over she accidentally touched the participant), 8 participants were flagged because the confederate looked at the participant while executing the interface, and 6 participants were flagged because the confederate smiled while executing the interface. An additional 5 participants were flagged because of problems with the survey packets.

In addition to this, only those participants who did not show suspicion of the confederate or study design, and who perceived only one interface condition being enacted (e.g., some participants perceived they were touched when they were not or perceived the confederate looked at them while touching them) were included in analyses. This decision was made because if participants were suspicious of the confederate or the study design they may have reacted differently to the touch than if they believed the fellow participant was not a confederate. Also, if participants perceived they were touched when they were not, it is unclear whether they reacted to the interface that was actually executed. As a result, 19 participants were flagged because they were suspicious of the confederate or design (e.g., they thought the confederate was told to touch them and were part of the study), and 17 participants were flagged because they thought multiple interfaces were performed.

*Final Sample.* In total, 53 participants were dropped from the analyses. There were no significant differences between the remaining and dropped participants on any personality traits or SN-Aff. The final sample had 209 participants consisting of 107 women and 102 men (aged 18-28,  $M=18.94$ ). The majority of participants self-identified as White, Caucasian (83.7%),

followed by Asian-American (6.2%), African-American (4.3%), and Latino/a (1.0%).

Participants remained fairly evenly distributed across the interface conditions (70 in the touch group, 63 in the lean group, and 76 in the shuffle group).

### *Materials*

The study had three parts (see Table 2 for overview of when variables were measured).

Participants responded to a set of surveys or questions in each part. In addition, the experimenter and confederate filled out response forms at the conclusion of each session.

*Table 2: Overview of Key Variables Measured/Manipulated During Study*

<u>Phase of Study</u>	<u>Manipulated or Measured Variables</u>
Packet One	Affiliation Prime
	Big Five Inventory
	State Need to Affiliate Questionnaire (SNAQ)
	Interface Condition
	Likelihood to Respond to Confederate
	Desire to Affiliate with Confederate in Short-Term
	Desire to Escape Situation
Packet Two	Personal Space Requirements in Subsequent Interface (Measured while retrieving packet two)
	Attention to Detail Task
Packet Three	Positive Personality Attribute of Confederate
	Negative Personality Attribute of Confederate
	Desire to Affiliate in Long-Term with Confederate
	Perceived Motivation of Confederate for Interface
	Self-Reported Mood
	Self-Reported Anxiousness
	Manipulation Check
	Perception of Interface as Positive
	Perception of Interface as Negative

*The first packet.* In the first survey packet, participants reported on their age, gender, race and experience with experimental studies, and answered questions concerning handedness, whether they had been in the room before, and whether they have seen the experimenter or confederate before (Appendix A).

Following this demographic page, participants were given the affiliation prime. Participants read one of the three priming passages that described the character John and his thoughts and reactions to reading his favorite book (Appendix B). Directions instructed participants to count the number of times the words “and” and “the” appear in the text as they read this passage. They were told to work on this section for about a minute, and not to write down their answer. The passage was either infused with words and themes that described people as innately good and with whom you should interact with (high affiliation prime), as innately evil and with whom you should avoid (low affiliation prime), or as effective and efficient workers (control condition). (Information regarding the construction and pre-testing of the prime can be found in Appendix C).

After completing the prime, participants moved on to the 44-item Big Five Inventory (BFI; John & Srivastava, 1992) (Appendix D) that measures five traits of personality. Extraversion was measured by 8 items, such as “Is full of energy” ( $\alpha=.85$ ). Agreeableness was measured by 9 items, such as “Is helpful and unselfish with others” ( $\alpha=.82$ ). Conscientiousness was measured by 9 items, such as “Does a thorough job” ( $\alpha=.81$ ). Neuroticism was measured by 8 items, such as “Worries a lot” ( $\alpha=.86$ ). Openness was measured by 10 items, such as “Is curious about many different things” ( $\alpha=.83$ ). Participants responded using a 5-point Likert type scale where 1 = Disagree Strongly and 5 = Agree Strongly.

After the Big Five Inventory, participants completed the State Need to Affiliate Questionnaire (SNAQ) created for this study (Appendix E). The SNAQ is a 14-item questionnaire that measures a participant’s current desire to be around others (e.g., “Right now I would find it draining to be around others” (reverse scored), and the participant’s desire to interact with those people that they are around (e.g., “Right now I would want to work with

others on a group task”) ( $\alpha=.91$ ). Participants responded using a 7-point Likert type scale where 1 = Not at All and 7 = Very Much. (Information regarding the construction and pre-testing of the SNAQ can be found in Appendix F.)

The final page of this packet had a series of five filler questions assessing the participant’s GPA and their normal habits during class (e.g., “How much do you pay attention in class?”) (Appendix G). The interface was performed while the participant answered these filler questions. Following the filler questions were two questions that assessed the participant’s short-term desire to affiliate with the confederate (“If you could choose between working with someone or working alone on the next task, how much would you prefer to work alone?”), and the participant’s desire to escape the situation (“If you were to work alone on the next task, how much would you prefer to go to another room to work alone?”). Participants responded using a 7-point Likert type scale where 1 = Not at All and 7 = Very Much. These two questions were only modestly correlated, and so were treated as separate dependent variables ( $r(208)=-.30$ ,  $p<.001$ ).

A set of instructions then informed the participant what s/he was to do in the next part of the study. The participant was directed to go to the materials table and pick up the second survey packet which would also say whether they were to stay in the room or finish the study in a separate room.

*The second packet.* In the second survey packet, participants responded to a series of questions that measured their attention to detail (Appendix H). The first three exercises asked the participants to count the number of times a certain letter or number appeared in a list. They were instructed to do all calculations in their head and to not write anything but their answers on the page. The number of errors made on a similar task as the one used in this study has been



shown to increase as the amount of stress a person is experiencing (as determined by salivary cortisol) also increases (Evans & Wener, 2007). Modest correlations were found among the three exercises such that if the participant made mistakes on one of the exercises, it was more likely the participant made mistakes on the other exercises ( $r(208)$ s ranged from .25 to .57). The fourth exercise was a word search puzzle in which the participants were told to find as many words as possible. This exercise served as a filler task. Participants were given a total of six minutes to complete all of the exercises.

*The third packet.* In the third packet, participants responded to a set of surveys and questions that constituted most of the self-report dependent variables for the study. The participants started with an 11-item questionnaire that asked participants to rate positive and negative personality traits of the confederate (Appendix I). These traits were drawn from a list of personality traits assembled by Storm, Bjork, and Bjork (2005) based on likeability norms. Sample positive traits asked the participants to rate how friendly and likable the confederate was ( $\alpha=.85$ ), while sample negative traits asked the participants to rate how annoying and rude the confederate was ( $\alpha=.85$ ). The positive and negative rating scales were minimally correlated with each other ( $r(209)=.13$ ,  $p=.061$ ), and will be treated as separate variables. Participants responded using a 7-point Likert type scale where 1 = Not at All and 7 = Absolutely.

After rating the confederate, participants responded to a 6-item questionnaire measuring their desire to interact with the participant in the future (Appendix J). The scale was designed similar to a social distance scale so that each subsequent question entailed a greater level of affiliation. The first question simply asked the participants if they would smile at the confederate if they saw her a few days later, whereas the last question asked if the confederate seem like a person they would confide in ( $\alpha=.84$ ). Participants responded using a 7-point Likert type scale

where 1 = Not at All and 7 = Absolutely. This scale was only modestly correlated with the desire to escape the situation and desire to affiliate in the short term ( $r(208)$  ranged from  $-.05$  to  $.36$ ), and was treated as separate dependent variable.

Next, participants responded to a questionnaire that asked whether a verbal interaction occurred between the confederate and themselves during the study, and if so, to rate the possible motivations of the confederate (Appendix K). Instructions told participants that interactions during studies are becoming more common and that the lab is interested in understanding how the interactions are perceived. The questionnaire was framed in this way in order to remind the participant of the verbal interaction without directly focusing on the nonverbal aspect of the interface. The first two questions served as a manipulation check to determine the extent to which they noticed and remembered what was said to them. The remaining seven items assessed potential motivations of the confederate. A sample item asked the participant to answer, “When the other participant spoke to you was he/she trying to annoy you?” Participants responded using a 7-point Likert type scale where 1 = Not at All and 7 = Absolutely.

Following these questions about the interface, participants responded to a short mood inventory (Appendix L). Three items assessed how positive the participants felt ( $\alpha=.912$ ), two items assessed how negative the participants felt ( $\alpha=.89$ ), and a final item assessed if the participant was anxious. Participants responded using a 7-point Likert type scale where 1 = Not at All and 7 = Absolutely. The positive and negative mood scales were highly correlated and were therefore combined for analyses ( $r(208)=-.78$ ,  $p<.001$ ). The combined scale had high reliability ( $\alpha=.88$ ). (Anxious mood was moderately correlated with positive,  $r(208)=-.427$ ,  $p<.001$ , and negative mood scales,  $r(208)=.525$ ,  $p<.001$ , and was treated as a separate variable.)

After the mood inventory were two short essay questions that asked if anything was unusual during the study and if participants knew the purpose of the experiment

Finally, participants responded to a five-question manipulation check (Appendix M) that asked them the gender of the other participant, if the other participant touched them, leaned in close to them, shuffled around in her seat, or looked at them while they were not looking back. After these questions, participants responded to a final eight questions that asked them to assess the attributes of the interface. Four questions asked the participant how positive the interface was, “How positive did you perceive the [touch, lean, shuffle] to be?” and “If you felt more like talking with other people by the end of the study, how much would you say the [touch, lean, shuffle] was the cause of that” ( $\alpha=.76$ ). The other four questions asked the participants how negative the interface was, “How negative did you perceive the [touch, lean, shuffle] to be?” and “If you felt less like talking with other people by the end of the study, how much would you say the [touch, lean, shuffle] was the cause of that” ( $\alpha=.81$ ). Participants responded using a 7-point Likert type scale where 1 = Not at All and 7 = Very Much. These two scales were minimally correlated, and were treated as separate dimensions in terms of perception of the interface ( $r(209)=.16, p=.018$ ).

*Experimenter and Confederate Forms.* After each session, both the experimenter and confederate filled out individual response forms to describe how each session went and noted any problems that may have occurred during the study. The experimenter response form asked the experimenter ten questions concerning what condition the participant was in, rate how well that condition was performed, note whether smiles, extra looks, or talking had occurred between the confederate and participant, and note any problems that had arisen during the study (Appendix N). The form also asked whether or not the participant responded to the confederate

after she spoke the GPA line. This measure, combined with similar information from the confederate's response form, served as the basis for the likelihood to respond to confederate variable. In addition, the experimenter recorded how much space the participant left between her/himself and the confederate when picking up the second survey packet. This measure was used as an indicator of the personal space distance the participant required. The confederate response form asked the confederate eight questions concerning which interface condition they were in, whether the participant responded to the GPA line, how well the interface was executed, whether the participant seemed to notice the interface, and if any other problems arose during the study (Appendix O).

### *Procedure*

*Overview.* Data were collected over the course of five months. Each experimental session lasted approximately forty minutes. A confederate participated for half of the experiment and was responsible for enacting the personal space interface. An experimenter oversaw the entire study session. Participants were told that the purpose of the study was to examine how personality related to attention to detail. The participant was debriefed at the study's conclusion.

*Experimenter and Confederate Training.* Confederates in the study were fourteen female research assistants from the Shields lab. All research assistants were required to participate in a series of three training sessions to ensure proper administration of the study. Training sessions took place in the three weeks before data collection began (see Appendix P for training protocol). In addition, a booster session for each experimenter was run at the mid-point of the data collection. Finally, each experimenter checked in at weekly meetings with any problems or questions about the study. A total of twenty-one pairings of experimenter and confederate were used to collect data for the study, with no pairing accounting for more than 14% of the total

sessions. No significant differences were found between pairings, between individual experimenters, or between individual confederates on any of the measured variables in the study.

The decision to use only female confederates was informed by research on the prevalence and comfort of same-sex and mixed-sex touching. Touch by females to females and by females to males is more prevalent than touch between males (Major, 1981; Stier & Hall, 1984). In addition, women are more likely to perceive touch from other-sex strangers to be unpleasant and an invasion of privacy, whereas men are less likely to perceive touch in these ways (Heslin, Nguyen, Nguyen, 1983). Thus, female confederates introduced fewer confounds when trying to understand the unique effects of the touch interface.

*Experimental Procedure.* Participants were instructed upon arrival by a sign on the door to wait outside while the experimenter set up the study. Upon seeing the participant arrive, the confederate joined the participant outside of study room and lightly tapped on the door while reading the sign. (Having the participant arrive after the confederate greatly reduced the potential for an interaction between the two before the study began). This tap indicated to the experimenter that both were present for the study. When the experimenter heard the tap, she opened the door, greeted the participant and confederate, and assigned them to their seats. If after five minutes past the study's original start time there was no tap on the door, the experimenter opened the door and invited whoever was outside into the room. If the confederate was late, the experimenter ran an alternative study. If the participant was late, the experimenter waited an additional five minutes before cancelling the session.

Inside the room there was a small table and chair near the door where the experimenter sat during the study (see Figure 2 for diagram of the room). On the wall opposite the door was a long desk with two chairs where the experimenter and confederate sat during the study. On the

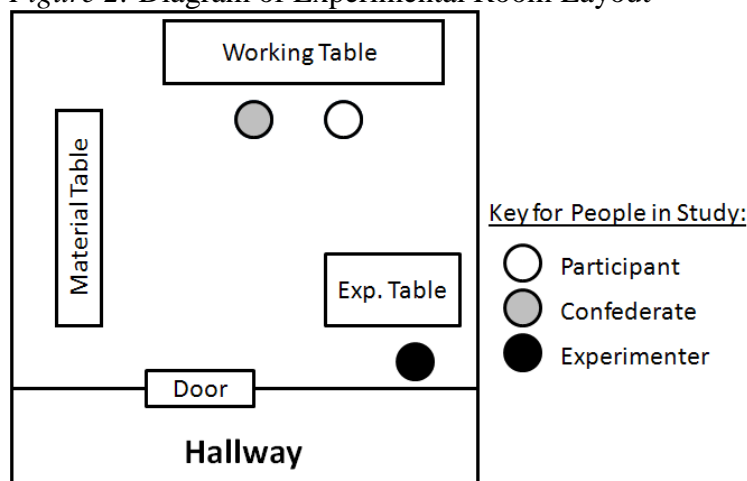
left hand side of the room was a narrow table where the confederate and participant would pick up additional study materials for the second part of the study. The confederate was instructed to always sit in the chair on the left so as to not interfere with the writing hand of the majority of participants when executing the interface. To help ensure the proper seating arrangement, if the confederate entered the room first, she immediately sat in the left seat, leaving only the right chair open for the participant. If the participant entered first, the experimenter stood in front of the left chair and pointed to the right chair while asking the participant to have a seat. While sitting down, the confederate adjusted her chair to ensure there was enough room between her and the participant as they worked. On average the distance between participant and confederate was two and a half feet.

After the initial instructions were read, the participant and the confederate were given the first packet which included the demographic questionnaire, the affiliation prime, the BFI, the SNAQ, the GPA filler questions, the desire to affiliate in the short term, and the desire to escape the situation. While the participant worked through the packet, the confederate mimicked working through this packet as well, but maintained a careful watch on the progress of the participant. The confederate waited until the participant flipped to the last page of the first packet, and then performed the interface condition.

Confederates were alerted as to which interface condition to perform by a code letter on bottom right-hand corner of the packet given to the confederate. (See Figure C for a rough visualization of the three experimental conditions. The arrows indicate the direction of the confederate's gaze, which was always on the survey packet and not directed towards the participant). In the touch interface condition, the confederate placed her left hand on the participant's right upper arm (Picture 1 in Figure 3). The touch was of light intensity and only

the fingertips made contact with the participant. In her right hand the confederate picked up the survey packet and acted as though she was reading the paper. The confederate held this touch position until the participant noticed the interface (e.g., turned and looked, made a movement on that side of the body, or made a noise immediately after the interface) or for a total of five seconds if the interface was not noticed.

*Figure 2: Diagram of Experimental Room Layout*

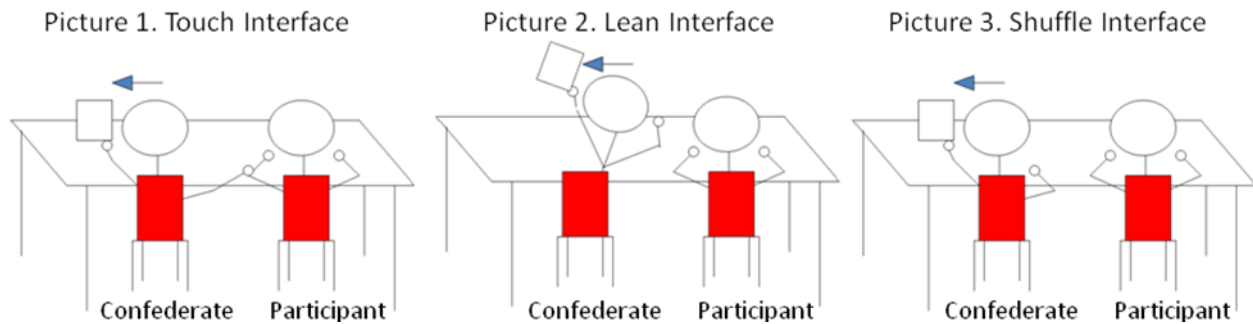


In the leaning close proximity interface condition, the confederate positioned herself by leaning across the table near the participant, approximately six inches from the participant (Picture 2 in Figure 3). As with the touch condition, she had the survey raised and pretended to read the paper. She remained in this position until the participant noticed the interface or for a total of five seconds if the interface was not noticed.

In the control condition, no direct personal space interface occurred. The confederate made her presence known by shuffling around in her chair and making a slight bit of noise. In this condition, the confederate once again picked up the survey packet in her left hand and pretended to read the paper. The confederate then shifted the chair and moved around (Picture 3

in Figure 3). She remained in this position until the participant noticed her or for approximately five seconds where she would make a movement at the 1, 3, and 5-second marks.

*Figure 3: Diagrams of Experimental Conditions*



Note: Arrow indicates the direction of gaze of confederate on the survey packet during the interface.

After the interface was noticed or the five-second time limit elapsed, the confederate returned to her position before the interface and said, “Can you believe that they are asking us about out GPA.” This phrase was chosen for its potential to be seen in multiple ways (e.g., as a question or as a statement of surprise or disapproval), thus allowing for the participants to infer the intention of the confederate speaking this phrase to them. Most importantly, to maintain its ambiguity, confederates said this phrase in a neutral way. They did not add any inflection at the beginning or end of the statement (as a question normally would have), and spoke with a flat affect (to show no clear emotional reaction). After the statement, the confederate placed her survey flat on the desk and continued to work. If the participant tried to engage in conversation with the confederate after the GPA statement, the experimenter interjected by saying, “Can we



please finish up this first section?" No participant tried to continue to have a conversation with the confederate after the experimenter interjected.<sup>9</sup>

The last page of the first survey packet instructed participants to go over to the narrow table in the room to pick up the second survey packet and read the instructions on the first page of this new packet. Participants were told that they could choose any packet from the pile, which was always on the far left side of the table (there were no differences between survey packets). Once they picked up the second survey packet, participants were instructed that they would stay in the room to finish the study. They were also told that some survey packets instructed participants to work in a different room.

The confederate in the study was always the first to the table, taking up a preset position while reading the packet and waiting for the participant. The confederate stood with her left leg directly in front of the table's left leg and kept her right leg about a foot away with the survey packets directly in front of her. Thus, when participants arrived at the table to get their packet and instructions, they had to decide how close they wanted to stand in relation to the confederate. This distance served as a behavioral measurement of the participants' need for personal space. The experimenter used discrete lines marked on the floor to determine how far away the participant was from the confederate (the distance between the confederate's right foot and the participant's left foot). Once this distance was recorded the experimenter asked the participant and confederate whether they were instructed by the second survey packet to stay or move to another room. The confederate always told the experimenter that she was to go to another room

---

<sup>9</sup> It is important to note that if at any point some kind of confrontation seemed likely to occur because of the personal space interface, the experimenter was instructed to intervene by immediately ending the experiment. The experimenter would then debrief the participant and field any questions the participant had, while assuring the participant that both the experimenter and confederate were highly trained and that everything was part of the study. The participant would then be encouraged to visit the Student Health Services if they were bothered by the study, and/or to contact me. No sessions needed to be stopped in this manner.

and the experimenter then escorted the confederate from the room. Before leaving, the experimenter indicated to the participant to begin the packet which should take about six minutes to complete. The experimenter returned alone with two minutes left, reminding the participant of how much time was left. The participant and confederate did not interact further. The confederate filled out the confederate response form in another room.

Once the time to complete the second packet was up, the experimenter collected this packet and handed the participant the third packet. This packet contained the confederate rating questions, desire to affiliate in the future questionnaire, the short mood inventory, the manipulation checks, and the attributions of the interface section. Participants worked at their own pace to complete the third packet. When participants finished, the experimenter collected the packet and handed them a debriefing form (Appendix Q). After they finished reading, the experimenter asked if the participant had any questions or had any comments about the procedure of the. The participant was then thanked. Finally, the experimenter filled out the experimenter response.

## Results

### *Manipulation Checks*

Everyone correctly identified the gender of the confederate as female. In terms of noticing and reporting of the interface, 60 (85.7%) participants in the touch condition reported noticing the touch, 17 (27.0%) participants in the lean condition reported noticing the lean, and 13 (17.1%) participants in the shuffle<sup>10</sup>. The GPA line that the confederate spoke directly after the interface was noticed by 190 (90.9%) participants. Of this group, 183 (93.9%) correctly remembered what the confederate had said.

### *Comparing the Interface Groups*

Comparing the groups on the Big Five personality trait measures and their SN-Aff (both measured before the interface occurred) revealed no significant differences between touch, lean, or shuffle groups. Agreeableness showed a trend ( $F(2, 204)=2.42, p=.091, \eta_p^2 = 0.02$ ) with the lean condition self-reporting as more agreeable than the touch and shuffle condition ( $M=4.02$  ( $SD=0.56$ ),  $M=3.79$  ( $SD=0.67$ ),  $M=3.90$  ( $SD=0.55$ ), respectively). Also, openness to experience showed a trend ( $F(2, 204)=2.84, p=.061, \eta_p^2 = 0.03$ ) with the lean condition self-reporting as less open than the touch and shuffle condition ( $M=3.29$  ( $SD=0.65$ ),  $M=3.52$  ( $SD=0.60$ ),  $M=3.53$  ( $SD=0.69$ ), respectively). There were no differences in reported GPA or the number of studies between the interface conditions. Overall, these results show the three interface groups to be comparable, with a slight bias for the lean condition to be more agreeable, but less open to new experiences. As a result, whenever the interface condition is included as an independent variable for analyses, agreeableness and openness to experience were used as covariates.

---

<sup>10</sup> As discussed later, whether or not participants noticed the interface did not influence results.

### *The Affiliation Prime*

As in pre-testing (see Appendix C), there were no differences between the prime conditions and any of the measured variables in the study (all  $p > .25$ ). Most notably, the prime had no effect on the SN-Aff ( $F(2, 206) < 1$ ), perception of interface as positive ( $F(2, 206) < 1.37$ ), perception of the interface as negative ( $F(2, 206) < 1$ ), or mood ( $F(2, 205) < 1$ ). As a result, the prime will be treated as an ineffective manipulation with no further discussion of this variable.

### *State Need to Affiliate Questionnaire (SNAQ)*

Because the prime did not manipulate SN-Aff, participants could not be broken up into meaningful groups based on this manipulation. Rather their scores were used as a measured independent variable to divide people into high and low SN-Aff groups (instead of being used just as a manipulation check). SN-Aff scores ranged from 1.79 to 7.00 ( $M=5.24$ ,  $SD=0.98$ ) on the questionnaire ( $\alpha=.91$ ). (See Appendix F for initial support of the external validity of the questionnaire.) Participants were broken into high and low SN-AFF groups based on the following: high SN-Aff participants identified as wanting to be around and interact with other people often to usually and had a mean score of greater than 5 on all items. Low SN-Aff participants identified as never to moderately wanting to be around and interact with other people and had a mean score of less than or equal to 5 on all items. Based on this grouping, 73 participants fell into the low SN-Aff group, and 136 participants fell into the high SN-Aff group. (See table 3 for correlations of SNAQ to all of the variables in the study.)

Table 3: Correlations of All Variables Measured in Study

	SNAQ	Extr	Agr	Cons	Neur	Open	PosP	NegP	STAf	Esc	LTAf	Mood	Anx	PosIn	NegIn	Dist	Mis	Resp	Verb
SNAQ	1.0	.40**	.40**	.13	-.25**	.03	.01	-.20**	.31**	-.18**	.21**	.61**	-.28**	.07	-.22**	.17*	.01	-.14	.08
Extr		1.0	.16*	.02	-.22**	.15*	.03	-.07	.12	-.18**	.19**	.29**	-.09	-.13	-.10	-.06	-.07	.05	.03
Agr			1.0	.17*	-.24**	-.02	.05	-.14*	.11	-.01	.16*	.32**	-.21**	-.09	-.09	.10	.10	-.07	.06
Cons				1.0	-.08	.01	.09	-.07	-.09	.03	.04	.19**	-.13	.06	.01	.02	-.05	-.01	-.12
Neur					1.0	-.11	-.12	.15	-.25**	.10	-.20**	-.40**	.37**	-.10	.18*	.03	-.03	-.02	.002
Open						1.0	.10	-.10	.07	-.15*	.17*	.16*	-.08	.01	-.21**	-.08	-.14*	.11	.18
PosP							1.0	.13	.12	-.04	.44**	.16*	-.07	.09	-.13	-.10	-.09	.09	.20*
NegP								1.0	-.18**	.14	-.17*	.24**	.24**	.07	.33**	-.03	.07	-.07	.09
STAf									1.0	.30**	-.36**	-.24**	.16*	-.11	.24**	-.05	-.09	-.11	.05
Esc										1.0	-.05	-.18**	.12	.11	.29**	.08	-.06	.002	-.03
LTAf											1.0	.26**	-.09	.06	-.31**	.06	.12	.19**	.18
Mood												1.0	-.51**	.08	-.27**	.07	-.04	-.06	.08
Anx													1.0	-.02	.12	-.02	-.003	-.01	-.11
PosIn														1.0	.16*	.04	.03	.03	-.16
NegIn															1.0	-.09	.08	-.01	-.02
Dist																1.0	.08	-.06	.16
Mist																	1.0	-.04	.05
Resp																		1.0	--
Verb																			1.0

Notes: SNAQ=State Need for Affiliation Questionnaire, Extra=Extraversion, Agr=Agreeableness, Cons=Conscientiousness, Neur=Neuroticism, Open=Openness to Experience, PosP=Positive Rating of Confederate, NegP=Negative Rating of Confederate, STAf=Short Term Desire to Affiliate in Future, Esc=Desire to Escape the Situation, LTAf=Long Term Desire to Affiliate in Future, Mood=Self-Reported Mood, Anx=Self-Reported Anxiousness, PosIn=Positive Rating of the Interface, NegIn=Negative Rating of the Interface, Dist=Distance Taken in Subsequent Interaction, Mist=Total Mistakes Made on Aftereffects of Stress Test, Resp=Whether Participant Responded to Confederate or Not, Verb=Whether the Response was Verbal or Not

\*p<.05

\*\* p<.01

*H1a: High SN-Aff = Personal Space Interactions*

Hypotheses 1a, 1b, 2a and 2b are tested with a 2 (affiliation: high vs. low SN-Aff) x 3 (Interface: touch vs. lean vs. shuffle) between-subjects ANOVA with Agreeableness and Openness to Experience as covariates on perception of the interface.

Hypothesis 1a predicts that if participants have a high state need to affiliate (High SN-Aff), they will be more likely to interpret personal space interfaces as positive interactions than participants who have a low need to affiliate (Low SN-Aff). To test this hypothesis, perception of interface as positive was the dependent variable in the analysis, and the main effect of affiliation was examined. Hypothesis 1a was not supported as SN-Aff was not significant,  $F(1, 199) < 1$ .

*H1b: Low SN-Aff = Personal Space Invasions*

Hypothesis 1b predicts that if participants have a Low SN-Aff, then they will be more likely to interpret personal space interfaces as negative invasions than participants who have a High SN-Aff. To test this hypothesis, perception of interface as negative was the dependent variable in the analysis, and the main effect of affiliation was examined. Hypothesis 1b was supported as SN-Aff was significant,  $F(1, 199)=6.63$ ,  $p=.011$ ,  $\eta_p^2=.03$ . As predicted, participants with a Low SN-Aff ( $M=2.70$ ,  $SD=1.13$ ) perceive the interface as more negative than participants with a High SN-Aff ( $M=2.27$ ,  $SD=1.19$ ).

*H2a: High SN-Aff will moderate Interface*

Hypothesis 2a predicts that if participants have a High SN-Aff, then they will interpret touch interfaces more positively than leans and shuffles. To test this hypothesis, perception of

interface as positive was the dependent variable in the analysis, and the interaction of affiliation with interface was examined.

A main effect of Interface was found,  $F(2, 199)=42.65$ ,  $p<.001$ ,  $\eta_p^2 =.30$ . Post-hoc analyses revealed that, as expected, touches ( $M=4.08$ ,  $SD=1.08$ ,  $p<.001$ ) and leans ( $M=3.72$ ,  $SD=1.28$ ,  $p<.001$ ) were considered more positive than shuffles ( $M=2.35$ ,  $SD=0.86$ ), though there was no significant difference between touches and leans ( $p=.198$ ). Agreeableness ( $p=.159$ ) and Openness to Experience ( $p=.588$ ) were not significant covariates.

Hypothesis 2a was supported as this main effect was qualified by an interaction between SN-Aff and Interface,  $F(2, 199)=4.09$ ,  $p=.018$ ,  $\eta_p^2 =.04$ . Post-hoc analyses revealed that this interaction (Table 4) was driven most notably by the Touch\*High SN-Aff group rating the interface as more positive than the Touch\*Low SN-Aff group ( $p=.077$ ), the Lean\*High SN-Aff group ( $p=.088$ ), and the Shuffle\*High SN-Aff group ( $p<.001$ ). In addition, the Lean\*High SN-Aff group rated the interface as more positive than the Shuffle\*High SN-Aff group ( $p<.001$ ). In other words, as predicted, when participants had a high SN-Aff, those interfaces that increased affiliation (touch and lean) were seen as the most positive compared to the interface that did not (shuffle).

*Table 4: Interaction for Hypothesis 1a*

Interface Condition	SN-Aff Grouping	Means (SDs)
Touch	Low (n=23)	$M=3.78$ ( $SD=1.21$ ) <sup>a</sup>
	High (n=47)	$M=4.22$ ( $SD=0.99$ ) <sup>a, b, c</sup>
Lean	Low (n=18)	$M=3.61$ ( $SD=1.19$ )
	High (n=44)	$M=3.77$ ( $SD=1.32$ ) <sup>b, d</sup>
Shuffle	Low (n=32)	$M=2.67$ ( $SD=0.87$ )
	High (n=43)	$M=2.12$ ( $SD=1.38$ ) <sup>d</sup>

Notes: Significance Values: a ( $p=.077$ ); b ( $p=.088$ ); c ( $p<.001$ ); d ( $p<.001$ )

*H2b: Low SN-Aff will moderate Interface*

Hypothesis 2b predicts that if participants have a Low SN-Aff, then they will interpret touch interfaces more negatively than leans and shuffles. To test this hypothesis, perception of interface as negative was the dependent variable in the analysis, and the interaction of affiliation with interface was examined.

A main effect of Interface was found,  $F(2, 199)=8.84, p<.001, \eta_p^2=.08$ . Post-hoc analyses revealed that those participants in the shuffle condition ( $M=2.01, SD=0.80$ ) found the interface less negative than the touch ( $M=2.52, SD=1.27, p=.006$ ) and lean groups ( $M=2.81, SD=1.32, p<.001$ ). There was no difference between the touch and lean group ( $p=.183$ ). Openness to Experience was a significant covariate,  $F(1, 199)=5.91, p=.016, \eta_p^2=.03$ , such that as the participants increased in their openness to experience, they were less likely to perceive the interface as negative. Hypothesis 2b was not supported, however, as the interaction was not significant,  $F(2, 199) < 1$ .

*H3a: Perceived as Interactions = Positive Effect of Interface*

Hypothesis 3a predicts that if participants perceive the interface as a positive personal space interaction, then the interface will result in positive effects compared to the participants who perceive the interface as an invasion. Participants who had an average score  $\geq 4.5$  on the “perceived the interface as positive” composite variable were grouped as the perceived as a personal interaction group, and were compared to the participants who averaged a  $\leq 3.5$ s on this composite variable. The perceived interaction as positive becomes a measured independent variable with 49 participants in the perceived as a personal space interaction group, and 125 participants in the comparison group. This variable was then used to test the above hypotheses by running three sets of one-way (Perceived as Interaction vs. Not an Interaction Group)



between-subjects MANOVAs on the self-report dependent variables. The first MANOVA tested the perceived personality attributes of the confederate examining a) ratings of the confederate's positive personality attributes, and b) ratings of the confederate's negative personality attributes. The second MANOVA tested the participant's desire to interact with the confederate examining the participant's c) desire to affiliate in short-term, d) desire to escape situation, and e) desire to affiliate in long-term. The third MANOVA tested the participant's self-reported mood examining f) positive/negative mood, and g) self-reported anxiousness. In addition, the hypothesis was also tested using a between-subjects ANOVA on the following behavioral dependent variables: a) likelihood to respond to the confederate during the interface, b) personal space taken in a subsequent interaction, and c) the aftereffects of the stress as determined by the number of mistakes made on the attention to detail task. Finally, the perceived motivations for the interface will be explored.

*Self-Report DVs.* Participants who perceive the interface as an interaction rated the confederate's personality attributes more positively than participants who did not perceive the interface as an interaction,  $F(1, 172)=4.95$ ,  $p=.027$ ,  $\eta_p^2=.03$  (Table 5, Row A). There was no difference, however, for ratings of negative attributes,  $F(1, 172) < 1$  (Table 5, Row B).

For the participant's desire to interact with the confederate, there was a trend for participants who perceive the interface as an interaction to desire to affiliate in the short-term compared to the group who did not perceive the interface as an interaction,  $F(1, 171)=3.46$ ,  $p=.065$ ,  $\eta_p^2=.02$  (Table 5, Row C). There was no difference, however in terms of the participant's desire to escape the situation,  $F(1, 171) < 1.6$  (Table 5, Row D). For the participant's desire to affiliate in the long-term, a significant effect was found where participants

who perceive the interaction as positive had a greater desire to affiliate than participants who did not,  $F(1, 171)=5.10$ ,  $p=.025$ ,  $\eta_p^2=.03$  (Table 5, Row E).

*Table 5: Self-Report Dependent Variables for Perceived Interface as an Interaction*

	Interface Perceived as Interaction (n=49)	Interface Not an Interaction (n=125)
<b>a) Positive Personality*</b>	<b>M=4.05 (SD=0.88)</b>	<b>M=3.71 (SD=0.92)</b>
b) Negative Personality	M=2.47 (SD=1.16)	M=2.42 (SD=1.01)
<b>c) Short-term Affiliation*</b>	<b>M=3.92 (SD=1.60)</b>	<b>M=3.40 (SD=1.70)</b>
d) Desire to Escape	M=3.24 (SD=1.73)	M=2.88 (SD=1.73)
<b>e) Long-term Affiliation*</b>	<b>M=3.83 (SD=1.25)</b>	<b>M=3.38 (SD=1.18)</b>
<b>f) Mood*</b>	<b>M=5.64 (SD=1.04)</b>	<b>M=5.16 (SD=1.23)</b>
g) Anxiousness*	M=2.75 (SD=1.80)	M=3.10 (SD=1.79)

Notes: 1) Items in bold are statistically significant. 2) Items with asterisk are in expected direction.

3) Because the sample sizes of the two groups are unequal, a Levene's Test of Equality of Error Variances was conducted for each dependent variable. None were significant indicating the assumption of equality of variance was not violated.

For participant's mood, those participants who perceive the interface as an interaction were in a more positive mood than those participants who did not,  $F(1, 171)=5.67$ ,  $p=.018$ ,  $\eta_p^2=.03$  (Table 5, Row F). There was no difference in anxiousness,  $F(1, 171) < 1.3$  (Table 5, Row G).

*Behavioral DVs.* Looking at whether the participant responded to the confederate, data was coded by combining data from the confederate and experimenter's response sheets. The following categories were then coded: 1) no response (n=102), 2) physical response (n=13) (e.g., the participant looked at confederate), 3) minor verbal response (n=45) (e.g., the participant laughed or grunted), 4) moderate verbal response (n=29) (e.g., the participant said "yeah"), and 5) elaborate verbal response (n=20) (e.g., "I can't believe they are asking that). The data was

then simplified into two variables. The first reported whether the participant responded in any way or not (group 1 vs. groups 2-5). No significant differences were found between the perceived the interface as an interaction or not groups,  $F(1, 172) < 1$ . I then coded whether the response was non-verbal or verbal (group 2 vs. groups 3-5), again finding no differences,  $F(1, 79) < 1.6$ .

Looking at the need for personal space dependent variable, 42 people (14 people per interface condition) had to be removed from the analysis because they walked to the opposite side of the table, thus making their measure of distance qualitatively different than participants who stayed on the same side as the confederate (e.g., how to interpret the effect of the physical barrier of the table in terms of personal space needs?). Thus, only participants who walked to same side of the table as the confederate were included in this analysis. There were no differences in personal space requirements,  $F(1, 136) < 1$ .

Aftereffects of stress was measured by errors on the attention to detail task, computed by summing the absolute value of the number of mistakes participants made. There was no difference between the groups on the number of errors made,  $F(1, 171) < 1$ . Though, this null effect was expected as more errors should only have been made if participants perceived the interface as an invasion.

Though there were no differences in terms of whether the participants responded to the confederate or not, there were differences in the participants' perceived motivations of the confederate reasons for speaking to them. Participants who perceived the interface as a positive interaction were more likely to perceive the motivations of the confederate in trying to talk to them **as being friendlier** ( $M=5.12, SD=1.43$  vs.  $M=4.13, SD=1.52$ ;  $F(1, 154)=13.43, p<.001, \eta_p^2=.08$ ), **as trying to alert them to something** ( $M=4.53, SD=1.79$  vs.  $M=3.82, SD=1.78$ ;  $F(1,$

154)=4.97,  $p=.027$ ,  $\eta_p^2=.03$ ), **as trying to comfort them** ( $M=2.12$ ,  $SD=1.48$  vs.  $M=1.44$ ,  $SD=0.84$ ;  $F(1, 154)=12.64$ ,  $p<.001$ ,  $\eta_p^2=.08$ ), and **as trying to hit on them** ( $M=1.63$ ,  $SD=0.90$  vs.  $M=1.19$ ,  $SD=0.62$ ;  $F(1, 154)=12.15$ ,  $p<.001$ ,  $\eta_p^2=.07$ ).

*H3b: Perceived as Invasions = Negative Effects of Interface*

Hypothesis 3b predicts that if participants perceive the interface as a personal space invasion, then the interface would result in negative effects. Participants who had an average score  $\geq 4.5$  on rating the interface as a negative invasion were compared to the participants who did not ( $\leq 3.5$  on this variable). Fifteen participants perceived the interface as an invasion, with 173 participants in the comparison group. The hypothesis was then tested by running one-way (Perceived as Invasion vs. Not an Invasion Group) between-subjects MANOVAs and ANOVAs as was done to test Hypothesis 3a.

*Self-Report DVs.* For the ratings of the confederate's positive personality attributes, participants who perceive the interface as an invasion rate the confederate less positively than participants who did not,  $F(1, 186)=10.22$ ,  $p=.002$ ,  $\eta_p^2=.05$  (Table 6, Row A). There was no significant difference, however, for the ratings of the confederate's negative personality attributes,  $F(1, 186) < 1$  (Table 6, Row B).

For the set of variables measuring the participant's desire to interact with the confederate, there was a trend for participants who perceive the interface as an invasion to not want to affiliate in the short-term compared to the group who did not perceive the interface as an invasion,  $F(1, 185)=3.15$ ,  $p=.078$ ,  $\eta_p^2=.02$  (Table 6, Row C). When looking at desire to escape the situation, participants who perceive the interface as an invasion have a greater desire to escape the situation than participants who did not perceive the interface as an invasion,  $F(1, 185)=5.90$ ,  $p=.016$ ,  $\eta_p^2=.03$  (Table 6, Row D). When looking at the desire to affiliate in the

long-term, a non-significant trend was found where participants who perceived the interface as negative had a lesser desire to interact than participants who did not,  $F(1, 185)=2.18$ ,  $p=.142$ ,  $\eta_p^2=.01$  (Table 6, Row E).

*Table 6: Self-Report Dependent Variables for Perceived Interface as an Invasion*

	Interface Perceived as Invasion (n=15)	Interface Not an Invasion (n=173)
<b>a) Positive Personality*</b>	<b>M=3.11 (SD=1.20)</b>	<b>M=3.85 (SD=0.82)</b>
b) Negative Personality*	M=2.48 (SD=1.02)	M=2.38 (SD=1.00)
<b>c) Short-term Affiliation*</b>	<b>M=2.93 (SD=1.62)</b>	<b>M=3.72 (SD=1.64)</b>
<b>d) Desire to Escape*</b>	<b>M=4.00 (SD=1.73)</b>	<b>M=2.90 (SD=1.69)</b>
e) Long-term Affiliation*	M=3.14 (SD=1.02)	M=3.61 (SD=1.17)
<b>f) Mood*</b>	<b>M=4.31 (SD=1.40)</b>	<b>M=5.40 (SD=1.14)</b>
g) Anxiousness*	M=3.60 (SD=1.72)	M=2.91 (SD=1.78)

Notes: 1) Items in bold are statistically significant. 2) Items with asterisk are in expected direction. 3) Because the sample sizes of the two groups are unequal, a Levene's Test of Equality of Error Variances was conducted for each dependent variable. Only a) positive personality was significant ( $F(1, 186)=9.05$ ,  $p=.003$ ), indicating that for all the other variables, the assumption of equality of variance was not violated. For the "a) positive personality" dependent variable, a more stringent significance level of .01 will be used.

Looking at participant's mood, those participants who perceived the interface as an invasion were in a more negative mood than those participants who did not,  $F(1, 185)=12.02$ ,  $p<.001$ ,  $\eta_p^2=.06$  (Table 6, Row F). Also, there was a non-significant trend for those participants who perceived the interface as an invasion to be more anxious than those participants who did not,  $F(1, 185)=2.07$ ,  $p=.152$ ,  $\eta_p^2=.01$  (Table 6, Row G).

*Behavioral DVs.* Looking at whether participants responded to the confederate or not revealed no differences between the two groups,  $F(1, 186) < 1$ . No differences were found

regarding whether participants verbally responded or not between the perception of the interface groups,  $F(1, 92) < 1.2$ .

Examining how much personal space participants needed in a subsequent interaction revealed no differences between participants who perceived the interface as an invasion or not,  $F(1, 147) < 1$ .

Comparing the participants who perceived the interface as invasion to those who did not on the number of mistakes they made on the counting task reveals a non-significant trend,  $F(1, 185)=2.18$ ,  $p=.142$ ,  $\eta_p^2=.01$ . Participants who perceived the interface as an invasion made more mistakes than participants who did not ( $M=7.45$  ( $SD=9.19$ ) vs.  $M=4.99$  ( $SD=5.93$ )).

Finally, there were no differences in terms of the participants' perceived motivations for the confederate speaking to them.

### *Exploratory Analyses*

*Exploratory Gender Hypothesis 1: Gender will not affect results.* Adding gender to the analyses for Hypothesis 1a reveals a marginal main effect of gender,  $F(1, 205)=5.63$ ,  $p=.068$ ,  $\eta_p^2=.02$ . However this result must be interpreted with caution as the Levene's test for equality of error variances was significant,  $F(3, 205)=3.09$ ,  $p=.028$ , indicating a more stringent p-value of .01 should be used. As such, the marginal effect would be further diminished. Looking at the pattern of results reveals that men perceived the interface as more positive than women ( $M=3.55$  ( $SD=1.39$ ) vs.  $M=3.14$  ( $SD=1.20$ )). The interaction of gender and state need to affiliate was not significant.

Adding gender to the analyses for Hypothesis 1b reveals neither the main effect of gender nor the interaction of gender\*state need to affiliate to be significant.

Adding gender to the analyses for Hypotheses 2a reveals a gender\*interface condition interface,  $F(2, 197)=5.09$ ,  $p=.007$ ,  $\eta_p^2 = .05$  (p-value correction employed because Levene's test for equality of error variances was significant,  $F(11, 197)=2.42$ ,  $p=.008$ ). Post-hoc analyses reveal that this effect was driven by males in the touch condition rating touches as more positive than males in the shuffle condition ( $p<.001$ ) and by females in the touch condition rating touch more positively than females in the lean condition ( $p=.006$ ) and shuffle conditions ( $p<.001$ ) (see Table 7). Also, males in the lean condition rated the interface more positively than females in the lean condition ( $p=.002$ ) and males in the shuffle condition ( $p<.001$ ). Finally, females in the lean condition rated the interface more positively than females in the shuffle condition ( $p=.011$ ).

Adding gender to Hypothesis 2b reveals no significant interactions.

*Table 7: Ratings of the Positive Attributes of Interface using Gender\*Interface Condition*

Interface Condition	Gender of Participant	Means (SD's)
Touch	Female (n=29)	M=4.03 (SD=0.87) <sup>a, b</sup>
	Male (n=41)	M=4.10 (SD=1.21) <sup>c</sup>
Lean	Female (n=33)	M=3.33 (SD=1.24) <sup>a, d, e</sup>
	Male (n=29)	M=4.16 (SD=1.18) <sup>d, f</sup>
Shuffle	Female (n=44)	M=2.40 (SD=0.88) <sup>b, e</sup>
	Male (n=31)	M=2.28 (SD=0.84) <sup>c, f</sup>

Notes: Significance Values: a, c, e ( $p<.001$ ); b ( $p=.006$ ); d ( $p=.002$ ); f ( $p=.011$ )

Adding gender to the analyses for Hypothesis 3a, all self-report and behavioral dependent variables were not significant except for likelihood to respond to the confederate, which was only marginally significant for gender,  $(1, 170)=2.87$ ,  $p=.092$ ,  $\eta_p^2 = .02$ , and the interaction of gender\*perception of the interface,  $F(1, 170)=2.87$ ,  $p=.092$ ,  $\eta_p^2 = .02$ .

Adding gender to Hypothesis 3b, all self-report and behavioral dependent variables were not significant expect for marginal effects of gender for ratings of personality attributes ( $F(1, 184)=3.43$ ,  $p=.066$ ,  $\eta_p^2 = .02$ ), desire to escape the situation, ( $F(1, 183)=2.93$ ,  $p=.089$ ,  $\eta_p^2 = .02$ ),

and likelihood to respond ( $F(1, 184)=4.01, p=.047, \eta_p^2=.02$  which necessitates a p-value correct because the Levene's Test of Equality of Error Variances was significant,  $F(3, 184)=11.21, p<.001$ ).

Because of the sampling distribution problems discussed above, gender was not examined for Hypothesis 4a or 4b.

Overall, there were very few differences between men and women, with no consistent pattern of results occurring across any of the hypotheses. This result is not unexpected, as it was proposed that because of the study design, differences attributed to gender alone would likely be minimized. Thus, while gender of the participant could be considered, there is insufficient evidence to conclude that it had a significant bearing on the outcome of the results.

*Exploratory Gender Hypothesis 2: Men Who Perceive Flirting Perceive More Positively.*

Using a one-way ANOVA with gender as the independent variable and perceive confederate as flirting as the dependent variable, revealed that men were more likely to perceive the confederate as flirting with them than women,  $F(1, 188)=31.33, p<.001, \eta_p^2=.14$  (men:  $M=1.59, SD=0.92$ ; women:  $M=1.05, SD=.026$ ). It should be noted that only four women perceived that the confederate was flirting with them, compared to thirty-four men. As a result, no direct comparison of men to women could be made. Rather, I compared perceived as flirting men to not perceived as flirting men in a one-way ANOVA with perception of the interface as positive as the dependent variable. As expected, men who perceived the confederate as flirting perceived the interface as more positive than men who did not,  $F(1, 100)=8.02, p=.006, \eta_p^2=.07$  (Flirting:  $M=4.08, SD=1.43$ ; Not Flirting:  $M=3.28, SD=1.30$ ). It is interesting to note that, perceived as flirting was unrelated to SN-Aff,  $r(209)=-.05, p < .52$ , indicating that the perceived as flirting information explains something distinct from SN-Aff.



*Exploratory Gender Hypothesis 3: Women Who Perceive Annoying Perceive More Negatively.*

Using a one-way ANOVA with gender as the independent variable and perceive as trying to annoy as the dependent variable, there is no difference between gender in trying to annoy,  $F(1, 188)=1.90$ ,  $p=.170$ ,  $\eta_p^2 = .01$ . As a result, I collapsed across gender and compared those who perceived as trying to annoy compared to those who did not on how negative they perceived the interface (thirty-eight men perceived as trying to annoy, and twenty-eight women perceived as trying to annoy). Those who perceived as trying to annoy perceived the interface more negatively than those who did not,  $F(1, 207)=10.93$ ,  $p=.001$ ,  $\eta_p^2 = .05$  (Annoying:  $M=2.81$ ,  $SD=1.16$ ; Not Annoying:  $M=2.24$ ,  $SD=1.15$ ). It is interesting to note that perceived as annoyed had a modest correlation to SN-Aff,  $r(209)=-.15$ ,  $p < .03$ , also indicating that the perceived as annoying information explains something distinct from SN-Aff.

*Anti-Touch Bias.*

There is an interesting disconnect in the data in that participants were reluctant to rate these interfaces as personal space invasions even though in the United States there is an anti-touch bias to view spontaneous touch between strangers as negative (Field, 2001; Hertenstein et al., 2006). Data from this study further shows this bias as prevalent. A subsample ( $n=39$ ) of the participants in the shuffle condition responded to an additional questionnaire measuring their perception of the attributes of an imagined touch ( $n=20$ ) or imagined lean ( $n=19$ ) at the end of the study after all other measures were taken. The questionnaire instructed participants to imagine that right before the participant spoke they either touched you on your shoulder or leaned in close to you. Looking at the positive attribution of the interface finds no differences between the groups,  $F(3, 168)=1.37$ ,  $p=.253$ ; there is a marginal effect where the actual touch condition rates the interface more positively than the actual lean condition ( $p=.074$ ) (Table 8).

However, what is most telling is looking at the negative attribution group. While there is still no difference between the imagined lean and actual lean, the imagined touch group is rated very negatively compared to actual touch ( $p < .001$ ), imagined lean ( $p = .031$ ), and actual lean ( $p < .001$ ). Most interesting is participants rate imagined touch as the most negative, but rate actual touch as the least negative.

*Table 8: Ratings of the Positive and Negative Attributions of the Actual or Imagine Interface*

	Imagined Touch (n=20)	Actual Touch (n=70)	Imagined Lean (n=19)	Actual Lean (n=63)
Positive Attribution	M=3.66 (SD=0.99)	M=4.08 (SD=1.08)	M=3.78 (SD=1.19)	M=3.71 (SD=1.27)
Negative Attribution	<b>M=3.96</b> <b>(SD=1.29)</b>	<b>M=2.52</b> <b>(SD=1.27)</b>	M=3.07 (SD=1.28)	M=2.81 (SD=1.31)

#### *Alternative Explanations*

*Noticing the Interface.* As discussed in the manipulation checks, whether or not participants noticed the interface varied significantly depending on condition: 60 (85.7%) of participants touched reported noticing being touched, 17 (27.0%) of participants in the lean condition reported noticing the lean, and 13 (17.1%) of participants in the shuffle condition reported noticing the confederate shuffling in her seat. Thus, it could be possible that some of the results might be better explained based on whether the participants noticed the interface, rather than the effects of the interface itself. For example, in my previous work I examined how noticing touch may alter the effects of the touch (Zawadzki, 2007). In that study, I found no overall difference on the effects of touch (dependent variables in that study were similar to the self-report dependent variables tested in Hypothesis 3) whether participants noticed the touch or not. However, there was an interaction of touch location and noticing, such that noticing touches on the upper arm produced more positive effects than noticing touches on the back. In other

words, this result suggests that the effects of noticing may be different for different types of interfaces (this assumes of course that these results apply to interfaces besides touch).

In order to test this possible alternative explanation of results a series of 2 (Noticed interface vs. Did not notice) x 3 (Touch vs. Lean vs. Shuffle) MANOVAs were run using Agreeableness and Openness to Experience as covariates on the series of dependent variables used in Hypothesis 2. Only the desire to escape the situation showed a marginal interaction,  $F(2, 198)=2.62$ ,  $p=.076$ ,  $\eta_p^2 = .03$ . This effect was driven by the Did Not Notice\*Touch group reporting they would like to escape the situation more than the Noticed\*Touch ( $p=.060$ ) and Did Not Notice\*Shuffle group ( $p=.021$ ), as well as the Noticed\*Lean group reporting they would be want to escape the situation more than the Noticed\*Shuffle group ( $p=.014$ ) (Table 9). Besides this marginal effect, a main effect of noticing was not significant for any of the self-report dependent variables ( $ps$  ranged from .163 to .555), nor was the interaction of Noticing\*Interface Condition for the remaining self-report dependent variables ( $ps$  ranged from .126 to .856).

*Table 9: Self-Reported Desire to Escape for Alternative Hypothesis of Noticing the Interface*

Interface Condition	Noticed Interface	Means (SD's)
Touch	No (n=10)	M=4.20 (SD=1.81) <sup>a, b</sup>
	Yes (n=60)	M=3.08 (SD=1.71) <sup>a</sup>
Lean	Now (n=45)	M=3.29 (SD=2.07)
	Yes (n=17)	M=3.88 (SD=1.69) <sup>c</sup>
Shuffle	No (n=61)	M=2.82 (SD=1.51) <sup>b</sup>
	Yes (n=13)	M=2.23 (SD=1.30) <sup>c</sup>

Notes: Significance Values: a ( $p=.060$ ); b ( $p=.021$ ); c ( $p=.014$ )

A series of 2 x 3 ANOVAs were then conducted with the four behavioral dependent variables used in Hypothesis 2. For amount of distance there was a main effect for noticing the interface or not,  $F(1, 155)=9.34$ ,  $p=.003$ ,  $\eta_p^2 = .06$  such that those participants who noticed the interface required more space than those who did not ( $M=4.91$  (SD=2.17),  $M=4.05$  (SD=1.66),

respectively). There was no difference for noticing for the rest of the behavioral dependent variables ( $p$ 's ranged from .618 to .662). In terms of the interaction of Noticing\*Interface Condition, a significant effect was found for whether or not participants would respond to the confederate or not,  $F(2, 199)=2.04$ ,  $p=.050$ ,  $\eta_p^2 = .04$ . Those participants in Did Not Notice\*Touch group were more likely to respond than the Noticed\*Touch group ( $p=.094$ ), the Did Not Notice\*Lean group ( $p<.001$ ), and the Did Not Notice\*Shuffle group ( $p=.004$ ) (Table 10). Also, the Noticed\*Touch group was more likely to respond than the Noticed\*Shuffle group ( $p=.061$ ), and the Did Not Notice\*Lean group was less likely to respond than the Noticed\*Lean group ( $p=.078$ ). There was no difference for the interaction for the rest of the behavioral dependent variables ( $ps$  ranged from .552 to .828).

*Table 10: Responded to Confederate or Not Testing Alternative Hypothesis of Noticing Interface*

Interface Condition	Noticed Interface	Means (SDs)
Touch	No (n=10)	M=0.90 (SD=0.32) <sup>a, b, c</sup>
	Yes (n=60)	M=0.67 (SD=0.48) <sup>a, d</sup>
Lean	Now (n=45)	M=0.31 (SD=0.47) <sup>b, e</sup>
	Yes (n=17)	M=0.53 (SD=0.51) <sup>e</sup>
Shuffle	No (n=61)	M=0.45 (SD=0.50) <sup>c</sup>
	Yes (n=13)	M=0.38 (SD=0.49) <sup>d</sup>

Notes: Significance Values: a ( $p=.094$ ); b ( $p<.001$ ); c ( $p=.004$ ); d ( $p=.061$ ); e ( $p=.078$ )

Overall, there were very few differences between either the groups who noticed and groups who did not, and the interaction term of NoticedOrNot\*Interface Condition showed no consistent patterns. The only common difference was the Did Not Notice\*Touch group was more likely to respond to the confederate but also reported a greater desire to escape the situation (which would be an opposite result based on the predictions and other results). Thus, while noticing the interface is something that could be considered, there is insufficient evidence to conclude that it had a significant bearing on the results.

## Discussion

The current study sought to clear up some of the inherent ambiguity of touch's meaning by examining the extent to which a person's SN-Aff explained differences in perceptions of a touch. The model that the study tested derived from theoretical and empirical work examining the competing needs for affiliation and personal space (Burgoon, 1978), and privacy regulation theory which states that people use personal space and the n-Aff to navigate and moderate social interactions (Altman 1975, 1993). I proposed that because touch constrains the regulation of space, response to touch depends upon that person's SN-Aff. A high-impact behavioral study was conducted in which a participant's SN-Aff was measured (though not manipulated), followed by one of three interfaces by a confederate: touch, lean or shuffle condition. A series of self-report and behavioral dependent variables then measured the reaction to the interface. I hypothesized that the higher a participant's SN-Aff the more positively they would interpret the interface, especially a touch interface. Furthermore, I hypothesized that the lower a participant's SN-Aff the more negatively they would interpret the interface, especially a touch interface. Finally, I hypothesized that perception of the interface as positive or negative would predict participants' self-report and behavioral reactions to the interface. Support was found for most hypotheses.

### *Summary of Results and Interpretations*

*The role of SN-Aff as a Moderator for Interactions.* Hypotheses 1a examined whether SN-Aff has a main effect on the extent to which a participant perceived the interface as a positive interaction, and Hypothesis 2a examined whether it interacted with the interface condition. While Hypothesis 1a was not supported, Hypothesis 2a was. As predicted with Hypothesis 2a, participant's with a High SN-Aff who were touched rated the interface more positively compared

to all other participants, most notably those in the high SN-Aff \*lean interface group. Furthermore, this High SN-Aff\*touch group rated the interface most positively than all other groups. In other words, when a confederate encroached upon the personal space of a participant, the participant's SN-Aff determined how positive the interface was rated. Thus, these results support the conclusion that unexpected, unscripted touches can be perceived very positively as long as a person has the inclination to want to interact with other people.

*The role of SN-Aff as a Moderator for Invasions.* Hypotheses 1b examined whether SN-Aff has a main effect on the extent to which a participant perceived the interface as a negative invasion, and Hypothesis 2b examined whether it interacted with the interface condition. Hypothesis 1b was supported, while Hypothesis 2b was not. As predicted with Hypothesis 1b, when participants had a low SN-Aff they were more likely to rate the interface as a negative invasion than participants with a high SN-Aff. In addition, a main effect of interface was found such that participants who had their personal space encroached upon (touch and lean) were more likely to rate the interface as negative compared to participants in the shuffle condition. In other words, regardless of the type of interface if a person had a low SN-Aff they would rate the interface more negatively than participants with a high SN-Aff.

Thus, Hypotheses 1 and 2 work together to show that while touches may have an initial inclination to be perceived negatively, this negative bias can be erased if participants have a high SN-Aff. If participant have a low SN-Aff, however, the type of interface does not matter.

*Perceiving the Interface as a Positive Interaction and Positive Effects.* A pattern of support was found for Hypothesis 3a which tested whether perceiving the interface as positive resulted in positive effects. When interfaces were perceived as positive interactions, participants rated the confederate's positive personality attributes more positively, had a greater desire to

affiliate with the confederate in the short- and long-term, and were in a more positive mood than when interfaces were not perceived as positive interactions. Though not significant, there were also trends for participants who perceived the interface as positive to have a lesser desire to escape the situation and be less anxious than participants who did not perceive the interface as a positive interaction. The only self-report variable not significant was the negative ratings of the confederate. It should be noted that ratings of the confederate's negative personality were low for both groups (Interface Positive:  $M=2.47$ ; Interface not Positive:  $M=2.42$ ) indicating a general aversion to rate a person negatively (see below for discussion of potential limitations of this variable).

While the self-report dependent variables provided support for hypothesis 3a, none of the behavioral dependent variables were significant. I propose that these behavioral dependent variables did not offer participants a chance to respond in a variety of ways that would have been necessary to show meaningful differences (see below for discussion of potential limitations of these variables).

*Perceiving the Interface as a Negative Invasion and Negative Effects.* A pattern of support was also found for Hypothesis 3b which tested whether perceiving the interface as negative resulted in negative effects. When interfaces were perceived as negative invasions, participants rated the confederate's positive personality attributes less positively, had a smaller desire to affiliate with the confederate in the short term, had a greater desire to escape the situation, and were in a more negative mood than when interfaces were not perceived as invasions. Also, there were non-significant trends for participants who perceived the interface as a negative invasion to have a lower desire to affiliate in the long-term and to be more anxious than the participants

who did not perceive the interface as a negative invasion. As discussed with the testing of Hypothesis 3a, participants again were reluctant to negatively rate the confederate.

Also similar to hypothesis 3a, the behavioral dependent variables were not significant. The attention to detail task, however, showed a pattern where people who perceived the interface as an invasion made more mistakes than participant who did not. Unfortunately, for this task participants only responded to three questions of moderate difficulty. I would expect that if participants had additional problems to solve of increasing difficulties a stronger effect might have emerged.

#### *The Effects of Gender and the Implied Effects of Status*

The present study was designed to minimize the potential effects of gender in order to examine the unique effects of touch and SN-Aff. As a result, gender was treated as an exploratory variable, with no consistent pattern of results found.

If we examine the issues of gender as a proxy for status, however, the results from the study imply that different results may have been found if status differences were made more apparent. As discussed, gender and status play a role in the mental preparation for an interface and influence how that interface is then perceived. For example, when participants are expecting a touch in a study, using only female researchers helps increase the comfort of participants by reducing possible ascribed status differences between men and women (Heslin, Nguyen, & Nguyen, 1983). In the present study, a small group of participants (n=38) responded that the confederate was flirting with them (indicating that they anticipated the interface in a different way than the majority of participants). These participants rated the interface more positively. Another group of participants (n=66) responded that the confederate was trying to annoy them. These participants rated the interface more negatively. In other words, I interpret these results as



an indication that how the other person is perceived influences how an interface is received. Thus as will be discussed in the future directions section below, the perception of the status of the interface has an important role in assessing the reactions to a touch.

It is important to note that SN-Aff had little to no correlation with either of the perceived as flirting or trying to annoy variables. In other words, how a person is perceived appears to be a separate piece of information that factors in to how a touch is perceived. Because the prime to manipulate SN-Aff was not effective, however, it is not possible to rule out that a third variable could be masking the relationship between these variables. For example, being in a positive mood might influence how you rate someone else, but may not have an effect on SN-Aff, whereas having a behavioral approach motivation may increase SN-Aff but not ratings of the confederate. Further testing would need to be conducted to show that perception of the other person is a distinct piece of information from SN-Aff.

### *Limitations of Study*

*Small Effect Sizes.* While the results provided a general pattern of support for hypotheses, many of the effect sizes were only small to moderate effects. As a result, this implies that the independent variables of SN-Aff and perception of the interface are not sufficient to fully explain the variance in the dependent variables. One reason may be that these variables are imprecise operationalizations of the hypothesized constructs. For example, the SNAQ was proposed to be a state measure of the need for affiliation, however it is unclear to what extent it is also measuring the need for affiliation as a trait. With the results from the scale validation data (Appendix F) we see that the SNAQ is moderately correlated to all of the trait measures of the need for affiliation. This could mean that some participants may have been placed in the wrong affiliation group (high vs. low SN-Aff). Some participants who currently had a low SN-Aff but had a high

general disposition for affiliation would have had an inflated score, and some participants who currently had a high SN-Aff but had a low general disposition for affiliation would have had a depressed score. If this were the case, some of the effect of the SN-Aff variable would be eliminated because the measure is not precisely capturing a person's current needs. More testing with the SNAQ needs to be done to determine when and how the trait and state measures of the need for affiliation differ, and to determine to what extent the SNAQ is truly measuring a participant's state need.

With the perception of the interface variable, the scale was designed to measure a general perception of positivity and negativity, and the extent to which a person directly attributed positive and negative qualities to the interface. It may be possible that these questions were too blunt, allowing participants to perceive the motivations behind the questions. As a result, participants may have responded based not only to the how they perceived the interface, but also how they believed they should have perceived the interface. As was demonstrated with the anti-touch bias data, participants responded more negatively to the thought of touches compared to leans and shuffles. For the participants who were actually touched, though they perceived the interface much more favorably compared to how the not touched participants imagined, it is possible that the touched participants still had some negative bias to the touch. For example, a participant may think "though I did not mind the touch by the confederate" (which should mean high positive ratings and low negative ratings), or "in general it is weird for a stranger to touch me." Therefore, the data measuring both the positive and negative perception of the touch may be affected in such a way that touches were perceived as less positive and more negative, thus masking some of the difference from the lean and shuffle conditions. Future testing would need to be conducted using a more disguised, online measurement of the perception of the interface.

Another reason that SN-Aff and the perception of the interface were not sufficient in explaining that variance in the dependent variables could be that other variables not measured in this study are also relevant to understanding how a person will react to a touch. A touch is communication that always takes place between a dyad, but in this study the focus was on the recipient of the touch. As will be discussed below in the future directions section, how the toucher is perceived by the touched may be just as important in predicting a reaction to a touch. As was hinted with the perceived motivation of the confederate as either flirting or trying to annoy, how the other person was perceived was important. I believe that this perception of the other person moderates the relationship of SN-Aff and perception of the interface (path I and II in Figure A). Without measuring this moderator, all participants are collapsed together increasing the variance and centralizing the mean, thus decreasing the predictive power of SN-Aff and lowering its effect size. Future studies would need to more directly measure how the toucher was perceived, using this as a moderator for understanding the effect of SN-Aff on perception of the interface.

*Problems with Dependent Variables.* Though some support was found for most of the hypotheses, a number of the dependent variables did not produce any pattern of results. This suggests that they were not sensitive enough to detect variability in participants' responses, or may have been constrained by the experimental environment (or as will be discuss in the next section, the manipulation may not have been strong enough). For the self-report measures, participants were reluctant to rate the confederate negatively (though they had no problem with rating a confederate less positively). Many participants expressed concern in the debriefing process about having to rate a person negatively who they did not know well or did not interface much with during the study. Thus participants tended to err of the side of caution and rate all

negative traits as not at all indicative of the confederate, thus eliminating any potential effects that were picked up when participants rated the positivity of the confederate.

For the behavioral dependent variables, participants did not vary in their likelihood to respond to the confederate, in their personal space requirements in a subsequent interface, and only showed non-significant trends in the number of mistakes they made on the attention to detail task. It is likely that the setup of the experiment did not allow variability in participants' reactions to these behavioral measures. With the likelihood to respond measure, typically participants are given instructions not to speak during studies and thus complete all studies in silence. With this norm in place, it was likely highly unusual for a participant to have the confederate speak to them, and also likely prevented participants from responding to the confederate.

With the personal space requirements in a subsequent interface, the table where participants picked up their next packet and established their personal space requirements likely was too short to give participants a full choice of where they would want to stand. Participants typically stood two-thirds of the way down, a distance that corresponds highly with the typically interaction distance for casual acquaintances (of one and a half to four feet) (Hall, 1959; Argyle & Dean, 1965). This usage of a normative distance was likely encouraged by the instructions to participants that their standing at the table was only temporary while they figured out what they would be doing for the next part of the study. If participants had been instructed that they would have to interact with the confederate at the table or were going to be staying at this table for a longer period of time, I expect participants would have shown more variation in the amount of personal space they required. Finally, the layout of the table made it possible for approximately one-fifth of participants to go to the other side precluding measurement. It is not possible to

know what guided these participants' decisions to go to the other side of the table, but undoubtedly a large amount of potential variance was lost with these participants.

Finally, with the number of mistakes made on the attention to detail task, a possible trend emerged in the predicted direction but that was not significant. Participants only responded to three questions of moderate difficulty. Furthermore, there was a lot of variability in the number of mistakes participants made. In order to truly separate out participants additional questions of increasing difficulty were likely needed.

*Strength of the Interface.* Another possible limitation concerns whether the interface conditions sufficiently resembled the types of interactions that would occur in everyday life. I designed the conditions to mimic the process of getting another person's attention (such as tapping them on the shoulder, standing close to them, or making noise to get their attention). However, in order to rule out potential confounds, confederates were trained not to look at the participant or to engage in multiple interfaces. In the real world, many of these interfaces are combined where a person might clear their throat as a way to announce the presence of themselves right before tapping someone on the shoulder, or they may look at the person as they stand near them. In this way, these combinations of interfaces may increase the directness and effectiveness of the personal space interface. Therefore it is hard to conclude that close proximity does not produce the same effects as a touch if other nonverbal interfaces would accompany the close proximity.

*Ineffectiveness of the prime.* Most unfortunate in this study was that the affiliation prime did not effectively manipulate a participant's SN-Aff. Instead, participants had to be grouped into high and low SN-Aff based on how they responded to the SNAQ. Practically speaking this led to a higher proportion of participants in the high SN-Aff group. Furthermore, this means that

the relationship between SN-Aff and perception of the interface is only correlational. As a result, a potential third variable may be driving the effects. It should be noted though that the correlation of SN-Aff and perception of interface is conceptually consistent with research presented to support the proposed rationale for the study. Despite the conceptual similarity, a direct test is needed to assess the causal link between SN-Aff and perception of an interface.

#### *Alternative Explanations*

By measuring the independent effects of each interface, some real world validity may have been lost. Participants when touched or in the close proximity condition may have been expecting the confederate to look at them while the interface occurred (e.g., many participants either looked at the confederate or the experimenter after the interface as if expecting more information or interaction). As a result, the expectations for the situation may have been violated, which could have had different consequences for touches and leans. When participants in the control condition were asked to imagine the touch, they rated it more negatively than participants who were actually touched. This disconnect might signal that participants were imagining the touch to be different than the actual touch, which would likely include eye contact. This disconnect did not exist for leans. Therefore, while the leans may have been as expected, because the touches were not as negative as imagined, a rebound effect may have occurred where participants rated the touches even more positive than other types of interface. This point does not diminish the results of this study, however, it points at a potential mediator to the effects of touch that concerns a person's expectations. While this study approximated those expectations by measuring SN-Aff (predicting that a high SN-Aff indicates positive expectations), it might be necessary to tease apart these two constructs.

Most notably, the prime to manipulate SN-Aff was ineffective, thus preventing ruling out a potential third variable that might be driving the results. As discussed above, this third variable may be participants' expectations, or it fall more along the lines of an approach/avoidance motivation. For example, if participants had an approach motivation, they may be more likely to rate an interface positively, whereas if they had an avoidance motivation they may be more likely to rate an interface negatively. While there was a main effect of SN-Aff to predict how negatively an interface was perceived, there was no main effect for SN-Aff to predict how positively an interface was perceived. It may be possible that the SN-Aff is tapping into a larger domain of approach/avoidance where it best approximates avoidance goals. Additional testing needs to be done to differentiate or link SN-Aff to these goals.

#### *Future Directions*

My previous work has examined what features about a touch are important to understand touch's effects (Zawadzki, 2007). This study applied work that described appropriate forms of touches are ones that are of short duration, of low intensity, and to a socially acceptable body region (Lynn, Le, & Sherwyn, 1998). As a result, the present study used a brief touch to the upper arm that had the greatest potential to be perceived as either positive or negative. In turn, the present study examined what features about the recipient of the touch are important in determining reactions to that touch (namely SN-Aff). Results from this study, suggest that an important third element to understanding reactions to touch involves the perceptions of the toucher by the recipient of the touch (an element that would also examine expectations of the interface). This study minimized the ability of participants to perceive the confederate. As a result, our ability to generalize to interfaces in everyday life where people either know each other

or have expectations/perceptions of who the toucher is and why the toucher is touching me is limited. In order to further up the ambiguity of touch, this next step is necessary.

In addition, this study began the creation and development of a scale to measure a person's SN-Aff. While initial testing is promising, two integral steps need to be taken to establish that this scale provides an online measurement of the need for affiliation. Most obviously, studies need to be conducted to show that the questionnaire is sensitive to situations where should have greater or less desires to affiliate. For example, as discussed earlier, when a person has their personal space invaded, their need for affiliation typically lessens. Such a study would need to be conducted to show that the SNAQ indeed captures a state need. Secondly, as discussed in the alternative explanations section, it is necessary to understand how the SNAQ differs and/or relates to the BIS/BAS scales (Carver & White, 1994) that measure approach and avoidance motivations.

Finally, this work ties into a larger debate concerning how embodiment within our environment affects the way we as humans interact with and interpret the world. Specifically, this work can have important implication for how embodiment affects the health domain. Previous work has demonstrated the positive effects of touch for clinical therapy sessions (e.g., to increase disclosure by patients, Pattison, 1973; to reduce stress, Diego et al., 2004, ; to increase perceptions of the clinician's competence, Alagna, et al., 1979). Furthermore, many patients report wanting their therapists to use touch at appropriate times during therapy sessions (Shattell, Starr, & Thomas, 2007). In other words, physically touching a client seems to create a positive level of intimacy that facilitates the health giving process. By identifying and understanding how a person reacts to a touch, extensions of this work can seek to examine when



touch should and should not be used with a client (rather than just teach a hands-off approach with clients in psychotherapy, Durana, 1998).

### *Conclusions*

In sum, the present study offers support that touch can be systematically studied and understood. This work comes in response to a general apprehension toward, and bias against, touch that exists in our society (Field, 2001). As a result of this anti-touch bias, research on touch lags far behind research on the other senses and is a topic avoided rather than 'embraced' (Hertenstein et al., 2006; Field, 2001). Touch remains an ambiguous, poorly understood form of communication (Burgoon, Walther & Baesler, 1992), and the research on touch examining contexts in which it is inappropriate and negative, such as with touch and sexual harassment, garners the most attention (Doughety et al., 1996; Marks & Nelson, 1993). Yet with touch being such an important part of communication between people (Hertenstein et al., 2006), simply ignoring one of our most powerful and universal ways to communicate with one another seems to deny a part of our humanity. While a considerable amount of additional research needs to be conducted to understand precisely how and when touch affects us, the present research presents support that SN-Aff is a crucial variable to consider.

## References:

- Aiello, J. R. DeRisi, D. T., Epstein, Y. M., & Karlin, R. A. (1977). Crowding and the role of interpersonal distance preference. *Sociometry*, *40*, 271-282.
- Argyle, M., & Dean, J. (1965). Eye contact, distance, and affiliation. *Sociometry*, *28*, 289-304.
- Altman, I. (1975). *The environmental and social behavior: Privacy, personal space, territory, crowding*. Monterey, California: Brooks/Cole, 1975.
- Altman, I. (1993). Dialectics, physical environments, and personal relationships. *Communication Monographs*, *60*, 26-34.
- Andersen, P. A., & Leibowitz, K. (1978). The development and nature of the construct touch avoidance. *Environmental Psychology and Nonverbal Behavior*, *3*, 89-106.
- Baum, A., Harpin, R. E., & Vallins, S. (1975). The role of group phenomena in the experience of crowding. *Environment and Behavior*, *7*, 185-198.
- Bentler, P.M. (1990). Comparative fit indexes in structural models. *Psychological Bulletin*, *107*, 238-246.
- Bieling, P. J., Beck, A. T., & Brown, G. K. (2000). The sociotropy-autonomy scale: Structure and implications. *Therapy and Research*, *24*, 763-780.
- Browne, M.W. & Cudeck, R. (1993). Alternative ways of assessing model fit. In Bollen, K.A. & Long, J.S. (Eds.), *Testing structural equation models* (pp. 136-162). Newbury Park, CA: Sage.
- Burgoon, J. K. (1978). A communication model of personal space violations: Explication and an initial test. *Communication Research*, *4*, 129-142.

- Burgoon, J. K., Buller, D. B., & Woodall, W. G. (1989). *Nonverbal communication: The unspoken dialogue*. New York: Harper & Row.
- Burgoon, J. K., & Jones, S. B. (1976). Toward a theory of personal space expectations and their violations. *Human Communication Research, 2*, 131-146.
- Burgoon, J. K., Walther, J. B., & Baesler, E. J. (1992). Interpretations, evaluations, and consequences of interpersonal touch. *Human Communications Research, 19*, 237- 263.
- Carmines, E.G. & McIver, J.P. (1981). Analyzing models with unobserved variables. In Bohrnstedt, G.W. & Borgatta, E.F. (Eds.), *Social measurement: Current issues*. Beverly Hills: Sage.
- Carver, C. S., & White, T. L. (1994). Behavioral inhibition, behavioral activation, and affective responses to impending reward and punishment: The BIS/BAS scales. *Journal of Personality and Social Psychology, 67*, 319-333.
- Craig, J. A., Koestner, R., & Zuroff, D. C. (1994). Implicit and self-attributed intimacy motivation. *Journal of Social and Personal Relationships, 11*, 491-507.
- Dougherty, T. W., Turban, D. B., Olson, D. E., Dwyer, P. D. & Lapreze, M. W. (1996). Factors affecting perceptions of workplace sexual harassment. *Journal of Organizational Behavior, 17*, 489-501.
- Evans, G.W., & Howard, R. B. (1973). Personal space. *Psychological Bulletin, 80*, 334-344.
- Evans, G. W., & Wener, R. E. (2007). Crowding and personal space invasion on the train: Please don't make me sit in the middle. *Journal of Environmental Psychology, 27*, 90-94.
- Feroleto, J. A., & Gounard, B. R. (1975). The effects of subjects' age and expectations regarding an interviewer on personal space. *Experimental Aging Research, 1*, 57- 61.

- Fisher, J. A., & Gallant, S. J. (1990). Effect of touch on hospitalized patients. In Gunzenhauser, N., Brazelton, T. B., and Field, T. M. (eds.), *Advances in Touch*. Skillman, NJ: Johnson & Johnson, 141-147.
- Goldenberg, J. L., Pyszczynski, T., Greenberg, J., Solomon, S., Kluck, B., & Cornwell, R. (2001). I am not an animal: Mortality salience, disgust, and the denial of human creatureliness. *Journal of Experimental Psychology: General*, *130*, 427-435.
- Hall, E. T. (1959). *The silent language*. New York: Doubleday.
- Hall, J. A. (1984). *Nonverbal sex differences: Communication accuracy and expressive style*. Baltimore, MD: The Johns Hopkins University Press.
- Hall, J. A. (1996). Touch, status, and gender at professional meetings. *Journal of Nonverbal Behavior*, *20*, 23-44.
- Harris, B., Luginbuhl, J. E., Fishbein, J. E., (1978). Density and personal space in a field setting. *Social Psychology*, *41*, 350-353.
- Hayduk, L. A. (1978). Personal space: An evaluative and orienting overview. *Psychological Bulletin*, *85*, 117-134.
- Hayduk, L. A. (1994). Personal space: Understanding the simplex model. *Journal of Nonverbal Behavior*, *18*, 245-260.
- Hertenstein, M. J., Verkamp, J. M., Kerestes, A. M., & Holmes, R. M. (2006). The communicative functions of touch in humans, nonhuman primates, and rats: A review and synthesis of the empirical research. *Genetic, Social, and General Psychology Monographs*, *132*, 5-94.
- Heslin, R., Nguyen, T. D., & Nguyen, M. L. (1983). Meaning of touch: The case of touch from a stranger or same sex person. *Journal of Nonverbal Behavior*, *7*, 147-157.

- Hill, C. A. (1987a). Affiliation motivation: People who need people but in different ways. *Journal of Personality and Social Psychology, 52*, 1008-1018.
- Hill, C. A. (1987b). Social support and health: The role of affiliative need as a moderator. *Journal of Research in Personality, 21*, 127-147.
- Hornik, J. (1987). The effect of touch and gaze upon compliance and interest of interviewees. *Journal of Social Psychology, 127*, 681-683.
- Jackson, D. N. (1974). *Personality research form manual*. Goshen, NY: Research Psychologists Press.
- John, O. P., & Srivastava, S. (1999). The Big-Five trait taxonomy: History, measurement, and theoretical perspectives. In L. Pervin and O.P. John (Eds.), *Handbook of personality: Theory and research* (2nd ed.) (102-138). New York, NY: Guilford Press.
- Johnson, K. L. & Edwards, R. (1991). The effects of gender and type of romantic touch on perceptions of relational commitment. *Journal of Nonverbal Behavior, 15*, 43-55.
- Judge, T. A., Thoresen, C. J., Pucik, V., & Welbourne, T. M. (1999). Managerial coping with organizational change: A dispositional perspective. *Journal of Applied Psychology, 84*, 107-122.
- Katz, D. (1937). *Animals and men*. New York: Longmans, Green and Co.
- Kleinke, C. L. (1977). Compliance to requests made by gazing and touching experimenters in field settings. *Journal of Experimental Social Psychology, 13*, 218-232.
- Kleinke, C. L. (1980). Interaction between gaze and legitimacy of requesty on compliance in a field setting. *Journal of Nonverbal Behavior, 5*, 3-12.

- Konechni, V. J., Libuser, I., Morton, H. & Ebbesen, E. B. (1975). Effects of violation of personal space and helping behavior. *Journal of Experimental Social Psychology, 11*, 288-299.
- Larsen, K. S., & LeRoux, J. (1984). A Study of Same Sex Touching Attitudes: Scale Development and Personality Predictors. *The Journal of Sex Research, 20*, 264-278.
- Larson, J. H., & Lowe, W. (1990). Family cohesion and personal space in families with adolescents. *Journal of Family Issues, 11*, 101-108.
- Lott, B. (1987). Sexist discrimination as distancing behavior: I. A laboratory demonstration. *Psychology of Women Quarterly, 11*, 47-58.
- Lott, B. (1989). Sexist discrimination as distancing behavior: II. Primetime television. *Psychology of Women Quarterly, 13*, 341-355.
- Lynn, M., Le, J. M. & Sherwyn, D. S. (1998). Reach out and touch your customers. *Cornell Hotel and Restaurant Administration Quarterly, 39*, 60-65.
- Major, B., (1981). Causes and consequences of sex-role stereotypes. *PsycCritiques, 26*, 689-699.
- Major, B., & Heslin, R. (1982). Perceptions of cross-sex and same-sex nonreciprocal touch: It is better to give than to receive. *Journal of Nonverbal Behavior, 6*, 148-162.
- Marks, M. A. & Nelson, E. S. (1993). Sexual harassment on campus: Effects of professor gender on perception of sexually harassing behaviors. *Sex Roles, 28*, 208-217.
- Middlemist, R. D., Knowles, E. S. & Matter, C. F. (1976). Personal space invasion in the lavatory: Suggestive evidence for arousal. *Journal of Personality and Social Psychology, 33*, 541-546.
- Moreland, R. L., & Beach, S. R. (1992). Exposure effects in the classroom: The development of affinity among students. *Journal of Experimental Social Psychology, 28*, 255-276.

- O'Connor, S. C., & Rosenblood, L. K. (1996). Affiliation motivation in everyday experience: A theoretical comparison. *Journal of Personality and Social Psychology, 70*, 513-522.
- Remland, M. S., Jones, T. S. & Brinkman, H. (1995). Interpersonal distance, body orientation, and touch: Effects of culture, gender, and age. *The Journal of Social Psychology, 135*, 285-297.
- Rice, B. K., & Dyson, J. N. (2008). *Personal space invaders*. Retrieved October 28, 2008, from Missouri Western State University website:  
<http://clearinghouse.missouriwestern.edu/manuscripts/180.asp>.
- Rustemli, A. (1986). Male and female personal space needs and escape reactions under intrusions: A Turkish sample. *International Journal of Psychology, 21*, 503-511.
- Rustemli, A. (1988). The effects of personal space invasion on impression and decisions. *The Journal of Psychology, 122*, 113-118.
- Schachter, S. (1959). *The psychology of affiliation: Experimental studies of the sources of gregariousness*. Oxford, England: Stanford University Press.
- Sinclair, S., Lowery, B. S., Hardin, C. D., & Colangelo, A. (2005). Social tuning of automatic racial attitudes: The role of affiliative motivation. *Journal of Personality and Social Psychology, 89*, 583-592.
- Smith, M. J., Reinheimer, R. E., & Gabbarb-Alley, A. (1981). Crowding, task performance, and communicative interaction in youth and old age. *Human Communication Research, 7*, 259-272.
- Stier, D. S., & Hall, J. A. (1984). Gender differences in touch: An empirical and theoretical review. *Journal of Personality and Social Psychology, 47*, 440-459.

- Storm, B. C., Bjork, E. L., & Bjork, R. A. (2005). Social metacognitive judgments: The role of retrieval-induced forgetting in person memory and impressions. *Journal of Memory and Language, 52*, 535-550.
- Thayer, S. (1986). Touch: Frontier of intimacy. *Journal of Nonverbal Behavior, 10*, 7- 11.
- Turner, S. M., Johnson, M. R., Beidel, D. C., Heiser, N. A., & Lydiard, R. B. (2003). The social thoughts and beliefs scale: A new inventory for assessing cognitions in social phobia. *Psychological Assessment, 15*, 384-391.
- Uggen, C., & Blackstone, A. (2004). Sexual harassment as a gender expression of power. *American Sociological Review, 69*, 64-92.
- Wilhelm, F. H., Kochar, A. S., Rother, W. T. & Gross, J. J. (2001). Social anxiety and response to touch: Incongruence between self-evaluative and physiological reactions. *Biological Psychology, 58*, 181-202.
- Wheaton, B., Muthén, B., Alwin, D.F. & Summers, G.F. (1977). Assessing reliability and stability in panel models. In Heise, D.R. (Ed.), *Sociological methodology* (84-136). San Francisco: Jossey-Bass.
- Wirth, M. M., & Schultheiss, O. C. (2006). Effects of affiliation (hope of closeness) and affiliation stress (fear of rejection) on progesterone and cortisol. *Hormones and Behavior, 50*, 786-795.
- Wisman, A., & Koole, S. L. (2003). Hiding in the crowd: Can mortality salience promote affiliation with others who oppose one's worldviews? *Journal of Personality and Social Psychology, 84*, 511-526.



- Wong, M. M., & Csikszentmihalyi, M. (1991). Affiliation motivation and daily experience: Some issues on gender difference. *Journal of Personality and Social Psychology, 60*, 154-164.
- Worchel, S., & Yohai, S. M. L. (1979). The role of attribution in the experience of crowding. *Journal of Experimental Social Psychology, 15*, 91-104.
- Zajonc, R. B. (2001). Mere exposure: A gateway to the subliminal. *Current Directions in Psychological Science, 10*, 224-228.
- Zawadzki, M. J. (2007). Noticing touch and its effects. Unpublished Manuscript. The Pennsylvania State University. Department of Psychology.
- Zimbardo, P., & Formica, R. (1963). Emotional comparison and self-esteem as determinants of affiliation. *Journal of Personality, 31*, 141-162.

**Appendix A: Demographic Questionnaire**

**Instructions:** Please fill out the following questions to tell us a little about yourself.

# of semesters in college \_\_\_\_\_

Your age \_\_\_\_\_

Your gender \_\_\_\_\_

Your race/ethnicity \_\_\_\_\_

# of studies you have participated in? \_\_\_\_\_

Have you ever been in this room before? (Yes or No) \_\_\_\_\_

Have you ever seen your experimenter before? (Yes or No) \_\_\_\_\_

Have you ever seen the other participant(s) before? (Yes or No) \_\_\_\_\_

## Appendix B: Affiliation Prime

**Instructions:** Below is a short story describing some events that take place in the day in the life of John. Please read the story looking for two pieces of information: the number of times the word “AND” appears, and the number of times the word “THE” appears. You must search quickly as you only have a minute to read this passage. Do not write down your answer.

### *High Affiliation Prime*

Every year, since he was 13, John reads his favorite book *Words to Live By*, written by a famous Canadian author. The book is not long, but each time he reads it, he takes away something new from the text. This year John was particularly moved by a passage that describes people as innately good. The author discusses how we are all connected and can trust each other because each one of us is a good person. John thought a lot about this passage wondering how it applied to his life.

As he went through his day, John began to notice just how many people there were in the world. He crossed paths with countless individuals he did not know and might someday. He said hello to handfuls of folks of who he knew their names but nothing else. Even the few people he did have conversations with were people he knew on a casual level. Yet he felt comfortable the entire time. John realized that this is what the author meant: sometimes we know each other, sometimes we rely on each other, and we can always trust knowing that people are good and there to help us if we ask.

Later that night, John decided to go to the supermarket to buy his food for the week. As he approached the store, John passed by a man scrambling to pick up his groceries that he had dropped when trying to put them in the trunk. This man was dressed in an overcoat and looked like he was clean shaven. John decided to help the man thinking of what he had learned. He was thanked many times over when all the groceries were stored safely in the car.

### *Low Affiliation Prime*

Every year, since he was 13, John reads his favorite book *Words to Live By*, written by a famous Canadian author. The book is not long, but each time he reads it, he takes away something new from the text. This year John was particularly stirred by a passage that describes people as innately bad. The author discusses how we are all disconnected individuals and must avoid each other because inside us is an immoral person. John thought a lot about this passage wondering how it applied to his life.

As he went through his day, John began to notice just how many people there were in the world. He crossed paths with countless individuals he did not know and never would. He saw handfuls of folks of who he knew their names but

nothing else. Even the few people he could converse with were people he knew on a superficial level. He did not feel comfortable the entire time. John realized that this is what the author meant: we do not know everybody, we cannot rely on anybody, and we can't trust people because they can be evil and out to harm us.

Later that night, John decided to go to the supermarket to buy his food for the week. At the store, John passed by a man scrambling to pick up his groceries that he had dropped when trying to put them in the trunk. This man was dressed in a long overcoat and looked like he had not shaven in weeks. John decided to avoid the man thinking of what he had read. He was not going to take a risk putting the silly groceries in the car.

### *Control Condition*

Every year, since he was 13, John reads his favorite book *Words to Live By*, written by a famous Canadian author. The book is not long, but each time he reads it, he takes away something new from the text. This year John was particularly moved by a passage that describes people as efficient workers. The author discusses how we can be productive and can do our jobs because everything we do is a type of work. John thought a lot about this passage wondering how it applied to his life.

As he went through his day, John began to notice just how many people there were in the world and how much work they did. He crossed paths with countless individuals he did not know working at their desk. He said hello to handfuls of folks he knew while they were at their computers. And even the people he did have conversations with were the kinds of talks about the things they had to do with the day. Yet he felt productive the entire time. John realized that this is what the author meant: sometimes we see people working, sometimes we talk about working, and we always know that people can work productively.

Later that night, John decided to go to the supermarket to buy his food for the week. As he approached the store, John passed by a man packing his groceries in his trunk. This man was dressed in an overcoat and looked like he just came from work. John decided to watch the man thinking of what he had learned. He knew that even buying groceries was a small act of work.

## **Appendix C: Pre-testing Affiliation Prime**

### *Rationale*

A prime to manipulate the participants SN-Aff was developed. Because of the design of the study, many existing primes that might potentially manipulate affiliation were not able to be used. Most notably, many primes manipulate the connection with a particular individual by doing an othering process, rather than to prime a general increased desire to affiliate with others (e.g., by having an experimenter act friendly or rude towards a participant; Sinclair, et al., 2005). Also, many of the primes require the presentation of long videos that likely evoke a variety of emotions and could cause fatigue in the participants (e.g., Wirth & Shultheiss, 2006). Finally, other primes have used mortality salience manipulations to increase affiliation (e.g., Wisman and Koole, 2003), however, are unable to decrease affiliation. The prime I developed followed in the tradition of primes which provides a passage for participants to read infused with the ideas the prime is to bring out (e.g., TMT researchers used a passage to prime connection or disconnection from nature, Goldenberg et al., 2001).

### *Prime Creation*

The prime begins by describing a character reading his favorite novel, *Words to Live By* (made up title), and how he receives a new message from the text each time he reads the novel. Within the passage of the prime are themes about one of the three following conditions: that people are good and you should interact with them (to increase SN-Aff), people are evil and you should avoid them (to decrease SN-Aff), or that people were efficient workers with no mention of interacting (a control condition). A paragraph then follows where the character sees these themes in real life at work. A final paragraph then describes the character in a parking lot

enacting the theme: either helping a person with groceries, ignoring the person, or seeing the person shopping as doing work (see Appendix B for each version of the prime).

Within each paragraph participants are instructed to count the number of times the words “and” and “the” appear in the text. The key words are interspersed throughout the passage, and in different syntactical locations. Overall, the passages have very comparable readability (Low Affiliation: 74.0 Flesch Reading ease, 7.3 Flesch-Kincaid grade level; High Affiliation: 76.3 Flesch Reading ease, 7.0 Flesch-Kincaid grade level; Neutral Affiliation: 75.9 Flesch Reading ease, 6.9 Flesch-Kincaid grade level). The word “and” appears 5 times in the text, and “the” appears 14 times.

#### *Pre-testing Sample*

With a small group of undergraduate volunteers ( $n=11$ ), either the high or low prime was administered. Participants were told that the study would measure personality and attention to detail. After reading the prime and recording the number of times “and” and “the” appeared, participants filled out the State Need for Affiliation Questionnaire (SNAQ) ( $\alpha=.89$ ). Participants were then asked to report if they knew what the prime was about, and if they could remember any details from the story.

A one-way between-subjects ANOVA was conducted with prime condition as the independent variable and SNAQ score as the dependent variable. Those participants in the low affiliation condition scored lower on the SNAQ than those in the high affiliation condition (Low:  $M=4.88$  ( $SD=1.02$ ); High:  $M=5.73$  ( $SD=0.49$ )), though the difference was not significant ( $F(1, 9)=2.88$ ,  $p=.124$ ,  $\eta_p^2 = 0.24$ ). About half of the participants recalled the message of the prime, however knowing the purpose did not affect the results. Though the difference between the groups was not significant, because of the large effect size, I proceeded with using the prime in

the present study thinking with more participants, I would have more power to detect reliable differences. I also conducted a more extensive pilot study to further test the prime.

### *Pilot Testing*

One-hundred seventy undergraduates participated for course credit (89 women, 81 men; aged 18-24,  $M=19.02$ ). Participants were told that the study was measuring personality and attention to detail and were given the positive, negative or neutral prime to read. After recording the number of times “and” and “the” appeared in the passage, participants responded to the SNAQ ( $\alpha = .90$ ), the Preference for Affiliation Subscale of the Sociotropy-Autonomy Scale (PAS-SAS; Bieling et al., 2000) ( $\alpha = .79$ ), the Positive Stimulation Subscale of the Interpersonal Orientation Scale (PSS-IOS; Hill, 1987a) ( $\alpha = .88$ ), the Affiliation Subscale of the Jackson Personality Research Form E (AS-PRF-E; Jackson, 1974) ( $\alpha = .84$ ), and the BFI (extraversion,  $\alpha = .89$ ; agreeableness,  $\alpha = .71$ ; neuroticism,  $\alpha = .83$ ; conscientiousness,  $\alpha = .79$ ; openness,  $\alpha = .74$ ). In addition, they responded to a brief mood inventory measuring positive mood ( $\alpha = .86$ ), negative mood ( $\alpha = .88$ ), and anxiousness.

A series of one-way between-subjects ANOVAs was conducted with prime condition as the independent variable and SNAQ, personality scores, and mood as the dependent variables. No differences were found between the prime conditions and any of the DVs. In addition, 40-60% of participants remembered various parts of the prime or correctly identified the valence of the prime. There were no differences, however between the groups. Finally, there were no differences in the number of mistakes in identifying the number of times “and” and “the” appeared in the passage by group. In sum, the prime did not appear to have any effect on any of the measured variables that included state and trait affiliation measures, personality traits, mood, and attention to detail.

### *Present Study*

The prime was administered in the same way as pilot testing, however participants only filled out the SNAQ and the BFI. In place of the other affiliation measures, confederates enacted brief touches, leans, or shuffles to get the participant's attention. Participants then rated how positive or negative they perceived these interfaces, how positive or negative they perceived the confederate, and how much they would want to interact with the confederate in the short- and long-term.

The final sample consisted of 209 participants (107 women and 102 men; aged 18-28,  $M=18.94$ ). A series of one-way between-subjects ANOVAs were conducted with prime condition as the independent variable and SNAQ, personality scores, reactions to the interface and confederate, and desire to interact with the confederate as the dependent variables. As with the pilot testing, the prime had no effect on any of the dependent variables.

### *Discussion*

Though affiliation has been manipulated in previous studies, the present study failed to create a brief prime that could manipulate a participant's SN-Aff. In addition, the prime did not influence a series of trait affiliation measures, personality traits, attention to a task, mood, reaction to an interface, judgment of a confederate interfacing with a participant, nor the desire to interact with a confederate in the future. As a result, the "prime" created for this study was an ineffective manipulation and merely served to support the cover story of the experiment.



## Appendix D: Big Five Inventory (BFI) Personality Inventory

**Instructions:** Here are a number of characteristics that may or may not apply to you. For example, do you agree that you are someone who likes to spend time with others? Please write a number next to each statement to indicate the extent to which you agree or disagree with that statement.

Disagree strongly 1	Disagree a little 2	Neither agree nor disagree 3	Agree a little 4	Agree strongly 5
---------------------------	---------------------------	------------------------------------	------------------------	------------------------

### I see Myself as Someone Who...

- |  |   |
|--|---|
| ___ 1. Is talkative                            | ___ 24. Is emotionally stable, not easily upset       |
| ___ 2. Tends to find fault with others         | ___ 25. Is inventive                                  |
| ___ 3. Does a thorough job                     | ___ 26. Has an assertive personality                  |
| ___ 4. Is depressed, blue                      | ___ 27. Can be cold and aloof                         |
| ___ 5. Is original, comes up with new ideas    | ___ 28. Perseveres until the task is finished         |
| ___ 6. Is reserved                             | ___ 29. Can be moody                                  |
| ___ 7. Is helpful and unselfish with others    | ___ 30. Values artistic, aesthetic experiences        |
| ___ 8. Can be somewhat careless                | ___ 31. Is sometimes shy, inhibited                   |
| ___ 9. Is relaxed, handles stress well         | ___ 32. Is considerate and kind to almost everyone    |
| ___ 10. Is curious about many different things | ___ 33. Does things efficiently                       |
| ___ 11. Is full of energy                      | ___ 34. Remains calm in tense situations              |
| ___ 12. Starts quarrels with others            | ___ 35. Prefers work that is routine                  |
| ___ 13. Is a reliable worker                   | ___ 36. Is outgoing, sociable                         |
| ___ 14. Can be tense                           | ___ 37. Is sometimes rude to others                   |
| ___ 15. Is ingenious, a deep thinker           | ___ 38. Makes plans and follows through with them     |
| ___ 16. Generates a lot of enthusiasm          | ___ 39. Gets nervous easily                           |
| ___ 17. Has a forgiving nature                 | ___ 40. Likes to reflect, play with ideas             |
| ___ 18. Tends to be disorganized               | ___ 41. Has few artistic interests                    |
| ___ 19. Worries a lot                          | ___ 42. Likes to cooperate with others                |
| ___ 20. Has an active imagination              | ___ 43. Is easily distracted                          |
| ___ 21. Tends to be quiet                      | ___ 44. Is sophisticated in art, music, or literature |
| ___ 22. Is generally trusting                  |   |
| ___ 23. Tends to be lazy                       |   |

### Appendix E: State Need to Affiliate Questionnaire (SNAQ)

**Instructions:** Please use the following seven-point scale to indicate the degree to which you agree with each statement. Answer the questions based on how you feel right now. Write your responses to the left of each item.

1	2	3	4	5	6	7
Not At All			Somewhat			Very Much

- \_\_\_\_\_ 1. Right now I would rather be alone than with a group of friends.
- \_\_\_\_\_ 2. Right now people would consider me quite friendly.
- \_\_\_\_\_ 3. Right now I would find it draining to be around others.
- \_\_\_\_\_ 4. Right now I would like to spend my free time with others.
- \_\_\_\_\_ 5. Right now I would not want to talk to anyone.
- \_\_\_\_\_ 6. Right now I would want to be around others.
- \_\_\_\_\_ 7. Right now I would want to work with others on a group task.
- \_\_\_\_\_ 8. Right now I would want to be by myself.
- \_\_\_\_\_ 9. Right now I would find it very satisfying to be able to form friendships with whomever I liked.
- \_\_\_\_\_ 10. Right now I would not want to be physically close to someone.
- \_\_\_\_\_ 11. Right now I would find it energizing to be around others.
- \_\_\_\_\_ 12. Right now I would like to avoid other people.
- \_\_\_\_\_ 13. Right now I would rather enjoy my own thoughts than socialize with others.
- \_\_\_\_\_ 14. Right now being around other people would be distracting.

## **Appendix F: SNAQ Creation and Validation**

### *Rationale for SNAQ*

People have competing needs for affiliation (n-Aff) and for personal space (Burgoon, 1978) which implies that neither need is static, but rather fluctuates throughout one's day and based on one's experiences (e.g., Hayduk, 1978). Though it is acknowledged that the n-Aff fluctuates the majority of literature regards the n-Aff as a dispositional trait and measures it as a trait variable rather than as a state variable (e.g., 1987a). A study relying on this trait measure to predict behavior may not get reliable results because it does not factor in previous experience throughout the day. I propose the creation of a measure to assess a person's State Need for Affiliation (SN-Aff). If a person's SN-Aff differs based on the situation, understanding this fluctuation may be useful in predicting the competing need for personal space, and interfaces that encroach upon personal space, namely touch (a prediction tested in the present paper).

### *Initial Questionnaire Construction and Testing*

The SNAQ was created to have items to tap into two domains: a person's current desire to be around others, and that person's desire to interact with those people that they are around. It was expected that on a state level, these items are highly related and work in conjunction with one another (i.e., the more a person wants to be around others, the more that person will want to interact with those people). As a result, I predicted that the items from both domains would form a single dimension of the SN-Aff.

Questions for the first version of the questionnaire were adapted from nine items of the positive stimulation subscale of the Interpersonal Orientation Scale (IOS) (Hill, 1987a), from ten items of the self-attributed intimacy motivation scale (SA-Int) (Craig et al., 1994), and from six items of the preference for affiliation subscale of the Sociotropy-Autonomy Scale (SAS) (Bieling

et al., 2000). Each of these scales measures the preference for an individual to be around others and their desire to interact with them. The positive stimulation subscale of the IOS focuses on how much positive benefit a person receives interactions with people in general. The SA-Int focuses on how much effort and desire a person has to interact with other people. The preference for affiliation subscale of the SAS focuses on people's emotional reactions when they are around others or not. In addition, I created six items tapping specifically into the two domains the scale intends to measure (see Table 11 for listing of items and their original source).

The resulting 31-item questionnaire was administered to a small sample of undergraduates participating on a volunteer basis (n=10). Before each item was the phrase, "Based on how I feel right now..." so as to stress that state nature of the questions. In focus group fashion, participants commented on items that sounded awkward (usually because the adaptation from a state to trait measure was not effective) or were repetitive. They were then told that the purpose of the scale, and were asked to identify items that they thought best got at the construct (face validity). Finally, the participants were asked to think of additional items that might also be able to get at the construct.

#### *Revised Questionnaire and Testing*

Based on these results, nine items from these scales were kept. Using the ideas from the focus group, and brainstorming with a small group of graduate students and faculty, an additional six items (Table 12) were added to ensure that a strong focus on a person's current desire to be around others and the desire to interact with those people that they are around was captured in the questionnaire.

The revised 15-item questionnaire was again tested on a small sample of undergraduates participating on a volunteer basis (n=9). After filling out the questionnaire, a similar procedure

Table 11. Initial pools of items for SNAQ

<u>Item</u>	<u>Source</u>
I go out of my way to meet people.	SA-Int
My friendships are many.	SA-Int
<b>Often I would rather be alone than with a group of friends (reverse).</b>	SA-Int
I try to be in the company of friends as often as possible.	SA-Int
<b>People consider me to be quite friendly.</b>	SA-Int
I spend a lot of time visiting friends.	SA-Int
I don't spend much of my time talking with people I see every day (reverse).	SA-Int
When I see someone I know from a distance, I don't go out of my way to say hello (reverse).	SA-Int
I don't really have fun at large parties (reverse).	SA-Int
I choose hobbies that I can share with other people.	SA-Int
I get lonely when I am home by myself at night.	SAS
I like to be certain that there is somebody close I can contact in case something unpleasant happens to me.	SAS
Having close bonds with other people makes me feel secure.	SAS
It would not be much fun for me to travel to a new place all alone.	SAS
<b>I like to spend my free time with others.</b>	SAS
Being able to share experiences with other people makes them much more enjoyable for me.	SAS
<b>How much do you want to be around others?</b>	
<b>How much would you want to work with others on a group task?</b>	
How much would you want to sit on a bus next to another person?	
<b>How much would you want to be by yourself (reverse)?</b>	
How much would you want to work at a table with no other people at it (reverse)?	
<b>How much would you want to avoid other people?</b>	
I think being close to others, listening to them on a one-to-one level is one of my favorite and most satisfying pastimes.	IOS
Just being around others and finding out about them is one of the most interesting things I can think of doing.	IOS
I feel like I have really accomplished something valuable when I am able to get close to someone	IOS
One of the most enjoyable things I can think of that I like to do is just watching people and seeing what they are like.	IOS
<b>I would find it very satisfying to be able to form new friendships with whomever I liked.</b>	IOS
<b>I seem to get satisfaction from being with others more than a lot of other people do.</b>	IOS
I think it would be satisfying if I could have very close friendships with quite a few people.	IOS
The main thing I like about being around other people is the warm glow I get from contact with them.	IOS
I think I get satisfaction out of contact with others more than most people realize.	IOS

Note: Items in **bold** are on final version of the SNAQ.

as with the initial version of the questionnaire was employed. Based on the feedback one additional item was dropped: “Right now I get more enjoyment from being with others than most people do.” Furthermore, no new items added. Within this sample, the remaining fourteen items had a high reliability ( $\alpha = .96$ ) (see Appendix E for final version of scale). These fourteen items comprise the final version of the SNAQ.

*Table 12. Additional items for SNAQ*

Right now I would find it draining to be around others.
Right now I would not want to talk to anyone.
Right now I would not want to be physically close to someone.
Right now I would find it energizing to be around others.
Right now I would rather enjoy my own thoughts than socialize with others.
Right now being around other people would be distracting.

### *Validating the SNAQ*

The SNAQ was then tested on a sample of 170 undergraduates participating for course credit (89 women, 81 men; aged 18-24,  $M=19.02$ ). The study had two purposes: test the reliability and validity of a single factor structure, and compare the SNAQ to other trait measures of the n-Aff.

Participants generally scored high on the SNAQ ( $M=4.83$ ,  $SD=1.05$ ). The reliability was again high ( $\alpha = .90$ ). A principal components factor analysis using a promax rotation was performed. A single factor emerges that accounts for 49.5% of the variance. Examining the correlation matrix reveals that no item consistently correlates highly with the other items on the scale (e.g., the first item correlates with the other items ranging from  $r=-.27$  to  $r=.71$ ). In sum, the scale appears to be internally reliable.

Participants next responded to the Preference for Affiliation Subscale of the Sociotropy-Autonomy Scale (PAS-SAS) ( $\alpha = .79$ ), the Positive Stimulation Subscale of the Interpersonal Orientation Scale (PSS-IOS) ( $\alpha = .88$ ), the Affiliation Subscale of the Jackson Personality

Research Form E (AS-PRF-E; Jackson, 1974) ( $\alpha = .84$ ), and the BFI (extraversion,  $\alpha = .89$ ; agreeableness,  $\alpha = .71$ ; neuroticism,  $\alpha = .83$ ; conscientiousness,  $\alpha = .79$ ; openness,  $\alpha = .74$ ). In addition, they responded to a brief mood inventory measuring positive mood ( $\alpha = .86$ ), and negative mood ( $\alpha = .88$ ).

It was expected that the SNAQ should have a positive correlation with the three trait affiliation scales (PAS-SAS, PSS-IO, AS-PRF-E), Extraversion, Agreeableness, and Positive Mood. The positive correlation is expected with three trait affiliation measures as there should be some overlap between the trait and state conceptualization of the n-Aff. There is an expected positive correlation with extraversion and agreeableness because these two traits measure aspects of sociability (with extraversion focusing on how outgoing a person is and agreeableness focusing on how much one gets along with others). Finally, because this study was collected in small groups, it was expected that people would be in a more positive mood if they had a higher SN-Aff (because the environment would match which of the competing needs was predominant, which has been shown to lead to more positive moods; Burgoon, Walther, & Baesler, 1992).

It was expected that the SNAQ should have a negative correlation with Neuroticism and Negative Mood. Neuroticism measures the extent to which a person is tense, gets worried or upset. Since the study environment involves participant to interact with others, it is expected that if a person had a low SN-Aff they should be more likely to be tense, worried or upset in the situation. The negative correlation with negative mood follows from the same logic as positive mood.

No relationship was expected with Conscientiousness and Openness. Conscientiousness measures the extent to which a person does a thorough job, pays attention to details and organizes oneself. This is not a trait about sociability and is should be unrelated to interacting

with others. Openness to Experience measures the extent to which one is creative and comes up with original ideas and again is not a trait about sociability.

As can be seen in Table 13, all of the predicted relationships were found. SNAQ was positively correlated with the preference for affiliation subscale of the sociotropy-autonomy scale, the positive stimulation subscale of the interpersonal orientation scale, the affiliation subscale of the Jackson personality research Form-E, extraversion, agreeableness, and positive mood. SNAQ was negatively correlated with neuroticism and negative mood. SNAQ had no relationship with conscientiousness and openness.

*Table 13: Correlations of n-Aff measures, personality traits, and mood with SNAQ*

Trait	Predicted Relation To SNAQ	SNAQ	Significance of Correlation
Positive Correlations			
PAS-SAS	+	.330**	p=.004
PSS-IOS	+	.473**	p<.001
AS-PRF-E	+	.596**	p<.001
Extraversion	+	.385**	p=.001
Agreeableness	+	.244*	p=.037
Positive Mood	+	.494**	p<.001
Negative Correlations			
Neuroticism	-	-.387**	p=.001
Negative Mood	-	-.335**	p=.004
No Correlations			
Conscientiousness	none	-.056	p=.638
Openness	none	.115	p=.333

### *Present Study*

After data cleaning (described in the methods section of the present paper), 209 participants were tested in the presented study (107 women and 102 men). Scores on the SNAQ ranged from 1.79 to 7.00 (M=5.24, SD=0.98), with again a high reliability ( $\alpha=.91$ ). A confirmatory factor analysis with all 14 items yielded support for the single factor structure. CMin/DF, which is the ratio of the minimum discrepancy divided by the degrees of freedom, =



2.76. This value is well below the acceptable minimum ratio of 5 to 1 suggested by Wheaton et al. (1977), and within the range of an acceptable fit between the hypothetical model and sample data of no more than 3 to 1 (Carmines & McIver, 1981). CFI = .909 which is above the generally accepted value of .9 considered reasonable threshold for the discrepancy (Bentler, 1990). RMSEA= .091, which is within the bounds of acceptability of no more than .10, however a more ideal estimate would be around .08 (Brown & Cudeck, 1993). Overall, both the reliability and factor analysis continue to support that the SNAQ is an internally reliable instrument.

The SNAQ is significantly correlated with the desire to affiliate in the short-term with how much the person wants to be around the confederate in the next section of the study ( $r(209)=0.31, p<.001$ ) which is consistent with the SNAQ being a state measure,. Though this is modest correlation, the SNAQ is superior to predicting short-term desire to affiliate than the two trait measures of personality dealing with sociability: extraversion ( $r(209)=.12, p=.089$ ) and agreeableness ( $r(209)=.11, p=.132$ ). In other words, while the SNAQ is related to extraversion and agreeableness ( $r(209)=.40, p<.001$  for both variables), only the SNAQ is related to the question of how much a person in a specific situation wants to interact with another person. In addition, a regression was run with SNAQ predicting the likelihood of the participant responding to the confederate. This regression was significant such that the higher the participant's SN-Aff, the more likely they were to respond,  $F(1, 207)=4.33, p=.039, r^2=.02$ .

### *Discussion*

There is evidence that the SNAQ is a reliable measure with a single factor structure. Furthermore, there is evidence that the SNAQ is measuring something different but related to

trait need to affiliate measures. Finally, in the present study, initial evidence supports the SNAQ as a state measure in predicting how much a person would want to interact with others.

More testing needs to be conducted to show that the SNAQ measures a person's SN-Aff. For example, a study that manipulated a person's SN-Aff would be a logically next step. If the SNAQ showed consistent differences in predicting whether participants had a high or low SN-Aff based on the manipulation, solid evidence would be provided to demonstrate the that SNAQ is a state measure.

## Appendix G: Desire to Affiliate in Short-term and Escape Measure

**Instructions:** Before you begin working on the task we just want a little more information about your experiences in school.

1. Please indicate your current GPA.

\_\_\_\_\_ 4.00-3.67

\_\_\_\_\_ 3.66-3.34

\_\_\_\_\_ 3.33-3.01

\_\_\_\_\_ 3.00-2.67

\_\_\_\_\_ 2.66-2.34

\_\_\_\_\_ 2.33-2.00

\_\_\_\_\_ <2.00

\_\_\_\_\_ I have no GPA yet

2. Have you ever worked on a group assignment before? (Yes or No) \_\_\_\_\_

**Instructions:** Please fill out the following questions using the following scale:

Not at all			Somewhat			Very Much
1			4			7

\_\_\_\_\_ 3. How much do you pay attention in class?

\_\_\_\_\_ 4. How much do you read the assigned texts in each class?

\_\_\_\_\_ 5. How much do you take notes in class?

\_\_\_\_\_ 6. If you could choose between working with someone or working alone on the next task in this experiment, how much would you prefer to work alone?

\_\_\_\_\_ 7. If you were to work alone on the next task, how much would you prefer to go to another room to work alone?

## Appendix H: Attention to Detail Task

**Instructions:** Please answer the following questions based on the information from the story about John.

- \_\_\_\_\_ 1) How many times did the word “and” appear in the text?  
 \_\_\_\_\_ 2) How many times did the word “the” appear in the text?

**Instructions:** Below is a list of words. Please read each word carefully. As you read each word, count the number of times the letter “a” appears in the list. Keep track of the amount in your head. Do not write anything on this paper except for your answer.

Aegean	France	Saipan	Australia
Panama	Australia	Antarctica	Japan
Asia	Tasmania	Afghanistan	Austria
Maryland	Asiatic	Thailand	Armenia

- \_\_\_\_\_ 3) In the space to the left, please write how many times the letter “a” can be found in the list of words above.

**Instructions:** Below is short paragraph. Please read the paragraph carefully. As you read the paragraph, count the number of times the letter “f” appears in the paragraph. Keep track of the amount in your head. Do not write anything on this paper except for your answer.

Finished files are the result of years of scientific study combined with the experience of years. After all the years of experience, the only file left unfinished is the file that is finished when the years of experience finish adding up.

- \_\_\_\_\_ 4) In the space to the left, please write how many times the letter “F” can be found in the sentence above.

**Instructions:** Below is a series of numbers. Please read each number carefully. As you read the numbers, count the number of times the number “1” appears in the series. Keep track of the amount in your head. Do no write anything on this paper except for your answer.

11211342    65123182    11191111    98762231    8771771    17171711  
 90924147    78613241    32414123    81891711    76231123

- \_\_\_\_\_ 5) In the space to the left, please write how many times the number “1” can be found in the series of numbers above.

### Appendix I: Confederate's Positive/Negative Personality Attribute

**Instructions:** This next part asks for your impressions of the other participant. Please rate how much the other participant possesses the following qualities. Use the scale below.

Not at all				Somewhat			Absolutely
1				4			7

1. How trustful is the other participant?

1      2      3      4      5      6      7

2. How humorous is the other participant?

1      2      3      4      5      6      7

3. How phony is the other participant?

1      2      3      4      5      6      7

4. How likable is the other participant?

1      2      3      4      5      6      7

5. How kind is the other participant?

1      2      3      4      5      6      7

6. How annoying is the other participant?

1      2      3      4      5      6      7

7. How mean is the other participant?

1      2      3      4      5      6      7

8. How helpful is the other participant?

1      2      3      4      5      6      7

9. How friendly is the other participant?

1      2      3      4      5      6      7

10. How conceited is the other participant?

1      2      3      4      5      6      7

11. How rude is the other participant?

2      3      4      5      6      7

## Appendix J: Desire to Affiliate in the Long-term

**Instructions:** Please answer the following questions using the scale below.

Not at all				Somewhat			Absolutely
1				4			7

1. If you saw the other participant a few days later how likely is it that you would smile at the other participant?

1      2      3      4      5      6      7

2. If you saw the other participant a few days later, how likely is it that you would introduce yourself to the other participant?

1      2      3      4      5      6      7

3. If you saw the other participant a few days later, how likely is it that you start up a conversation with the other participant?

1      2      3      4      5      6      7

4. If you saw the other participant a few days later and he/she asked you to help him/her with a small favor, how likely would you considering helping the other participant?

1      2      3      4      5      6      7

5. How much does the other participant seem like someone you would be friends with?

1      2      3      4      5      6      7

6. How much does the other participant seem like someone you would confide in?

1      2      3      4      5      6      7

## Appendix K: Perceived Motivations for the Interface

1. At any point during the study did the other participant seem try to talk to you?

Yes No

*If "Yes" please answer questions 2-9. If "No" please move on to next page.*

2. Please use the space below to write out what the other participant said to you.

---



---



---



---



---

**Instructions:** Please answer the following questions using the scale below.

Not at all				Somewhat			Absolutely
1				4			7

3. When the other participant spoke to you was he/she trying to be friendly?

1 2 3 4 5 6 7

4. When the other participant spoke to you was he/she trying to request information?

1 2 3 4 5 6 7

5. When the other participant spoke to you was he/she trying to alert you to something?

1 2 3 4 5 6 7

6. When the other participant spoke to you was he/she trying to show off?

1 2 3 4 5 6 7

7. When the other participant spoke to you was he/she trying to annoy you?

1 2 3 4 5 6 7

8. When the other participant spoke to you was he/she trying to hit on you?

1 2 3 4 5 6 7

9. When the other participant spoke to you was he/she trying to comfort you?

1 2 3 4 5 6 7

## Appendix L: Mood Inventory

**Instructions:** Please rate how you feel right now. Use the scale below.

Not at all				Somewhat			Absolutely
1				4			7

How positive do you feel right now, at this moment?

1    2    3    4    5    6    7

How unpleasant do you feel right now, at this moment?

1    2    3    4    5    6    7

How anxious do you feel right now, at this moment?

1    2    3    4    5    6    7

How happy do you feel right now, at this moment?

1    2    3    4    5    6    7

How negative do you feel right now, at this moment?

1    2    3    4    5    6    7

How pleasant do you feel right now, at this moment?

1    2    3    4    5    6    7

**INSTRUCTIONS:** Please write your answers in the space provided.

1. Was there anything confusing or unusual about this study?

2. State in your own words what you think the purpose of this study is.



### Appendix M: Manipulation Check and Perception of Interface as Positive/Negative

**Instructions:** Please answer the following questions about your experiences during this study.

1. What was the gender of the other participant? \_\_\_\_\_
2. At any point during the study did the other participant seem to lean in close to you?  
Yes No
3. At any point during the study did the other participant seem to touch you?  
Yes No
4. At any point during the study did the other participant seem to shuffle around in their seat?  
Yes No
5. At any point during the study did the other participant seem to stare at you?  
Yes No

**Instructions:** Please answer the following questions using the scale below.

Not at All			Neutral			Very Much
1	2	3	4	5	6	7

If you answered “Yes” to Question #2, then respond to the following questions based on that experience with the other participant leaning in close to you.

If you answered “No” to Question #2, then respond to the following questions imagining that the other participant leaned in close to you.

- \_\_\_\_\_ 6. How much did you perceive the leaning as directly trying to communicate with you?
- \_\_\_\_\_ 7. If you felt less like talking with other people by the end of the study, how much would you say the leaning was the cause of that?
- \_\_\_\_\_ 8. How positive did you perceive the leaning to be?
- \_\_\_\_\_ 9. If felt in a more positive by the end of this study, how much would you say the leaning was the cause of that?
- \_\_\_\_\_ 10. How much did you perceive the leaning as intruding upon your personal space?
- \_\_\_\_\_ 11. If you felt more like talking with other people by the end of the study, how much would you say the leaning was the cause of that?
- \_\_\_\_\_ 12. If you felt more negative by the end of this study, how much would you say the leaning was the cause of that?
- \_\_\_\_\_ 13. How negative did you perceive the leaning to be?

## Appendix N: Experimenter Response Form

Participant #: \_\_\_\_\_

### Experimenter Response Form

**Instructions:** Please answer the following questions about how the confederate administered the study.

1) Looking at the marks on the floor, how many marks apart was the confederate's foot from the participant's foot? \_\_\_\_\_

2) Which of the following actions did the confederate perform?

Touch Participant

Lean in Close to Participant

Move Around in Seat

3) Based on the training sessions, please rate how correctly the action (the touch, the lean or the moving around) was performed. Circle your response below.

Not at All Correct			Somewhat Correct			Very Much Correct
1	2	3	4	5	6	7

4) Please write down anything the confederate said to the participant in the space below (including any scripted lines): \_\_\_\_\_

---



---



---

5) Based on the training sessions, please rate how correct the spoken portion of the administration was. Circle your response below.

Not at All Correct			Somewhat Correct			Very Much Correct
1	2	3	4	5	6	7

6) How neutral did the confederate sound during the spoken portion of the administration? Circle your response below.

Not at All Neutral			Somewhat Neutral			Very Much Neutral
-----------------------	--	--	---------------------	--	--	----------------------

1	2	3	4	5	6	7
---	---	---	---	---	---	---

7a) Did the participant try to respond to the confederate? Yes No

If "Yes" please write what the confederate said. If "No" please move on to next question.

---

---

---

---

8) At any point did the confederate look at the participant while the participant was looking back? Yes No

If yes, please describe the encounter: \_\_\_\_\_

---

---

---

9) At any point did the confederate smile at the participant while the participant was looking back? Yes No

If yes, please describe the encounter: \_\_\_\_\_

---

---

---

10) Please describe anything else that you think should be noted.

---

---

---

---

---

---

**Appendix O: Confederate Response Form**

Participant #: \_\_\_\_\_

Confederate Response Form**Instructions:** Please describe any problems that arose during the study.

---



---



---



---



---

1) Did the participant attempt to talk to you after you commented on the GPA questions?  
 Yes    No

2) Which condition were you instructed to do?  
 Touch            Lean            Shuffle

3) Which Condition did you actually do?  
 Touch            Lean            Shuffle

4) Did you do more than one condition? Please describe:

---



---



---

**Instructions:** Please answer the following questions according to what condition you were in. Write your answers in on the line to the left. Use the scale below.

Not at all			Somewhat			Absolutely
1			4			7

\_\_\_\_\_ 5. How much did the [touch, lean, shuffle] during the study resemble the type practiced during the training sessions?

\_\_\_\_\_ 6. How likely is it that the participant noticed you [touching, leaning, shuffling]?

\_\_\_\_\_ 7. If the participant noticed, how negatively did he/she react?

## **Appendix P: Training Protocol**

All research assistants were required to participate in a series of training sessions so as to ensure proper administration of the study. Training sessions took place two weeks before data collection began. In addition, midway through data collection research assistants participated in a set of booster sessions. Finally, research assistants participated in weekly meetings checking in with the progress of their sessions and talking through any problems in administration during the studies (no problems were presented in the majority of these meetings).

### *Session One*

The first session outlined the overall project, fielded any questions that experimenters had, and provided a demonstration of each portion of the study. Research assistants were told that the purpose of the study was to test how participants respond to different types of interactions, but were not informed of specific hypotheses. They were shown the different ways that they would interact with participants (touch, lean, and shuffle) as confederates, and the roles they would perform as experimenters. Also they were shown all of the experimental materials that would be used to collect data during the study. Finally, the research assistants were given a chance to ask questions.

### *Session Two*

The second session gave the Research Assistants a chance to practice each part of the study to become familiar and expert in the varying procedures. During this session, research assistants partnered up and took turns being the experimenter and confederate, while I acted as the participant. Each variant of the personal space invasion were practiced at least twice so as to allow the research assistants to gain an increased comfort level with the procedure. The research

assistants also practiced the greeting and exiting (confederate)/ending (experimenter) phases of the experiment.

### *Session Three*

The third session had the research assistants form small groups of three so as to allow them to administer the study to each other simulating an actual testing session. The research assistants rotated positions so as to get a simulated experience for each role. The research assistants reported back to me any problems and questions that arose during the simulations.

### *Weekly Meetings*

In addition to these sessions, weekly meetings were held where participants reported on any questions or problems they had while doing the study.

### *Booster Sessions*

At the midpoint of data collection, a pair of booster sessions were run following the same procedure as was done for the second and third training sessions.

## **Appendix Q: Debriefing Form**

### INFORMATION ABOUT THIS STUDY

Thank you for participating in our study. Now that you have completed the questionnaire packet, we would like to give you a little more information about what we were studying.

The purpose of the present study is to test the extent to which nonverbal communication affects the way one person interacts and judges another. In particular, we are interested in touch. Past research has demonstrated that light touches on a person's arm not only affects the way the person touched rates the toucher, but that being touched also has an effect on the type of answers participants give in response to various questions.

The type of touch used in this study was designed to mimic the way a person might touch the upper arm of another person when trying to get that person's attention. In this study, we were comparing these types of touches with other behaviors that can also be used to get another person's attention, specifically gazing at that person or leaning in close to that person. During this study you may have been touched on your arm, gazed at, or leaned in against by another participant.

The surveys you filled out were designed to capture any effect that this brief touches, gazes or leans may have had on you. In particular we were measuring your potential desire to be around the other participant in the future (positive consequences of the nonverbal behavior), and also if you seemed to be stressed or bothered by the touch, gaze or lean (negative consequences of the nonverbal behavior).

Many stereotypes exist in our society where touch is seen as a negative thing. In schools, for example, a "hands-off" approach is taken between teachers and students. Yet, when touches do occur, they often can be very positive and affirming for the both the person touching and the person being touched. In looking at touch as a positive experience, it is important to stress that the touch must not be invasive or too personal and that the touch must be for the appropriate length of time and of the right touch intensity. We hope that this study will inform us about when a touch might meet these conditions.

To help us make this experiment as realistic as possible, the other participant in this experiment was actually a research assistant working in our lab posing as a participant. Extensive training was performed with our research assistants so that this touch, gaze, or lean was enacted delicately and would cause no discomfort. The experimenter administering the study was trained to monitor reactions for any discomfort. You can be assured that had you showed any sort of visible apprehension during the study, the experimental procedures would have been stopped immediately.

If you have any comments or questions pertaining to this study, feel free to contact Matthew Zawadzki at (814) 865-1671 or Dr. Stephanie Shields at (814) 863-1729. Also, if you would like to talk with a counselor about some of the issues raised in today's study, you may contact the Center for Counseling and Psychological Services (CAPS) at 863-0395 or visit the center in person at 221 Ritenour Building.