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### An Experimental Analysis of The Effect of Socially Acceptable And Socially Unacceptable Body Odor On Person Perception And Communication

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AN EXPERIMENTAL ANALYSIS OF THE EFFECT OF SOCIALLY  
ACCEPTABLE AND SOCIALLY UNACCEPTABLE BODY ODOR ON  
PERSON PERCEPTION AND COMMUNICATION

A Research Problem Submitted to the Graduate Division  
in Partial Fulfillment of the Requirements for the  
Degree of Master of Arts

By

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July, 1980

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## CHAPTER I

### INTRODUCTION

Odor is a major part of nonverbal communication. Deodorant and anti-perspirant commercials base their ads on the assumption that odor or, rather, the lack of body odor, is socially important.

Most academic studies, however, deal primarily with other aspects of nonverbal communication. Some of these studies have overflowed into mass marketing for the general public, such as the books How to Read a Person Like a Book and Is Your Volkswagon a Sex Symbol? In the first book, specific body movements, body posture and facial expressions are diagnosed as having specific meanings. In the latter, ownership of certain possessions are equated with various motivations on the part of the owner.

Traditional scholarly texts have omitted odor from any lengthy treatment. For example, one text discusses sign language, laughter, loudness of voice, clothing, eye contact and touch (1). Another discusses gestures, posture and eye contact (2). Similarly, a third discusses dress, posture, gestures, facial expression and eye contact (3)

The aspects of nonverbal communication cited above are important in the study of human communication. This paper, however, focusses on the nonverbal variable of odor.

The purpose of this chapter is to present a review of literature on odor. Specifically, the chapter is divided into seven sections: 1) the basic olfactory system of both animals and humans, 2) the methodology involved in experimentation on humans, 3) studies conducted with animals, 4) the comparison of animal behavior to humans, 5) non-quantitative attributes to humans, 6) studies and experiments involving humans and odor, and 7) person perception.

### REVIEW OF LITERATURE

Olfactory system: This section reviews the basic olfactory system of both animals and humans. Regarding animal research, a typical study involved experimentation done frog, *Rana Pipiens*. The research attempted to delineate how the sense of smell works. Experimenters used either a decapitate frog with the olfactory mucosa exposed by removing the dorsal surface of the nasal cavity or a curarized frog with the same exposure.

The results of the experiment revealed that the olfactory receptors are all odor-selective, that is, each one responds to certain of the odors to which it is exposed and does not respond to others(4).

Other studies involving animals include recording activity from the primary olfactory nerve in response to odorous stimuli(5) and investigation of the distribution of the olfactory nerve in response to odorous stimuli(6).

Amoore, Tucker, Venstrom, Ottoson, Henkin, Bartley, et. all have done work with animals and the olfactory system, but much has been repetitive investigation. In summary, research has been done to discover exactly how the olfactory system works in animals, often by recording olfactory nerve responses through the use of different types of recording devices.

The absolute threshold for human smell, expressed by the number of molecules entering the nose, depends on the time of presentation of the stimulus, concentration of the odorous substance, and rate of flow of the carrier gas (usually air). In many experiments the rate of flow for normal breathing is used (250 cubic centimeters per second per nostril). For short stimuli, the threshold expressed in number of molecules is nearly constant; for longer stimuli it becomes proportional to the time of presentation. This means that the concentration becomes the controlling factor. For very short pulses, the threshold tends to go up. This is because the volume of air involved becomes very small; consequently the volume of the nasal cavity that has to be filled before the odorous substance reaches the sensory epithelium becomes relatively more important (7).

The study of the human olfactory system is typically done with the use of a constructed model. The flow pattern in a model of a nasal cavity was studied by observing aluminum particles suspended in water flowing through it. For normal breathing between 5 and 10 percent of the total flow was

found to pass through the olfactory slit. For higher flow rates this fraction increases up to at most 20 percent. In the lower part of the nasal cavity no flow of water was observed. Needless to say, individual deviation from these figures may occur because of differences in the geometry of the nose (8).

From analysis of the olfactory threshold data it is derived that the threshold of one human olfactory cell is at most eight molecules for appropriate odorous substances. Analysis of frequency-of-response curves shows that at least 40 molecules are necessary to produce a sensation (9).

In summary, the study of the human olfactory system is done with an artificial facsimile, noting that individual human noses will probably vary somewhat. Some studies have been done with human noses, though, and the following section discusses the methodology involved in such experimentation. Unlike animals, where the olfactory nerves are cut and attached to mechanical registering devices, the method used with humans is the presentation of odorants to the human nose, via various methods.

Methodology of research on humans: The research on humans is best catagorized by the means used to present the odor stimulus. This section reviews three major methods, blast injection, sniff bottles, and sniff strips.

Blast-injection: This method refers to the use of various

means--a syringe, for example--to deliver a measured volume of an odorant into the subject's nostrils. Although this method has been criticized for stimulating touch as much as smell, it is still considered useful for medical purposes in controlling the location of stimulation. However, it seems to have largely disappeared from experimental work in psychophysics.

Sniff bottles: The simplest and cheapest, but perhaps the most inexact method is to present odorants diluted in water, mineral oil, benzyl benzoate, or diethyl phtalate in test tubes or beakers for the subject to sniff. One of the shortcomings of this method is that the physical dynamics of liquids in a container may produce great variability or disequilibrium in the vapor the subject thus inhales.

Although measurement of the liquid concentration is simple, the specification of the effective variables of vapor pressure or number of molecules emitted from the container is almost impossible.

Sniff strips: Perfumers sniff odorants from strips of blotting paper which provide a more constant vapor than sniff bottles. This does not permit specification of the vapor, but it does seem to produce more reliable responses. One version of this method is to present the odorant on cotton wrapped around a glass rod. In this case, the odorant is kept in a container with a fitted glass disk with interstices permitting a constant vapor pressure from the liquid odorant at equilibrium inside the container to be sniffed by the subject.

Except for blast-injection methods, these methods depend on the subject to keep the flow rate constant from trial to trial. Subjects can be trained to sniff with sufficient constancy for quality experiments where this variable is less crucial. However, in experiments with odor intensity at the threshold level, one will find that the subjects tend to sniff harder and thus increase the flow rate and hence the likelihood of detection at the expense of the overall reliability of the response(10).

In summary, the presentation of odorants is the only practical method to use in an attempt to investigate the sensitivity of a human nose.

Animal order experiments: The thrust of the next section deals with animal behavior in relation to odor. Much of the animal behavior research has involved sexual responses, such as the use of odor in mate identification and sexual attraction. Studies have explored other animal behaviors, such as the use of odors by mammals to aid in territory marking(11). For example experiments conducted at the University of Pisa indicated that at times researchers could change the headings on which pigeons set out for home by taking them on long circuitous detours on the outbound journey. These responses occurred only when the pigeons could smell the changing odors of the countryside through which they were traveling. This strengthened the Italians' view that pigeons use olfactory cues to find their way back "home"(12).

by lithium chloride poisoning. The secretion, which is sniffed and ingested by the male, contains a substance that specifically affects sexual motivation which does not depend on previous experience(15).

In summary, animals use odor mostly for sexual attributes, with additional factors such as territory marking and returning to their home. But man is also literally an animal, and observing laboratory mice and other animals is experimentally easier than human studies. Consequently, animal behaviors are compared to human behavior. Since animal behavior with odor is mostly sexual, the comparison of animals to humans tends to be also sexual in nature. The following section reviews the literature making such comparisons.

Animal and human studies: The sexual behavior of the male rhesus monkey to an odorant emitted by the female tended to support the belief held by some scientists and laymen that specific, naturally occurring body odors, pheromones, may have previously unsuspected influences on social and sexual behaviors of man(16).

The nasal mucosa in a monkey swells and becomes reddened when estrogens are administered in the normal female, male, and in female castrates(17). Studies indicate similar erectile properties in the penis and clitoris, in comparison to the nasal mucosa. Other studies indicating a relationship between genital organs and the nose include nose bleeds with menstruation, acute nasal secretions during sexual intercourse and



sneezing associated with coitus (18).

A study of rodents found that females have irregular estrous cycles unless male urine is present, in which case the estrous cycles become regular cycles of four or five days (19). In comparison, human females living together over a period of time will sometimes have attained synchronized menstrual cycles (20).

Studies have been done concerning the sexual attractants of a single life form--the female moth. These epheral beings must lure their mates over great distances and thus rely on pheromones, a word coined from the Greek meaning "a carrier of excitation," to initiate the attraction. A male gypsy moth, for example, can respond to fewer than 100 molecules of the female's lure. And the minute pheromone content of her scent gland, if released all at once in silent aerial odor trails, could attract and excite a billion males (21).

The human nose, with five million olfactory receptor cells, is also remarkably sensitive. In a liter of air, a person can smell as little as one four-hundred-billionth of a gram of ethyl mercaptan--the essence of rotten meat (22).

Insect pheromones, however, serve as only theoretical models for the study of scent signals in large organisms, because these simpler creatures respond to odors in a nearly

automatic way. Male houseflies will attempt to copulate with knotted shoelaces that have been treated with the female fly's chemical sex lure. And worker ants will carry alive-and-struggling sisters out to the refuse heap if the latter are first daubed with odors of decomposition. Every house mouse or dog can tell a livemate from a dead one. Thus, human studies are based more directly on the scent behavior of other animals (23).

In summary, the study of animal behavior in relation to odor is often sexually related, and so the comparison of animal behavior with odor is also sexually related.

Few studies exist concerning human behavior and odor, with no comparison being added between animals and humans. Much of the information on humans and odor is speculative with no quantitative experimental work being used. The following section cites examples of speculative writings and works in this area.

Non-quantitative odor research: An entire section is devoted to intercultural odor effects in Perspectives on Cross-Cultural Communication, but the author admits that his writings were influenced from personal experiences in foreign countries and by interviewing visitors to foreign countries rather than experimental data(24).

In Intercommunication Among Nations and Peoples, it is suggested that, like taste, smell recalls memories of past events; but unlike taste and touch, which linger within time

rather than progressing through it, smell loses its sensitivity to odors protracted in time. Moreover, the sense of smell lags in time for it is a less pronounced sense than the others(25).

Reports from the perfume and toiletries companies offer their opinions on human behavior. The belief is that specific parts of the human body give off odor more so than other parts of the body. Therefore, soaps and perfumes to cover-up these "negative" body odors are intentionally constructed(26).

And to compare our toiletries to odor and sex, as in many of the animal studies, many perfumes today have as their base musk, civet, or ambergris which have their origin in animal scent-producing sex glands. The names given perfumes are nearly all variations on the theme of passion and lust or of body cleanliness. The word musk, is Persian taken from the Sanskrit meaning testicle while lavender comes from the Latin, lavare, meaning to wash. In addition, it is assumed that there are at least three possible reasons existing for a woman to wear perfume: 1) she wears perfume to enhance her feminine allure; 2) to cover real or imagined offensive body odors; and 3) because she herself derives sensory pleasure from the perfume(27).

In summary, a great deal of speculation exists concerning humans and odor, however the extent of empirical testing done with humans and odor is minimal. The next section reports studies which have been done with humans and odor. The major thrust of these studies, as with animals, is sexually

related.

Human odor studies: In experiments comparable to mate identification experiments with animals, several studies have been done by asking subjects not to bathe for a period of time, nor use deodorants or perfumes. Then subjects wore plain white undershirts were turned in to the experimenters. In one of these studies, the subjects were asked to smell each shirt and rate the person who wore the shirt, using 20, 7-point bipolar adjective scales. Then the subjects were asked to smell each shirt to identify their own shirt on the basis of odor(28). Another similar experiment had each person smell the shirts and complete these questions:

- 1) Which shirt has your own smell?
- 2) Which shirt has your partner's smell?
- 3) Which shirts smell male?
- 4) Which shirts smell female?
- 5) Which shirts smell pleasant, which indifferent, which unpleasant?(29).

A third such study was done with mothers and infants to find if an infant could detect the scent of his own mother(30).

The overall results of these studies indicate that correlations between odor unpleasantness and trait attributions were surprisingly large. Almost all correlations proved statistically significant( $p < .05$ ), providing a positive correlation between odor unpleasantness and socially undesirable traits. Thus, persons producing unpleasant odors tended to be perceived as unsociable, dirty, unfriendly, unintelligent,

and so on.

Regarding the question of whether donors could identify their own odor, results indicated that little more than 25 percent subjects correctly identified their own shirt.

The question of whether odor donors ranked their own shirt as less unpleasant than did other raters was examined by comparing each donor's ranking of his own shirt to the mean ranking of his shirt provided by the other donors. Results indicated that in 82 percent of the cases the donor ranked his own shirt as less unpleasant than did the other raters(31).

Two studies have been done which indicate that opinions can be influenced through the use of odor. Both studies used college students, and both asked the students to evaluate students running for student offices. Descriptions of the candidates were passed among the students, and each used odors in an attempt to influence judgements. The odors were used in very subtle quantities so as not to be detected. One experiment used an odor found in men's urine, which seemed to influence women more than men(32). The other study used odor found in animals, which seemed to influence the students based on comparison with a control group(33).

A "paper-and-pencil" evaluation study was conducted at the University of Pittsburgh. Male and female subjects were given written descriptions of individuals and then returned a written evaluation of each description of a person who

had a "severe body odor problem." The target, presented as a male or female, was described as : (a) either aware or unaware of his/her odor and (b) either capable of controlling the odor.

Results of the study indicate that target evaluation was higher (a) when the target was unaware than aware of his/her odor and (b) when the target was incapable rather than capable of controlling the odor. Overall, both male and female subjects responded more favorably (a) to a controllable same-sex than to a controllable opposite-sex target and (b) to an uncontrollable opposite-sex than to an uncontrollable same-sex target (34).

This study seems to be the only one available which examines social perceptions and social standards and odor.

In summary, the experiments conducted with humans and odor seem to be sexually oriented for the most part, with studies of mate and sex identification. Along these lines, studies have established the possibility to synchronize women's menstrual periods through odor, even if the women had never met (35). These type studies are similar to the studies conducted on animals as previously cited. Few studies involve person evaluation, those often times being a written description on paper. The involvement of other-person evaluations due to odor is involving person perception, which the final section of this chapter entails.

Person perception: A major factor in our society is the perceptions of people who have odor. This, at least, is what

seems to be a common belief. As cited previously, perfumes and toiletries are made specifically to cover-up or hide human body odors. And, as previously mentioned, in the study at the University of Pittsburgh, after the results were tabulated, means indicated that target evaluation was higher (a) when the target was unaware rather than aware of his/her odor and (b) when the target was incapable rather than capable of controlling the odor(36). And in this study, the person with the "odor problem" was merely a description on paper, no genuine odor being presented to the subjects. It would seem that our society has set standards and set perceptions about body odor.

Person perception refers to the processes by which man comes to know and to think about other persons, their characteristics, qualities and inner states. We attribute to a person properties of consciousness and self-determination, and the capacity for representation of his environment(37).

The general structure of person perception is:

1. Person O's characteristics or state.
2. The concomitants of O's characteristics.
3. The cues of O's characteristics that are available to P.
4. The cues of O's characteristics that are utilized by P.



5. The cognitive processes that utilize the proximal cues.
6. The percept or judgment by P of O's characteristics.

In considering the issue of the definition of the stimulus, it must be added that one needs also to relate systematically the stimulus properties of the person, or part of the person, to the circumstances surrounding the person in space and time(38).

Almost any source of direct or indirect cues, from the stimulus person or from the situation, can be used to arrive at an impression of a person; and, in general, many such cues are used with considerable agreement among judges. Given cues have, so to speak, a typical meaning. Work has shown that the beholder subtly integrates the information from various cue sources, and that no single element of the process can account fully for the final cognitive attainment(39).

Human body odor is, under many situations, a characteristic available for detection and, probably, a cue with a typical meaning. The consideration to bear in mind is that some humans with body odor are unable to control the body odor. However, as mentioned previously, humans attribute to another properties over which he or she has self-control. Therefore, body odor is an important role in person perception, a role which has had little empirical testing. We can conclude that



body odor has a typically negative meaning in our society, and that people created negative perceptions of those with body odor that the target person could control. Further, it's assumed they do not interact readily with those who have body odor, and would choose consciously to not do so(40).

Some researchers in the area of person perception believe that people view or perceive other people with both attraction and repulsion, which puts the viewer in an uncomfortable situation(41).

People perceive others on many factors including such factors including such factors as social distance during conversation, favor-doing, pupil size, and many others(42). Odor, however, seems to be omitted from the lists of perceptual factors, just as it is omitted from very much empirical testing. This is in contrast to the cited social beliefs which indicate that odor is an important part of person perception in our society.

Research Hypotheses

The review of literature concluded that odor is a significant nonverbal element in the creation of perceptions of others. It is the specific conclusion of this chapter that the following research hypotheses would be supported through empirical experimentation.

- H<sub>1</sub>: Confederates displaying non acceptable levels of negative body odor will be judged significantly lower in credibility than confederates with normal levels of body odor.
- H<sub>2</sub>: Confederates displaying non-socially acceptable levels of negative body odor will be judged significantly lower in credibility than confederates with normal levels of body odor.
- H<sub>3</sub>: Confederates displaying negative, but socially acceptable, levels of body odor will be judged significantly lower in credibility than confederates with normal levels of body odor.
- H<sub>4</sub>: Confederates displaying non-socially acceptable levels of negative body odor will be judged significantly lower in credibility than confederates with socially acceptable levels of negative body odor.
- H<sub>5</sub>: Confederates displaying non acceptable levels of negative body odor will be judged significantly lower in sociability than confederates with normal levels of body odor.

- H<sub>6</sub>: Confederates displaying non-socially acceptable levels of negative body odor will be judged significantly lower in sociability than confederates with normal levels of body odor.
- H<sub>7</sub>: Confederates displaying socially acceptable levels of negative body odor will be judged significantly lower in sociability than confederates with normal levels of body odor.
- H<sub>8</sub>: Confederates displaying non-socially acceptable levels of negative body odor will be judged significantly lower in sociability than confederates with socially acceptable levels of negative body odor.
- H<sub>9</sub>: Confederates displaying non acceptable levels of negative body odor will be judged significantly lower in communication competency than confederates with normal levels of body odor.
- H<sub>10</sub>: Confederates displaying non-socially acceptable levels of negative body odor will be judged significantly lower in communication competency than confederates with normal levels of body odor.
- H<sub>11</sub>: Confederates displaying socially acceptable levels of negative body odor will be judged significantly lower in communication competency than confederates with normal levels of body odor.

- H<sub>12</sub>: Confederates displaying non-socially acceptable levels of negative body odor will be judged significantly lower in communication competency than confederates with socially acceptable levels of negative body odor.
- H<sub>13</sub>: Confederates displaying non-socially acceptable negative body odor will be selected significantly less than confederates displaying socially acceptable negative body odor for future encounters by the subjects.
- H<sub>14</sub>: Confederates displaying non acceptable levels of negative body odor will have significantly fewer interactions with the subjects than confederates displaying normal levels of body odor.
- H<sub>15</sub>: Confederates displaying socially unacceptable levels of negative body odor will have significantly fewer interactions with the subjects than confederates with normal levels of body odor.
- H<sub>16</sub>: Confederates displaying socially acceptable levels of negative body odor will have significantly fewer interactions with the subjects than confederates with normal levels of body odor.
- H<sub>17</sub>: Confederates displaying socially unacceptable levels of negative body odor will have significantly fewer interactions with the subjects than confederates with socially acceptable levels of negative body odor.

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## CHAPTER II

In order to test the hypotheses stated in chapter 1 the following experiment was conducted.

Subjects: A total of 59 subjects were used in the experiment, 38 were female and 21 were male. The subjects were randomly selected from three sections of a required introductory speech course at Pittsburg State University, Pittsburg, Kansas. The course is listed at the sophomore level, but any undergraduate may take it. Subjects were also selected from an introductory English course which had the same grade level of students.

Independent Variables: The independent variables used in this study were 1) socially acceptable negative body odor, 2) socially unacceptable negative body odor, and 3) normal body odor. The negative odor variables were further subdivided into chemical odor and natural odor.

Socially Acceptable Negative Odor: This independent variable was operationally defined as a confederate who displayed above normal levels of body odor and was dressed in athletic clothes. The chemically produced negative odor was created by having each confederate dab at least three drops of Butyric Acid on their clothes and carry a handkerchief which had been treated by the same chemical.

The natural body odor was created by having confederates participate in extensive physical activity, two games of raquetball, and reserve their clothing in a locker. On the day of the experiment the confederates wore the same clothing for another session of physical activity, and then dressed in

the socially acceptable clothing, i.e., gym clothing.

Socially Unacceptable Negative Odor: The socially unacceptable negative odor variable was operationally defined as a confederate displaying the same levels of body odor, both chemically and naturally produced, as the socially acceptable case, and dressed in semi-formal clothing. The clothes included a coat and tie for the male confederates and a dress for female confederates.

Normal Body Odor: Normal body odor was defined as a confederate who had bathed within sixteen hours of the experiment, wore no excessive levels of perfume, or after shave lotion, and was dressed in normal school attire.

Dependent Variables: The dependent variables used in this study were 1) perceived subjects' credibility, 2) perceived subjects' sociability, 3) perceived subjects' interpersonal communication skills, 4) subjects' selections for future work, and 5) subjects' interaction behavior.

Perceived Subjects' Credibility: The subjects' perceived credibility of the confederates was defined as the total score received in three post-test questions, asking the subject to judge whether the confederate was well informed, if the confederate understood the issues, and if the confederate supported his/her position with facts.

Perceived Subjects' Sociability: The subjects' perceived sociability of the confederates was defined as the total

score received on three post-test questions asking the subject to judge whether the subject enjoyed talking with the confederate, if the subject found the confederate pleasant, and if the subject felt comfortable talking with the confederate.

Perceived Subjects' Interpersonal Communication Skills:

The perceived subjects' interpersonal communication skills of the confederates was defined as the total score received in three post-test questions asking if the confederate interacted openly, if the confederate listened well, and if the confederate expressed himself/herself clearly.

Subjects' Selections for Future Work: The subjects' selections for future work was defined as the selection or omission of confederates from a question on the post-test asking which of the confederates the subject would like to work with again.

Subjects' Interaction Behavior: The subjects' interaction behavior was defined as the subject initiating discussion with confederates and responding to confederates' discussions, as determined by the observer's notes from each discussion. (See Appendix for post-test and interaction forms.)

Method:

Pre-Test: During the week of June 14, 1979, a researcher went to each of the four introductory classes used in the experiment and asked each student to fill out a pre test questionnaire following an explanation of the test. (See Appendix A).

The first section was a five-point likert scale used to determine to what extent each subject rated the importance of odor and dress as a determinant of forming impressions. The second section was a list of possible discussion topics. Each subject expressed his/her opinion of each topic using a five point likert type scale.

The purpose of the pre-test was two-fold. First, the subjects randomly chosen for selection to the experimental groups were among those assigning importance to odor and dress. Secondly, the pre-test was used to determine discussion topic to be used by each experimental discussion session, which had the least variability.

The pre-test indicated that most subjects felt that odor and dress are important factors in communication. Further results of the pre-test indicated that the topic, "All DC-10's should be permanently grounded", was the least controversial topic. The DC-10 topic was chosen for discussion in an effort to prevent the subject from becoming involved in a controversial argument and overcoming the importance of odor from his perception.

Confederates: Seven of the confederates were graduate students at Pittsburg State University, while eight confederates were undergraduate students at P.S.U. Six of the graduate students were present or former graduate students in the Department of Speech and Theatre, the seventh, a math major graduate student volunteer. All of the undergraduate



students were volunteers from Speech and Psychology classes. Fifteen confederates were chosen because three confederates were needed for each discussion session. The observer in each discussion was a graduate student.

Confederates brainstormed to arrived at several discussion statements that would represent neutral statements regarding the topic (See Appendix B). Each confederate then memorized the statements. Confederates used these statements, and other neutral statements during discussion. This was done to provide consistency in statements.

Confederates were told to allow the subject to speak as much as he/she wanted. If the discussion began to falter, confederates were then to make statements. Confederates were warned to not direct all comments at the subject, but to direct statements towards both the subject and the fellow confederate.

The task of the observer was to introduce the purpose of the discussion to the subject and the confederates. The observer also recorded interaction patterns during the discussion by drawing arrows in a chart (See Appendix C) indicating amount and direction of each participants interactions. Finally the observer distributed the post-test to each participant.

The experiment took place during the regular class meetings from which the subjects were taken. An experimenter

went to the class and directed the subject to the appropriate room in the same building. The observer and one confederate were already in the room. The second confederate arrived after the subject, posing as a student also taken from a class.

To two confederates, always either both male or both female, and the subject were seated in a close circle. The observer positioned himself apart from the group.

The observer stated that all three were taken from separate classes so as to minimize the risk of possibly knowing each other. The observer added that this was a study of small group discussion, that the group should discuss naturally for a time limit of ten minutes, and that the discussion topic was to be "The DC-10 should be permanently grounded." The observer informed them that he would take notes on the discussion but not to concern themselves about that. The observer then gave each discussion member a number, indicating this was to be able to take better notes of the discussion. The subject was always number one, the neutral odor confederate #2 and the odor-bearing confederate #3.

During the discussion, the confederates initiated interaction only when the subject was not talking. The confederates also maintained the use of neutral statements about the topic, and avoided directing all statements to the subject.

The interactions were recorded, as previously mentioned, by the observer drawing an arrow each time interaction was

initiated on a diagram of the discussion.

The observer stopped discussion at the ten minute time limit. The observer asked that each person fill out a post-test (Appendix D) asking their opinion of the discussion, then to go back to class. The observer suggested that two of the members fill out the post-test in other rooms, so as not to influence one another's decisions. The observer then sent each of the confederates to specific other rooms to fill out the post-test while the subject filled out the post-test in the same room. Each participant was to leave the post-test in the room for the observer to gather at a later time. Only the subject actually did fill out the post-test.

Experimental Design: The experimental design utilized in this study was a 2 x 2 factorial design, sex by odor type.

The purpose of the design was to guard against a possible sex-effect in person perception. Subjects were assigned to either a same sex situation, the confederates same sex situation as subject, or an opposite sex situation, both confederates the opposite sex as the subject.

To further guard against experimental bias, each confederate acted as both the non-body odor, and the negative odor confederate. Data checks were performed to assure that the variables of confederate sex or personal mannerisms did not significantly attribute to the subjects actions. These data are reported in the next section.

After each session subjects were debriefed and asked if they could determine odor differences. Because a majority of subjects could not identify the chemically produced odor as body odor, the decision was made to use only naturally produced odor as the independent variable.

Socially Acceptable Negative Odor	Socially Unacceptable Negative Odor	Same Sex
7 cases	5 cases	
3 cases	4 cases	Opposite Sex

FIGURE 1  
EXPERIMENTAL DESIGN:

Posttest: The posttest measured the subjects' perceptions of each confederates' credibility, sociability, and interpersonal communication skills. This was done by having the subject rank each confederate on a five-point likert scale.

The post-test also measured each subject's selection of a confederate for future work. Subjects completed the post-test privately. All subjects completed the post-test without question.

## CHAPTER III

This chapter reports the results of the experimental investigation described in Chapter II. The chapter is divided into three major sections: (1) a reporting of the results of the various tests used to analyze the assumptions and hypotheses of the study; (2) a discussion of the implications of those results; and (3) summary.

RESULTS

This section reports the results of the various tests which were performed on the data generated by this experiment. The section is divided into two parts: (1) assumption checks, and (2) hypotheses testing.

Assumption Checks: Three major assumptions were made concerning the validity of the research design. First, it was assumed that the subjects could detect and identify the independent variable, negative body odor. In order to check this assumption post experimental debriefing was conducted with each subject. Results indicated that subjects did not identify the chemical odor as negative body odor. The decision was then made to use only naturally produced negative body odor. The debriefing sessions indicated that all subjects did detect the negative odor and identified it as body odor.

A second assumption was that each confederate would present approximately the same amount and type of discussion material. In order to check this assumption the observers

coded the amount and content of the interactions of each confederate. No apparent differences were observed and the assumption was made that each confederate initiated approximately the same amount of interactions, and each confederate offered the same qualitative material.

The third assumption was that each confederate would not be perceived significantly different on each scale, independent of confederate role. In order to check this a one-way analysis of variance was run on the scores attributed to each confederate. The resultant  $F$  was not significant, and it was assumed that the confederates did not significantly contribute to the subjects responses.

Hypotheses Testing: This experimental study was designed to test seventeen hypotheses. This section reports the results of the various statistical tests used to test each hypotheses.

- H<sub>1</sub> Confederates displaying non acceptable levels of negative body odor will be judged significantly lower in credibility than confederates with normal levels of body odor. ( $p < .05$ , one-tailed,  $H_0: \bar{X}_1 = \bar{X}_2$ )

In order to test this hypothesis, a  $t$  test was performed. The resultant  $t$  was not significant ( $p < .05$ ). On the basis of this test, the null hypothesis ( $H_0: \bar{X}_1 = \bar{X}_2$ ) could not be rejected.

- H<sub>2</sub> Confederate displaying non-socially acceptable levels of negative body odor will be judged significantly lower in credibility than confederates with normal levels of body odor. ( $p < .05$ , one-tailed,  $H_0: \bar{X}_1 = \bar{X}_2$ ).

In order to test this hypothesis, a  $t$  test was performed. The resultant  $t$  was not significant ( $p < .05$ ). On the basis of this test, the null hypothesis ( $H_0: \bar{X}_1 = \bar{X}_2$ ) could not be rejected.

- H<sub>3</sub> Confederates displaying negative, but socially acceptable, levels of body odor will be judged significantly lower in credibility than confederates with normal levels of body odor. ( $p < .05$ , one-tailed,  $H_0: \bar{X}_1 = \bar{X}_2$ ).

In order to test this hypothesis, a  $t$  test was performed. The resultant  $t$  was not significant ( $p < .05$ ). On the basis of this test, the null hypothesis ( $H_0: \bar{X}_1 = \bar{X}_2$ ) could not be rejected.

- H<sub>4</sub> Confederates displaying non-socially acceptable levels of negative body odor will be judged significantly lower in credibility than confederates with socially acceptable levels of negative body odor. ( $p < .05$ , one-tailed,  $H_0: \bar{X}_1 = \bar{X}_2$ ).

In order to test this hypothesis, a  $t$  test was performed. The resultant  $t$  was not significant ( $p < .05$ ). On the basis of this test, the null hypothesis ( $H_0: \bar{X}_1 = \bar{X}_2$ ) could not be rejected.

- H<sub>5</sub> Confederates displaying non acceptable levels of negative body odor will be judged significantly lower in sociability than confederates with normal levels of body odor. ( $p < .05$ , one-tailed,  $H_0: \bar{X}_1 = \bar{X}_2$ ).

In order to test this hypothesis, a  $t$  test was performed. The resultant  $t$  was not significant ( $p < .05$ ). On the basis of this test, the null hypothesis ( $H_0: \bar{X}_1 = \bar{X}_2$ ) could not be rejected.



- H<sub>6</sub> Confederates displaying non-socially acceptable levels of negative body odor will be judged significantly lower in sociability than confederates with normal levels of body odor. ( $p < .05$ , one-tailed,  $H_0: \bar{X}_1 = \bar{X}_2$ ).

In order to test this hypothesis, a  $t$  test was performed. The resultant  $t$  was not significant ( $p < .05$ ).

On the basis of this test, the null hypothesis ( $H_0: \bar{X}_1 = \bar{X}_2$ ) could not be rejected.

- H<sub>7</sub> Confederates displaying socially acceptable levels of negative body odor will be judged significantly lower in sociability than confederates with normal levels of body odor. ( $p < .05$ , one-tailed,  $H_0: \bar{X}_1 = \bar{X}_2$ ).

In order to test this hypothesis, a  $t$  test was performed. The resultant  $t$  was not significant ( $p < .05$ ).

On the basis of the test, the null hypothesis ( $H_0: \bar{X}_1 = \bar{X}_2$ ) could not be rejected.

- H<sub>8</sub> Confederates displaying non-socially acceptable levels of negative body odor will be judged significantly lower in sociability than confederates with socially acceptable levels of negative body odor. ( $p < .05$ , one-tailed,  $H_0: \bar{X}_1 = \bar{X}_2$ ).

In order to test this hypothesis, a  $t$  test was performed. The resultant  $t$  was not significant ( $p < .05$ ).

On the basis of the test, the null hypothesis ( $H_0: \bar{X}_1 = \bar{X}_2$ ) could not be rejected.

- H<sub>9</sub> Confederates displaying non acceptable levels of negative body odor will be judged significantly lower in communication competency than confederates with normal levels of body odor. ( $p < .05$ , one-tailed,  $H_0: \bar{X}_1 = \bar{X}_2$ ).

In order to test this hypothesis, a  $t$  test was performed. The resultant  $t$  was not significant ( $p < .05$ ).

On the basis of the test, the null hypothesis ( $H_0: \bar{X}_1 = \bar{X}_2$ ) could not be rejected.



$\bar{X}_2$ ) could not be rejected.

- H<sub>10</sub> Confederates displaying non-socially acceptable levels of negative body odor will be judged significantly lower in communication competency than confederates with normal levels of body odor. (p. < .05, one-tailed, H<sub>0</sub>:  $\bar{X}_1 = \bar{X}_2$ ).

In order to test this hypothesis, a  $t$  test was performed. The resultant  $t$  was not significant (p. < .05).

On the basis of this test, the null hypothesis (H<sub>0</sub>:  $\bar{X}_1 = \bar{X}_2$ ) could not be rejected.

- H<sub>11</sub> Confederates displaying socially acceptable levels of negative body odor will be judged significantly lower in communication competency than confederates with normal levels of body odor. (p. < .05, one-tailed, H<sub>0</sub>:  $\bar{X}_1 = \bar{X}_2$ ).

In order to test this hypothesis, a  $t$  test was performed. The resultant  $t$  was not significant (p. < .05).

On the basis of this test, the null hypothesis (H<sub>0</sub>:  $\bar{X}_1 = \bar{X}_2$ ) could not be rejected.

- H<sub>12</sub> Confederates displaying non-socially acceptable levels of negative body odor will be judged significantly lower in communication competency than confederates with socially acceptable levels of negative body odor. (p. < .05, one-tailed, H<sub>0</sub>:  $\bar{X}_1 = \bar{X}_2$ ).

In order to test this hypothesis, a  $t$  test was performed. The resultant  $t$  was not significant (p. < .05).

On the basis of this test, the null hypothesis (H<sub>0</sub>:  $\bar{X}_1 = \bar{X}_2$ ) could not be rejected.

- H<sub>13</sub> Confederates displaying non-socially acceptable negative body odor will be selected significantly less than confederates displaying socially acceptable negative body odor for future encounters by the subjects. (p. < .05, one-tailed, H<sub>0</sub>:  $z = 0.0$ )

In order to test this hypothesis, a test for significance of difference in proportions was calculated. The resultant  $z$  was significant ( $z = -2.49$ ,  $p < .01$ ). On the basis of this test the null hypothesis ( $H_0: z = 0.0$ ) was rejected, and the research hypothesis ( $H_{13}: z < 0.0$ ) was supported.

- H<sub>14</sub> Confederates displaying non acceptable levels of negative body odor will have significantly fewer interactions with the subjects than confederates displaying normal levels of body odor. ( $p < .05$ , one-tailed,  $H_0: \bar{X}_1 = \bar{X}_2$ )

In order to test this hypothesis, a  $t$  test was performed. The resultant  $t$  was significant, ( $t = 2.63$ , d.f. 36,  $p < .01$ ). On the basis of this test, the null hypothesis ( $H_0: \bar{X}_1 = \bar{X}_2$ ) was rejected, and the research hypothesis ( $\bar{X}_1 > \bar{X}_2$ ) was supported.

- H<sub>15</sub> Confederates displaying socially unacceptable levels of negative body odor will have significantly fewer interactions with the subjects than confederates with normal levels of body odor. ( $p < .05$ , one-tailed,  $H_0: \bar{X}_1 = \bar{X}_2$ )

In order to test this hypothesis, a  $t$  test was performed. The resultant  $t$  was significant, ( $t = 2.48$ , d.f. 16,  $p < .025$ ). On the basis of this test, the null hypothesis ( $H_0: \bar{X}_1 = \bar{X}_2$ ) was rejected, and the research hypothesis ( $\bar{X}_1 > \bar{X}_2$ ) was supported.

- H<sub>16</sub> Confederates displaying socially acceptable levels of negative body odor will have significantly fewer interactions with the subjects than confederates with normal levels of body odor. ( $p < .05$ , one-tailed,  $H_0: \bar{X}_1 = \bar{X}_2$ )

In order to test this hypothesis, a  $t$  test was performed. The resultant  $t$  was significant, ( $t = 2.21$ , d.f. 16,  $p < .025$ ). On the basis of this test, the null hypothesis

( $H_0: \bar{X}_1 = \bar{X}_2$ ) was rejected, and the research hypothesis ( $X_1 > X_2$ ) was supported.

H<sub>17</sub> Confederates displaying socially unacceptable levels of negative body odor will have significantly fewer interactions with the subjects than confederates with socially acceptable levels of negative body odor. ( $p < .05$ , one-tailed,  $H_0: \bar{X}_1 = \bar{X}_2$ )

In order to test this hypothesis, a  $t$  test was performed. The resultant  $t$  was significant, ( $t = 2.33$ , d.f. 16,  $p < .025$ ). On the basis of this test, the null hypothesis ( $H_0: \bar{X}_1 = \bar{X}_2$ ) was rejected, and the research hypothesis ( $\bar{X}_1 > \bar{X}_2$ ) was supported.

DISCUSSION

A problem arose with the use of chemical odor during the experiment. After a few experimental sessions in the available rooms, several confederates noted that the odor seemed to linger in the room. That would cause difficulty in detecting the chemical odor that the one confederate wore during each experimental session. One subject did note that a strange odor could be detected in the room and in the hall. The subject's data was intentionally omitted from the total data.

A second problem which arose with the use of chemical odor is whether or not the chemical odor smelled realistically like body odor, which was needed. The chemistry department at Pittsburg State University indicated that Butyric Acid would be the closest chemical odor to natural body odor. Many confederates, however, noted their opinion that the chemical smelled much more like regurgitation (vomit) than body odor.

The use of natural body odor during the experimental sessions seemed, in the opinion of the confederates, to be more accurate. Natural odor seemed not to carry through the air as did the chemical odor and, therefore, could be more readily attributed to just the one person wearing the odor.

A second benefit of natural body odor, of course, is that it is genuine and would rarely be considered a different

type of unpleasant odor, as the confederates felt was a problem with the chemical odor.

Information taken by the observers during the experimental sessions indicate that the subjects initiated discussion with and, overall, discussed mostly with the confederate who was wearing no odor. The confederates wearing chemical odor and the confederates wearing natural odor were, during the course of discussion, somewhat ostracized. This would indicate that the chemical odor worked as well as natural odor, and that the factor of the odor carrying throughout the room was not a problem. It would also indicate that society shuns those who do have body odor.

The subjects' post tests, filled out immediately after each experimental discussion, indicate that the subjects do not desire to consciously choose to ostracize a person who has body odor. When asked which of the other discussion members they would like to be involved in another discussion with, the subjects chose both of the confederates equally. One, of course, was wearing natural or chemical odor, one had no odor. When chosen equally, it would indicate that the odor was either not a consideration in some cases or some subjects chose to overlook the odor, especially in the cases where the confederate with odor was well dressed.

Hopefully this investigation will trigger further investigation into an area too long overlooked, the fact that odor is important in considering factors of person perception and nonverbal communication.

SUMMARY

This chapter described the experimental procedures designed to test the research hypotheses listed in Chapter I. Subjects used in the experiment were volunteers from various undergraduate courses at Pittsburg State University. Hypothetical discussion groups were formed. In each group two confederates, one display negative body odor, either socially acceptable or socially unacceptable, and the other normal levels of body odor, interacted with a subject.

A post-test was designed to ascertain the perception of the subject of each confederate on a number of dependent variables. Interaction charts were used to determine the subjects communication behavior toward each confederate.

Results indicated that significant differences occurred in interaction, with more communication being directed toward the normal odor confederate by the subjects. Subjects also selected the confederate who displayed socially acceptable levels of body odor to be a future partner, at a significantly greater proportion.

Although the discussion indicated some areas of experimental concern, it is the general conclusion of the study that body odor does have a significant impact on the perception of others.

## APPENDIX A

HUMAN COMMUNICATION  
ATTRACTION-DISTRACTION  
SCALE

NAME \_\_\_\_\_

SEX \_\_\_\_\_

AGE

Under 20 \_\_\_\_\_

20-30 \_\_\_\_\_

30-40 \_\_\_\_\_

40-50 \_\_\_\_\_

50-60 \_\_\_\_\_

Over 60 \_\_\_\_\_

This research is sponsored by Dr. Peter K. Hamilton, and in no way will the results of this survey influence your grade in any course. Your answers will be kept confidential and only those individuals directly involved with this research project will have access to these results. At the conclusion of the project the research team will be glad to share all results with each participant. Thank you for your cooperation.

This survey is designed to assess your feelings about the importance of a number of personal qualities involved in your interaction behavior with people. Please answer each item honestly when expressing your opinion. Remember, there are no correct or incorrect responses. Be sure to mark each item.

Listed below are a number of personal "traits" that often determine how much, if at all, you may wish to interact with certain people. Please rate each item as its relative importance to you. For example, if you feel that the other persons "sense of humor" would be an important trait in determining if you would want to interact with him or her, then you would mark "5." If you feel that the other person's "sense of humor" is not important to you, then you should mark "1."

Sample:	Totally Unimportant	Mostly Unimportant	No Opinion	Mildly Important	Very Important
Sense of Humor	1	2	3	4	5

This means the other Person's sense of humor, no matter what it is, is not a determining factor in your desire to interact with that person.

Sample:	Totally Unimportant	Mostly Unimportant	No Opinion	Mildly Important	Very Important
	1	2	3	4	5

This means the other person's sense of humor, no matter what, it is, is not a determining factor in your desire to interact with that person.



	Totally Unimportant	Mostly Unimportant	No Opinion	Mildly Important	Very Important
Authoritative- ness on the topic of dis- cussion	1	2	3	4	5
Listening behavior	1	2	3	4	5
Pleasant Personality	1	2	3	4	5
Opposite sex other	1	2	3	4	5
Well dressed other	1	2	3	4	5
Physical attractive- ness	1	2	3	4	5
Same sex order	1	2	3	4	5
Personal hy- giene of other	1	2	3	4	5
Talkative- ness of other	1	2	3	4	5
Reputation of Other	1	2	3	4	5
Well groomed other	1	2	3	4	5
Tone of voice other uses	1	2	3	4	5
If other behaves as though he be- lieves you	1	2	3	4	5
If other is dressed differently than you are dressed	1	2	3	4	5
A habit which may be annoying such as smoking, biting finger nails, etc.	1	2	3	4	5

This survey is designed to assess the way people feel about a variety of topics. We are interested in the overall opinions of various groups on these topics. Please answer each question as it applies to you by marking a 1 if you strongly agree with the statement, a 2 if you agree, a 3 if you have no opinion, a 4 if disagree, and a 5 if you strongly disagree. (Remember there are no right or wrong answers, only your opinion).

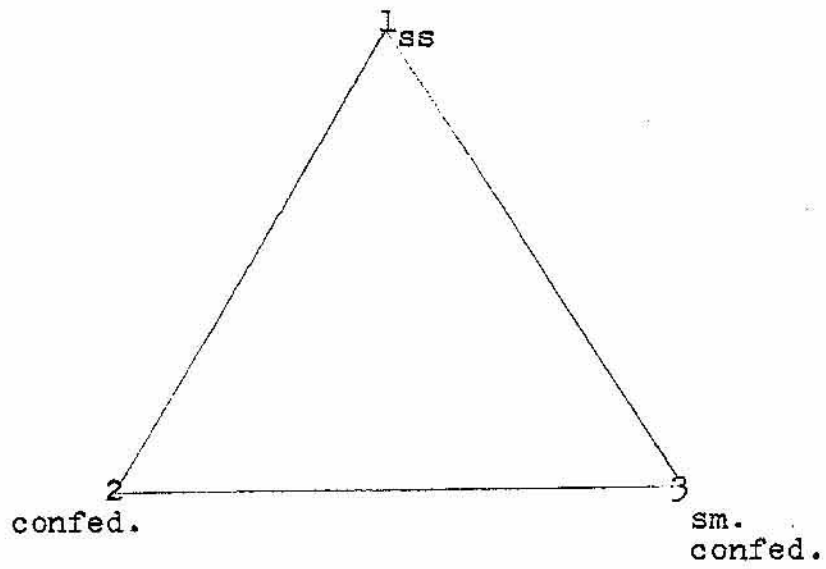
	Strongly Agree 1	Agree 2	No Opinion 3	Disagree 4	Strongly Disagree 5
1. All Dc - 10's should be permanently grounded.			1	2	3 4 5
2. Fraternities and sororities serve no useful function at PSU.			1	2	3 4 5
3. The number of required courses should be significantly reduced at PSU.			1	2	3 4 5
4. No athlete in any professional sport is worth the money he/she is being paid.			1	2	3 4 5
5. Marijuana should be legalized.			1	2	3 4 5
6. Carney Hall should be immediately torn down and a new building erected as soon as possible.			1	2	3 4 5

## APPENDIX B

"The DC-10 Should be permanetly grounded."

1. The airplane inspectors should perhaps be more qualified.
2. I heard that one bolt broke and that caused the loss of the engine.
3. Cars are frequently called back due to defects--planes are no different, they are bound to have defects also.
4. Airplane inspectors should be allotted more time to inspect each individual airplane.
5. Machines built by humans are bound to have flaws.
6. Think of all the money the airlines would lose if the DC-10's are grounded permanetly, and inflation is bad already.
7. If not so many lives had been lost, for example if it had been a cargo plane, there would not probably have been such a fuss.
8. Airplane inspector should be held more responsible for airline crashes.
9. I heard the engine was held on by only 3, one-eighth inch bolts.
10. The DC-10's should be re-structured and re-built for more security.

## APPENDIX C



## APPENDIX D

Name \_\_\_\_\_

The purpose of this study is to assess your opinion of the other members of this group. We are asking each member to privately evaluate the other members on a variety of issues relevant to group discussion. Please answer each question, and remember that the others will in no way have access to your evaluation.

Directions: Please find your "number" and draw a line through all of the answer blanks. Respond to each question twice, once for each of the other members in the group, according to the following scale:

- 1 Strongly agree; 2 Mildly Agree; 3 No opinion; 4 mildly Disagree  
5 Strongly Disagree

	Member 1	Member 2	Member 3
1. This member interested openly	_____	_____	_____
2. This member listened well	_____	_____	_____
3. This member expressed himself/herself clearly	_____	_____	_____
4. This member was well informed	_____	_____	_____
5. This member understood the issues	_____	_____	_____
6. This member supported his/her position with facts	_____	_____	_____
7. I enjoyed talking with this member	_____	_____	_____
8. I found his/her pleasant	_____	_____	_____
9. I felt comfortable talking with him/her	_____	_____	_____

10. If you were asked to participate in another discussion with ONE of the two members, which one would you select?
-

## WESTERN KENTUCKY UNIVERSITY

BOWLING GREEN, KENTUCKY 42101

## APPENDIX E



Department of  
Communication  
and Theatre

Mr. Gary D. Verburg  
810 West 3rd  
Pittsburg, Kansas 66762

March 7, 1979

Dear Mr. Verburg,

Most of the evidence on odor and perception is anecdotal. One source that influenced me on the subject was Michael Prosser's first chapter in Intercommunication Among Nations and Peoples. Beyond that, I know of little else.

I guess my own perceptions of odor stem from personal experiences in foreign countries and from interviewing visitors to foreign countries who are often most immediately in culture shock because of the vast differences in smell as well as sounds, visual experiences, etc.

I am grateful you asked - sorry I don't have book, chapter, and verse. Your thesis sounds like a great idea - submit your findings to the International and Intercultural Annual.

Sincerely,

A handwritten signature in cursive script that reads "Carley Dodd".

Carley Dodd

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