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The influence of arousal and positive affect on humor perception and response

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THE INFLUENCE OF AROUSAL AND POSITIVE AFFECT ON HUMOR PERCEPTION AND RESPONSE

by

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Abstract

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by

William B. Tierney

Adviser: Professor Howard Ehrlichman

The purpose of this study was to explore the differential contributions of positive affect (PA) and arousal toward the various components of humor perception: getting the joke, appraising its funniness, and amusement.

Based on pilot data from 22 judges, five blunt and five subtle cartoons were selected for use as humor stimuli in the main study. The ten cartoons were rated by 60 subjects, each of whom was randomly assigned to one of three experimental conditions: PA, arousal, and control. The study tested three hypotheses: 1) Subjects receiving positive-affect induction will report more positive appraisal ratings to humorous stimuli than subjects in the other two groups; 2) subjects in the arousal group will report greater amusement than control subjects, but less than PA subjects; and 3) while all subjects will understand nearly every blunt joke, the level of understanding for subtle jokes reported by PA subjects will exceed that reported by subjects in the other two groups.

In order to induce PA, subjects were thanked for their participation, and then given a lottery ticket. A pilot study confirmed the effectiveness of this method by using pleasantness-ratings of affect-neutral words as an indirect measure of PA. Subjects receiving praise and a lottery ticket rated these words more positively than did subjects who received neither.

Subjects in the arousal condition were required to perform an exercise described in Isen, Daubman & Nowicki (1987), which was intended to elevate their heart rate without influencing their hedonic state. In order to compare PA levels among groups, all subjects were asked to rate neutral-word lists--one list at the beginning of the session, right after receiving a lottery ticket or performing the exercise (when applicable), and another list at the end of the experiment.

No significant differences were found among the groups with respect either to appraisal, amusement, or getting the joke. There was no evidence of enhanced PA among subjects in the PA condition, and the exercise resulted in only a modest increase in heart rate. Difficulties in inducing prolonged PA are considered, and methodological improvements are discussed.

DEDICATION

To my father,

William W. Tierney

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Chapter I

Introduction

The present study addresses the issue of the various cognitive and affective states involved in humor perception. Whereas most of the research literature on humor focuses on the characteristics of the humor stimuli (e.g., sex humor, aggressive humor), the particular interests of this paper lie in the variablility within subjects, that is, the psychological factors relating to people's momentary reactions to humor.

Why is it that a person may find a joke funny at one time, while at another time that same person may not find it funny at all? There are a wide variety of possible reactions to any potential humor stimulus.

1) Getting the joke. It is logical to assume that in order to find a joke funny it is necessary to "get" the joke: to identify and understand the incongruity in what is said or presented. Understanding the joke is a necessary but not sufficient event in order for any bona fide amusement to occur; one can understand the joke and still not find it funny, but if one does not understand the joke, one cannot fully appreciate the humor.

2) The feeling of amusement. This refers to the private, subjective feeling of appreciation that is commonly felt every time a humorous stimulus is effective, that is, every time we appreciate a good joke. It is not enough merely to think a

joke is funny, for it is possible to believe a joke is funny and still not feel amused. For example, if a person is depressed or otherwise in a "bad mood", he or she may not be predisposed to experience amusement, no matter how funny the joke may be. Also, a person may be distracted or in an analytic or serious mindset. In addition, the feeling of amusement wanes upon repeated exposure to a joke. No matter how funny it is, if you've heard a joke several times, the feeling of amusement is much greater the first time one has heard it (e.g., Gavanski, 1986).

3) Amusement without laughter. Another possible response to a humor stimulus is to feel amusement but not to laugh. Just because someone appreciates humor does not necessarily mean he or she will laugh at it. Fatigue or embarrassment are possible reasons for this. A person may be less likely to laugh when he is alone than with a crowd of people.

4) Laughter without thinking the joke is funny. By now non-humorous laughter is a well-documented phenomenon (Deckers & Devine, 1981; Deckers & Kizner, 1975; Giles & Oxford, 1970; McGhee, 1983; Nerhardt, 1970, 1976). In some cases laughter is believed to serve as a tension-reduction mechanism. Furthermore it is possible to be influenced by the laughter of other people. For example, if someone were listening to a comedian telling jokes in a foreign language, and she were the only one in a large audience who did not understand the

language, she might still laugh along with the others. Another example may be found in a person laughing merely because she is in an extremely happy or aroused state, when she is greatly predisposed to laughter in the first place. This may also occur when one is drunk or otherwise intoxicated (Weaver, Masland, Kharazmi & Zillman, 1985).

5) Laughter without amusement. Finally, for reasons of impression management, a person may laugh without feeling the least bit amused, in order, for example, to be polite, or in feigning amusement in order to flatter or ingratiate someone. In some cases extreme anxiety or hysteria may also give rise to laughter without amusement.

The Distinction Between Emotional and Intellectual Factors

Is humor appreciation unidimensional or multifaceted? Investigators of humor response have employed three different basic measures. The first employs a single Likert scale, on which the subject rates the joke according to how funny he believes it to be. Another method also employs a Likert scale, only here the subject is asked to rate the joke in terms of how much amusement he felt. In addition, a number of studies have used a camera to record the facial responses (i.e., the expression--laughing or smiling) elicited by the humor stimulus. Consequently, none of the early humor studies succeeded in distinguishing between

appraisal and amusement. Instead they usually relied on a single, monolithic humor scale, with one end labeled "not funny" and the other labeled "extremely funny". Even now there is disagreement as to whether such scales tap the appraisal, amusement, or some combination of both (e.g., see Gavanski, 1986; Strack, Martin & Stepper, 1988). Accordingly, research of this type is of little value to psychologists whose goal it is to disambiguate the cognitive and affective sources of humor response. In fact Gavanski (1986) suggests that future humor research must include both an appraisal and an amusement measure of humor appreciation in each study, and should specify "whether they expect their manipulations to affect the cognitive evaluation of humor, the emotional appreciation of humor, or both" (Gavanski, 1986, p.214).

The differentiation among various types of humor perception may be traced back to an early but well executed study by Levine and Redlich (1960). They considered separately the influence of intellectual and emotional factors upon the appreciation of humorous cartoons. They compared five groups of psychiatric patients to one group of normal controls in their performances in a humor test. To each of a series of single-frame cartoons (taken from popular magazines such as the New Yorker and Saturday Evening Post), subjects expressed their spontaneous response

(e.g., smile, laugh) and dysphoric responses (e.g., frown, grimace). In addition, they sorted the cartoons into three piles: Like, Indifferent and Dislike. Finally the subjects were asked to interpret and freely react to the stimuli. Their findings indicated that the humor behavior of psychiatric patients was impaired as shown by their failure to appreciate the humor of the stimuli. They not only laughed and smiled at fewer cartoons, but displayed less positive reaction to these stimuli, either by choice or affective expression, than would normally be expected. Although a high correlation between intelligence and the understanding of the humorous stimuli was found, there was evidence that the psychiatric patients failed to understand many cartoons because of emotional rather than intellectual factors. They expressed a dislike for the stimuli much more often than did the controls, and tended to make many more perceptual and cognitive distortions of the thematic content, particularly in the direction of overlooking or mitigating sexual and aggressive elements. Levine and Redlich (1960) infer from these findings that emotional disturbances, particularly those involving anxiety, greatly impair the ability to appreciate humor. Therefore, it is likely that humor appreciation consists of at least two separate processes: one cognitive, the other emotional.

A commonsense notion of humor appreciation would have us expect that the three measures are virtually identical. After all, if a person thinks a joke is funny, he will likely feel amusement and laugh. However there is still no concrete evidence that this is the case, since there is no study which uses all three methodologies in a within-subjects design. However a recent study by Gavanski (1986) comes close. Gavanski tested the hypothesis that laughing and smiling responses are sensitive to the emotional appreciation of humor, whereas humor ratings reflect cognitive appraisals of humor stimuli. He presented cartoons between one and five times to 20 male and female undergraduates. Half the subjects were asked to rate jokes, on a scale of 1 to 5, according to how funny they were. The other half were asked to indicate, also on a scale of 1 to 5, how amused they felt upon rating the joke. Meanwhile the expressive responses of all subjects were recorded on a scale of 0 to 3 (0= no response, 1= attenuated smile, 2= full smile, and 3= laughter).

The design of the study precludes calculating the correlation between appraisal and amusement. However, Gavanski presents data which fairly strongly support the notion of covariance of the three measures of humor response: "The average ratings for cartoons that elicited mirth responses of 3,2,1, and 0, were 3.78, 3.46, 2.70, and

2.20, respectively on the funniness scale, and 4.16, 3.73, 3.30, and 2.90, respectively, on the amusement scale (Gavanski, 1986, p. 211).

From these findings one may conclude that the various measures of humor appreciation are virtually identical. While this may be true under normal conditions, however, under certain experimental conditions there have been found two basic aspects which may vary independently of each other. One may make a distinction between cognitive and affective components of humor response. "The cognitive component is the evaluation of humor stimuli in terms of their perceived humor content; the affective component is the subjective feeling of enjoyment produced by the humor stimuli" (Gavanski, 1986, p.209).

For example, in a frequently quoted study, Schachter and Wheeler (1962) sought to determine the effects of epinephrine, chlorpromazine, and a placebo on both overt expression and the evaluation of a humorous film. These investigators found that expressive responses increased monotonically with increases in the arousal characteristic of the injection. In contrast to their expectations, however, the ratings of funniness were completely unaffected by the injections. Young and Frye (1966) exposed subjects to a large number of jokes and compared their responses (overt expressions and joke ratings) under a variety of

conditions. They found that laughing increased in a group as opposed to a solitary setting but that there were no differences in joke ratings.

In a later pair of studies, Leventhal and Mace (1970) assessed the effect of age (first and second grades versus fourth and fifth grades and junior high school) and sex on the relationship between expression and the evaluation of a humorous film. Each study used a different procedure to vary spontaneous laughter. In the first experiment, subjects were either encouraged to laugh or were told to avoid laughing at the film. In the second study, the presence or absence of canned laughter was used to manipulate laughter response. Both the facilitative set and the canned laughter increased the subject's expression, and the effects were similar for male and female subjects at all grade levels. But the effects of set and canned laughter upon evaluations of the films were sharply moderated by the sex of the subject. In the first study, the grade-school boys who were encouraged to laugh rated the film as less funny than did boys in a control condition who were not encouraged to laugh. In contrast, the grade school girls rated the film as funnier when they were encouraged to laugh. In the second study, the junior high school boys devalued the film when exposed to the canned laughter, while the girls found it funnier when exposed to the canned

laughter. Moreover, within-cell correlations showed that laughter and film evaluations were highly and positively correlated for females while they were often uncorrelated or negatively correlated for males.

In a study of brain-damaged psychiatric patients, Gardner, Ling, Flamm, & Silverman (1975) found that subjects with left-hemisphere damage were able to interpret humorous cartoons without necessarily laughing or showing any amusement. Conversely, right-hemisphere patients did show laughter, but not at the appropriate cartoons.

Gavanski (1986) also demonstrated that cognitive and affective humor responses can be systematically dissociated. Cartoons were presented from one to five times to subjects. A behavioral measure of expressive response was obtained following each cartoon presentation. Humor ratings were obtained during the last presentation of each cartoon by means of scaled items. Participants were instructed either to rate how amused they were by the cartoons, or to rate how funny they thought the cartoons were. Cartoon repetition reduced amusement for all participants, according to their self-reports. However, repetition reduced humor ratings only for females who received amusement instructions. Laughter, on the other hand, decreased significantly with cartoon repetition for all groups.

Furthermore Gavanski says:

> "it is possible to conceive of many instances in which cognitive and affective humor responses might vary independently. For example, hearing a joke repeatedly may reduce people's amusement at the joke without reducing their appraisal of it, whereas sharing a joke with others may increase people's amusement without increasing their evaluations of the joke's funniness" (Gavanski, 1986, p.209).

Strack, Martin and Stepper (1988) approached this issue in a slightly different way. Instead of examining smiling or laughing per se, subjects were asked two questions about the cartoons they were presented. The question "How funny do you think these cartoons are if you try to apply an 'objective' standard?" was used to measure a cold, objective appraisal of the stimuli. The question "What feeling was elicited in you by looking at the cartoons?" was used to tap amusement. Among their findings was that facial feedback operates on the affective but not on the cognitive component of the humor response, reinforcing Gavanski's (1986) earlier findings.

Arousal

A great deal of research has been devoted to the idea that humor is arousing. An enduring popular conception of humor (first advanced over 125 years ago by Spencer, 1860) suggests that the laughter that accompanies humor serves to reduce built-up energy or tension (McGhee, 1983). Spencer argued that laughter serves as a form of "safety valve" for relieving excess energy built up in the nervous system.

Freud (1960) also adopted this notion, arguing that laughter is a means of releasing excessive "psychic energy." The subjective feeling of reduced tension after laughing has probably given rise to the belief that there is a corresponding physiological energy release.

Berlyne's Theory of Collative Motivation

A more contemporary approach has been pursued by Daniel Berlyne (1960, 1969, 1972). According to him, the main properties of humor stimuli that lead to humor appreciation are what he refers to as their "collative properties." These properties are defined in terms of absolute stimulus qualities as they relate to the individual's knowledge of those properties. Any arousal changes that occur in response to a given stimulus depend on the outcome of comparing one's knowledge about comparable stimuli that were experienced in the past with the properties of this particular stimulus. The most important collative properties of stimuli are novelty, complexity, incongruity, and, perhaps, redundancy. Berlyne proposes that these stimulus properties cause changes in arousal levels which account for the extent of humor experienced (McGhee, 1983).

In a study by Yates and Miller (1982), two experiments tested Berlyne's prediction that subjects' pre-existing arousal states influence their appreciation of humor. Seating orientation was varied to effect changes in arousal.

In the first experiment, arousal was varied by a direct manipulation of the social situation of subjects exposed to jokes. They believed that females are more relaxed when a stranger sits across from them and more aroused when the stranger sits next to them, and that the opposite holds true for males. Therefore, 18 female undergraduates were asked to rate 10 pre-recorded jokes for humorousness while seated either side-by-side or face-to-face with a female stranger. As predicted, jokes were rated more highly in the more arousing side-by-side condition. However, no difference in subjects' laughter was observed.

In the second experiment, 32 female and 32 male undergraduates rated the 10 jokes while seated in either arrangement with a same-sex stranger. Despite methodological improvements in the measure of expression and evidence of its reliability (experimenters were now able to hear, as well as see the subjects), again no differences for smiling were observed. As predicted, female subjects rated jokes more highly when side-by-side, but so did males. These results support Berlyne's theory but suggest that heightened arousal in the side-by-side condition may have been related to the physical distance between subjects rather than to seating orientation per se. However since no manipulation checks were conducted, the conclusions based on the results of these studies may not carry as much weight as

might otherwise have been the case had proper checks been carried out.

Arousal and Physiology

Investigators studying the relationship between arousal and humor have clearly demonstrated that humor is associated with an increase of activity in the sympathetic nervous system (e.g., Averill, 1969; Levi, 1965; Sternbach, 1962). Similar activation occurs in very different emotional states, such as sadness and anger (Averill, 1969; Levi, 1965). The fact that epinephrine is secreted during both anger and laughter points to the general importance of autonomic arousal in each of these emotional states. Early support for the contribution of such arousal to reported funniness of a humor stimulus was provided in Schachter and Wheeler's (1962) classic study, described earlier, in which it was found that injection of subjects with epinephrine led to increased laughter while watching a humorous film. Other studies have shown that the laughter experience is associated with increased heart rate (Averill, 1969; Godkewitsch, 1976; Goldstein, Harman, McGhee, & Karasik, 1975; Jones & Harris, 1971; Langevin & Day, 1972; Martin, 1905; and Spencer, 1860), increased skin conductance (Averill, 1969; Godkewitsch, 1976; Goldstein et al., 1975; Langevin & Day, 1972), increased muscle tension (Chapman, 1973, 1976; Spencer, 1860)), altered respiratory patterns

(Fry & Rader, 1977; Fry & Stoft, 1971; Lloyd, 1938; Spencer, 1860; and Svebak, 1975, 1977), and characteristic EEG changes (Svebak, 1982). Therefore we may conclude that there is an impressive body of evidence associating smiling or laughing with autonomic arousal.

In an important study by Godkewitsch (1976), it was found that heart rate and skin conductance indices of arousal indicated that increased arousal was linearly and positively related to judged funniness. Also, punch lines rather than joke-bodies or set-ups were found to be the major source of humor-associated arousal. Physiological responses to punch lines were positively correlated with their funniness. The more arousal the punch lines of the jokes evoked, the funnier the jokes were rated. "The findings indicate that arousal is necessary for humor and that humor cannot be explained simply in terms of cues that operate independently of arousal". (Godkewitsch, 1976, p. 134).

Based on this reasoning, Cantor, Bryant and Zillmann (1974) demonstrated that humor responses are enhanced not only by the excitation produced during the time of exposure to humor stimuli, but also by "residues of excitation caused by a variety of emotional states aroused prior to exposure to humor" (Cantor et al., 1974). Subjects were exposed to stimuli inducing either high or low levels of

emotional arousal before exposing them to humorous communications. Subjects were exposed to humorous communications after reading one of four written stories which had been chosen to effect a factorial variation in a) hedonic tone (positive, negative) and b) excitatory potential (low, high). The differentiation of the written communications was validated by analyses of ratings given to the experimental stimuli by the subjects. They found only a main effect for arousal: under conditions of both positive and negative hedonic tone, prior arousing communications resulted in significantly higher funniness ratings of the subsequent cartoons and jokes than prior exposure to the less-arousing stimuli (Cantor et al., 1974). It was concluded that there is a high degree to which a person's response to humor may be influenced by his excitatory state deriving from immediately prior experiences.

Laughter and Arousal Change Without Humor

There is now some reason to believe that laughter and arousal change may occur without any kind of humorous stimuli. Specifically, laughter serves a general arousal-reduction function, apart from its connection with humor. In "nervous laughter," for example, the act of laughing appears to help regulate felt tension (McGhee, 1983). Also, Nerhardt (1970, 1976) and Deckers (Deckers & Devine, 1981; Deckers & Kizer, 1975) have found that

laughter occurs in weight-lifting experiments when there is a large discrepancy between the weight expected and the weight actually encountered. This laughter appears to serve to return the arousal resulting from the expectancy violation back to a base level range. It is probably the awareness of this arousal reduction that propelled support for the earlier belief that laughter actually releases energy from the nervous system (McGhee, 1983).

Tomkins (1962) argued that laughter and other positive affects result from the changes in neural firing that accompany sudden drops in stimulation. Tomkins also considered laughter to be simply an intense form of smiling. Actually, for Tomkins it is the combination of the original degree of intensity of stimulation and the suddenness of the drop in neural firing that determines whether laughter or smiling occurs.

Both existing data and theoretical views, then, suggest that the link between arousal changes and laughter is a very general one that does not necessarily require a humor experience as a prerequisite. While it is difficult to speculate about when in human evolutionary history the capacity for humor began to appear, it seems likely that this general relationship between laughter/smiling and arousal (in a positive or safe context) developed first. As the cognitive experience of humor developed out of a more

general disposition toward play, its associated arousal changes must have been incorporated into the general system linking laughter to arousal. While it is commonly acknowledged (e.g., see Giles & Oxford, 1970) that there are several forms of nonhumorous as well as humorous laughter, virtually no attempt has been made to study how these different kinds of laughter differ in terms of their physiological and psychological sources, and their possible role in the history of human evolution (McGhee, 1983).

Humor and Affect

Several studies have examined the question of which affective or motivational states best predispose a person to respond to humor. In a fairly early study, Young and Frye (1966) explored the importance of various manipulations of the social environment on appreciation of humor among college males. There were three experimental conditions. The first was hostility-arousal (in which a professional actor, playing the role of E kept subjects waiting and then scolded them for not hurrying to the experimental setup. During the study subjects were continually harassed). The second condition was group (vs. individual) administration. The third condition was presence of a laughing (vs. non-laughing) confederate. It was found that group administration and laughter by the confederate resulted in facilitation of both the ratings of jokes and, especially,

overt laughter, while hostility- arousal and a confederate's embarrassment at sex jokes markedly decreased both types of subjects' assessed humor appreciation.

Another early study by Hom (1966) investigated the effects of threat of shock on the perception of humor, employing subjects of various levels of trait anxiety (Taylor Manifest Anxiety Scale). Twenty subjects were in each of the categories of high, medium, and low anxiety scores. Half of the subjects in each category were administered a "threat of shock" treatment, while the other half were given "no threat of shock" treatment. Each subject rated 10 jokes as to how funny they were on a 5-point scale. Threat-of-shock treatment significantly attenuated humor appreciation, but there were no significant differences in response as a function of levels of anxiety. Hom concludes that threat of shock served as an "effective emotional disturbance in the sense that, as an aversive stimulus, it suppressed the perception of humor" (Hom, 1966). His findings are consistent with the Freudian notion that anxiety may mitigate humor appreciation unless the humorous stimulus is perceived as harmless upon getting the joke.

Fasolo and Gambini (1981) examined the influence of negative affect upon humor perception. They presented 10 humorous limericks to 25 sheltered depressed patients and to

25 nurses. Each subject rated the humor of each limerick on a three-point scale. No attempt was made to quantify laughter or facial expression, however. It was concluded that depressed people, contrary to popular opinion, do understand the humor in incongruity and nonsense. Humor about being depressed seemed more humorous to the depressed themselves than to the nurses.

In a factor analytic study by Wicker, Thorelli, Barron, & Willis (1981), subjects rated jokes on funniness after rating their own mood on the Mood Adjective Checklist. Three mood factors reliably predicted joke appreciation: surgency, elation, and vigor (all closely related to positive affect; see Thayer, 1978). Humor appeared independent of aggression, anxiety, tension, and inhibition (mostly negative affects). Relationships among joke-ratings were highly similar for subjects who reported being in relatively positive moods and for those reporting more negative moods. Still, the contribution to arousal from positive affect (e.g., elation) and that from neutral-valence autonomic arousal (e.g., surgency) was not spelled out.

Motivation and Humor Preference

Several, mostly early studies, manipulated subjects' motivational state in order to examine the role of motivation on humor perception. For example, in an

experiment by Strickland (1959), subjects were shown cartoons and asked to rate them on a 15-point scale. It was shown that the arousal of different types of motivations produces differences in humor preferences. Specifically, subjects in a hostility-arousing situation (they were treated impolitely by an experimenter) preferred humorous material of a hostile and aggressive nature, while subjects placed in a sexually-arousing situation (being shown nude photographs) preferred humorous material with a sexual theme.

Dworkin and Efran (1967) performed an experiment which involved insulting the subjects in the experimental group, thus angering them. Angered subjects judged hostile humor (excerpts from live comedy albums) as funnier than did the non-angered subjects. The authors suggest that humor preferences are sensitive to at least one kind of arousal--anger, and that anger does not make people more appreciative of humor in general, but only to respond selectively to humor of hostile content. However in this study, arousal is confounded with negative affect. Thus it is impossible to disentangle the separate effects of each variable.

According to Goldstein, Suls, & Anthony (1972), it is possible to interpret motivational studies like these in cognitive terms. In much of this research it has been

assumed that these inductions did, in fact, influence acute drive state. Moreover, such experiments have usually been restricted to sexual and aggressive drives. An interpretation of these studies based on a cognitive framework suggests that what is being manipulated is not so much the subjects' motivational state, as the salience of particular types of stimuli. By showing subjects aggressive photographs, for instance, the experimenter may simply be lowering their threshold for the perception of other aggressive stimuli. Thus, subjects shown aggressive photographs may rate aggressive humor as funnier than other types because they have, in some sense, an aggressive cognitive set which facilities their processing of aggressive jokes. In addition, manipulation checks, which have been carried out in only a few of these studies, may be considered in the same light; that is, they may be measuring salience as much as actual motivational states. Thus, when subjects are asked to indicate their post-manipulation moods by checking self-descriptive adjectives on a checklist, they may indicate those traits which are most salient to them, rather than (or in addition to) their motivational states. In one experiment, it was shown that when aggression is the salient theme in a cartoon, subjects preferred aggressive humor to other types of thematic content, and that when automobiles were made salient, subjects showed the greatest

enjoyment of cartoons with automobile content (Goldstein et al, 1972).

The Role of Affect and Arousal Upon Cognition

Another program of research suggests that positive affect also may enhance one's predisposition to appreciate humor. For example, recall the studies described above in which increased humor ratings were found among subjects exposed to laughter, and among subjects experiencing a positive affective state (e.g., Wicker et al., 1981; Young & Frye, 1966).

Positive affect apparently has far-reaching psychological consequences, influencing social behavior (e.g., promoting prosocial behavior and liking for others), as well as cognition (e.g., causing subjects to rate slides of ambiguous scenery as more pleasant than subjects who are not in a state of positive affect, giving rise to optimism and expectations of future success, facilitating the recall of positive material, promoting the use of intuitive, rather than logical problem-solving strategies, increasing creativity and facilitating decision making) (Isen, 1984). However the exact extent to which affect may influence cognition is still unknown. In fact it may be difficult to overestimate the role affect plays on cognition. For example, Zajonc (1980; 1984) argues that while affect and cognition are "under the control of separate and partially

independent systems that can influence each other in a variety of ways" (Zajonc, 1980), affect is primary, and precedes cognition. Isen (1984) concludes that "feeling states are so pervasive--they color almost everything that we experience and do--that they seem to involve as part of their definition the cognitive processes whereby they tend to cue compatible thought and behavior." (p. 226).

In addition to this, several more recent experiments performed by Isen and her colleagues (Isen, Daubman, & Nowicki, 1987) demonstrate the facilitative role positive affect plays in performance on tests of creativity. The authors concluded that "good feelings increase the tendency to combine material in new ways and to see relatedness between divergent stimuli (Isen et al., 1987). One may therefore believe there to be a close correspondence between the creativity involving the ability to see relatedness in diverse stimuli that normally seem unrelated, and the cognitive "jokework" necessary to "get" subtle humor.

Another important issue is the relationship between arousal and positive affect. It is implicit in much of the affect literature (e.g., Thayer, 1978, Thayer, Takahashi, & Pauli, 1988; Watson & Tellegen, 1985) that arousal is an important component of positive affect (just as is the case with negative affect). If this were the case, then the two are inseparable. However, Isen questions such an

assumption. In her research, a manipulation designed to induce positive affect improved performance on two tests of creativity; one manipulation intended to induce negative affect, and two promotive of arousal devoid of any particular affective tone had no effect on these measures (Isen et al, 1987). Thus Isen and her colleagues concluded that elation, if it involves arousal, is unlike some other aroused states in that it seems to lead to the kinds of thinking that enable people to solve problems that require ingenuity or innovation. She states that "it is not clear whether positive affect does in fact create an aroused state, although many assume so...." (Isen et al, 1987).

Recently Mandler, a strong proponent of the role of arousal in emotion, argued that arousal is not a prime component in the types of mood examined in most affect studies (Isen et al, 1987; Mandler, 1984). In one of her studies, described above, Isen herself successfully employed an exercise manipulation to induce a state of arousal devoid of any affective tone (Isen et al., 1987). She summarizes the issue as follows:

> "Although it is not possible to say for certain that positive affect of the kind used in these studies (mild elation) involves any arousal, it does seem clear that feeling good has effects different from those commonly associated with or produced by arousal. Thus in sum, there seems to be reason that we should not think of elation as involving arousal. Yet the mere use of the term elation, rather than positive affect, in the

> preceding sentence makes clear how difficult it will be to think of positive affect as devoid of arousal. Thus, let us conclude by saying that even if positive affect does have an arousal component or does result in increased arousal, it also has other effects; it has been demonstrated to have influences on cognition and behavior that mere arousal does not. In conclusion, the interpretation that we have suggested for the impact of positive affect on creative problem solving is that good feelings increase the tendency to combine material in new ways and to see relatedness between divergent stimuli. This occurs because the large amount of cognitive material cues by the positive affective state results in defocused attention, and the more complex cognitive context thus experienced by persons who are feeling happy allows them greater interpretations. This increased range of interpretations results in awareness of more aspects of stimuli and more possible ways of relating and combining them" (Isen et al, 1987).

Mood Effects or Cognitive Priming Effects?

Despite the growing corpus of literature, the issue of cognitive/affective primacy remains: does affect cause cognition, or does cognition cause affect? Early studies on mood and memory have shown a correspondence between affective state and memory. Specifically, people in a positive mood are more likely to recall positive material than are people in a negative mood, and, similarly, people in a negative mood are more likely to recall unpleasant material than are people experiencing a positive mood (Blaney, 1986). Two different theories have been proposed to explain how affect may influence cognition in this way. The first and probably more popular is cognitive priming

theory. This states that affect can "prime", or increase the accessibility of material, stored in memory, that is in some way similar. In other words, material stored in memory exists in a network of associations. A particular affective state simply activates other material to which it is related. Thus a positive state would automatically give rise to cognitive structures associated with that mood. These cognitive structures then prime, or serve as a cue to other items which are in some way associated to them in long-term memory. Thus it is the mood-related cognitions that influence memory retrieval and not affect per se (Blaney, 1986; Rholes, Riskind and Lane 1987). A rival theory, however, proposes that affect results from the cognitive appraisal of one's current situation as either good or bad. According to this model, affective experience itself can directly influence subsequent perception and behavior (Blaney, 1986; Ehrlichman & Halpern, 1988; Erdley and D'Agostino, 1988).

Definition of Terms

At this point it may be useful to clarify and define some terms that will appear throughout the rest of this paper. The word appraisal will be used to mean an objective rating--a value judgement of goodness or badness, especially as it applies to humorous stimuli. Arousal denotes a physiological state of increased autonomic arousal (e.g.,

heart rate), without respect to affective tone or valence. By amusement we mean a subjective state of positive affect. When the word understanding is used, it refers to "getting the joke", or gaining insight into why a stimulus is funny. And the term expression refers to an external, observable response (e.g., laughing).

For the sake of further clarification, it is worth demonstrating how this study deals with each of the four dimensions of affect with respect to humor response. In the cognitive domain, we deal with both the appraisal of a joke, as well as understanding it. In the physiological domain, we deal with autonomic arousal. For the expressive component, laughing and smiling is considered. And for the experiential aspect of affect, we consider amusement.

Proposed Model of Humor Response

The main question this study addresses is how pre-existing mood and arousal influence the process of joke perception and humor response. In order to clarify the origins of the proposed hypotheses, it may be helpful to propose a series of steps by which a person responds to a humorous stimulus.

Our starting point is the cognitive component of affect--whether or not a person understands the joke. If he does not understand it, the humor-response process ends. If, however, a person does understand it, he must then

appraise the joke, or decide whether it is funny or not. If he thinks it is not funny, then the process ends. If he thinks it is, then the next phase of the process deals with the experiential component, namely amusement. If the subject is not amused by the stimulus, the process ends. If he is amused by the joke, the next phase of the response is physiological--the extent to which a person is aroused. If he is not aroused, the process ends. If arousal does take place, we may come to the expressive component--specifically, smiling, and even laughter may result, provided the subject believes laughter would be an appropriate response according to the social situation.

Origins of Hypotheses

It is proposed that positive affect may serve to enhance the first three steps of the process. It can enhance the understanding of the joke because positive affect enhances "the tendency to combine material in new ways and to see relatedness between divergent stimuli" (Isen et al., 1987). It can influence the appraisal of a joke because it affects the way in which people make objective ratings (Isen, 1984). And it can augment the feeling of amusement simply because of the increase of positive affect. Arousal, on the other hand, is believed not to influence the first two steps of the process (understanding and appraisal), but to enhance the third step--the feeling of

amusement. This is because arousal is increased upon feeling amused by a joke (e.g., Godkewitsch, 1976).

Relation of Model to Theory

This proposed model must now be related to past research and theory. What predictions and explanations do these bodies of research provide?

According to the Schachterian model (e.g., Schachter and Wheeler, 1962), a person feels amusement upon encountering a joke because he is aroused by it. In other words, non-valenced arousal increases the amusement component of humor response. While this model would explain arousal-dependant amusement, it does not account for amusement in the absence of arousal.

According to self-perception theory (Bem, 1972), a person would decide to appraise a joke as funny because he is amused. He knows he likes the joke (he may even be laughing or smiling), so based on this self-perception he concludes that he must think the joke is funny.

More recent research suggests that positive affect can influence cognitive processes. Specifically, positive affect seems to dispose people toward making positive judgements. In one study, for example, Isen, Shalker, Clark, & Karp (1978) discovered that subjects who received a positive-affect induction (receiving a free gift) reported that their cars and television sets performed better than

did subjects in a control group. This would lead us to believe that positive affect could influence the appraisal component of humor response.

Additional research also suggests that there is a further relationship between positive affect and cognition. For example, recall the study by Isen et al. (1987) in which it was suggested that positive affect enhanced the ability to see relatedness in diverse stimuli. Research such as this would suggest that positive affect may facilitate the cognitive processes (or "jokework") involved in responding to humor, namely understanding a joke.

Despite all the studies just described, there is still at least one aspect of humor perception that theory and research do not address: the relationship between positive affect and amusement. While so much research has focused on the influence of affect upon cognition (e.g., Isen, 1984), there has been very little work done on the influence of affect on affect! Are people who are experiencing a good mood more inclined to react more positively to events? While most lay persons would probably suspect this to be true (it makes intuitive sense), there is a curious absence of research evidence that would suggest a direct link between mood and amusement.

The present study sets out to evaluate some of these notions, and will focus on the role of positive affect.

This study is unique in that it examines several different components of the process of humor perception and makes specific and differential predictions about each one. It is hoped that by approaching the subject in this manner, a clearer picture of humor response will emerge.

Hypotheses

The various contributions made by positive affect (PA) and arousal cannot be considered in a vacuum. Although they each play a different role, they must be considered as a package.

According to the model outlined previously, appraisal leads to amusement. However according to Bem (1972), self-perception could feed back. Amusement could feed back on appraisal (e.g., "I'm smiling, therefore I must think this is funny"); or arousal could feed back on appraisal (e.g., "I feel aroused, therefore I must think this is funny"). It is therefore necessary to consider PA and arousal together in order to tease out the different effects of each.

Hypothesis 1: Subjects receiving positive-affect induction will report more positive appraisal ratings than subjects in a control group, while subjects in the aroused condition will not differ from the control group. Table 1 shows the hypothesized relationships among the appraisal ratings for each joke type and experimental condition.

Table 1

Diagram of Hypothesized Relationships Among Appraisal Ratings by Experimental Condition and Joke Type (Hypothesis 1)

CONDITION	JOKE TYPE	
	Blunt	Subtle
Positive Affect	+	+
Arousal	0	0
Control	0	0

Note: 0 merely denotes a baseline level; + denotes a level greater than baseline. Although hypotheses are identical for both blunt and subtle stimuli, the basis for this distinction is made clear later, in discussing hypothesis 3.

It is predicted that positive affect will have a direct effect on appraisal. We base this on the findings that PA can influence appraisal and other cognitive processes (e.g., Isen, 1984). This has to do with the subjects' more positive appraisal, that is, the more positive evaluation of the funniness of the cartoon. Therefore PA has a direct impact on the positivity of appraisal.

Unfortunately, the same prediction is also made by self-perception theory. That is, assuming that PA can also influence amusement, instead of there being a direct link from PA to appraisal, there could be a self-perception of amusement which, in turn, leads to more positive appraisal. According to this perspective, PA enhances positive appraisal, not because PA directly influences the cognitive processes involved in evaluating a joke, but because of an indirect feedback loop from amusement to self-perception, to appraisal. If self-perception theory is true, then not only PA, but also arousal will serve to enhance positive appraisal. In other words, the subject may self-perceive her arousal ("I'm feeling aroused, therefore this must be funny"). Thus self-perception theory predicts a pattern such that both PA and arousal contribute to more positive appraisal.

Although this is reasonable, the empirical evidence is very weak (recall Schachter & Wheeler, 1962). Therefore,

that is not predicted. It is instead predicted that amusement and arousal are not self-perceived, and that only PA serves to enhance positive appraisal of humor stimuli because of the direct role PA plays in cognitive appraisal in general. Of course, the research literature does not support the idea of arousal influencing appraisal; nevertheless, it cannot be ruled out. The prediction that arousal will not influence appraisal represents an empirical generalization stemming from the Schachter and Wheeler findings (1962) that arousal enhanced laughter, but did not influence the appraisal stage. Aroused subjects did not find jokes any funnier than the non-aroused subjects--they just laughed more.

However we do know from the same research that arousal can enhance amusement. Thus if we were to predict, on the basis of the findings of Schachter and Wheeler the influence of arousal upon the amusement response to a joke, we would say that arousal would enhance amusement, without influencing appraisal.

On the other hand, there are (surprisingly) no theoretical perspectives leading to the prediction that positive affect leads to enhanced amusement in responding to a humor stimulus. So far, the lay person's presumed position that positive affect is connected to continued positive affect, has not yet been verified (indeed, to our

knowledge it has not even been tested!). Nevertheless, based on this common sense understanding of the dynamics of affect, we may predict that the positive feeling derived from PA will transfer over to the amusement response.

In addition to this, there is another process whereby PA can exert an influence upon amusement. Because PA is thought to increase positive appraisal, and thereby enhance one's appreciation of the joke, our proposed model of humor response dictates that this will lead to heightened amusement. After all, if a person thinks a joke is funny, it is logical to believe that he will experience amusement. Increase the appraisal of funniness, and you enhance the amusement. Therefore, because there are two processes in which PA influences amusement (increased positive appraisal, and transfer of positive feeling), and only one way in which arousal enhances amusement (i.e., through the transfer of arousal), we may predict an additive effect upon amusement level among PA subjects. As a simplifying assumption, let us assume that the three processes just described (i.e., increased positive appraisal, transfer of feeling and transfer of arousal) all have equivalent effects.

It is therefore hypothesized that both PA and arousal will serve to enhance the amusement component of humor response. Furthermore, an ordinal effect is predicted in the way of a trend from control group to arousal group to PA

group. Specifically, it is hypothesized that the arousal group will be more amused than the control group because of the transfer of arousal, and the PA group will be more amused than the arousal group because of the combined effect of the joke-appraisal and the transfer of positive mood. Hence the next hypothesis:

Hypothesis 2: Subjects receiving positive-affect induction will report greater amusement than subjects in the arousal condition, who, in turn, will report greater amusement than subjects in a control group. Table 2 shows the hypothesized relationships among the amusement ratings for each joke and experimental condition.

Furthermore, positive affect has been found to enhance creativity (e.g., Isen et al., 1987). This is perhaps because positive affect improves the ability to see relatedness among diverse stimuli which may normally seem unrelated (Isen et al., 1987). Because a positive affective state may enhance the ability to see relatedness in diverse, apparently unrelated stimuli, it is therefore hypothesized that:

Hypothesis 3: Subjects receiving a positive-affect induction will report greater understanding of the subtle humor stimuli than either subjects in the arousal condition or subjects in a control group, while all three groups will report equal understanding of the blunt

Table 2

Diagram of Hypothesized Relationships Among Amusement Ratings by Condition and Joke Type (Hypothesis 2)

CONDITION	JOKE TYPE	
	Blunt	Subtle
Positive Affect	++	++
Arousal	+	+
Control	0	0

Note: 0 merely denotes a baseline level; + denotes a level greater than baseline.

stimuli. Table 3 shows the hypothesized relationships among the understanding-scores for each joke and experimental condition.

The findings stemming from the third hypothesis may have a bearing on the pattern of results stemming from the first two hypotheses. For example, if it is found that subjects in the PA condition were able to understand a greater number of the subtle jokes than did the subjects in the other two experimental conditions, as the third hypothesis predicts, then it would be likely for these PA subjects to have also reported greater positive appraisal and amusement. This is because the humor response is an integrated process, having at least three distinct components.

Summary of Hypotheses

Subjects receiving positive-affect induction will report more positive appraisal ratings to humorous stimuli than subjects in either the arousal or control group. Aroused subjects, however, will report greater amusement than control subjects, but less than PA subjects. Finally, while all subjects will understand nearly every blunt joke, the level of understanding for subtle jokes reported by PA subjects will exceed that reported by subjects in the arousal and control group. These last two groups will report equal levels of understanding for the

Table 3

Diagram of Hypothesized Relationships Among Understanding Scores by Experimental Condition and Joke Type (Hypothesis 3)

CONDITION	JOKE TYPE	
	Blunt	Subtle
Positive Affect	++	+
Arousal	++	0
Control	++	0

Note: 0 merely denotes a baseline level; + denotes a level greater than baseline.

subtle stimuli.

Chapter II

Method

Pilot Study

Subjects

Judges for the pilot study were recruited from the Brooklyn College Subject Pool. A total of 29 subjects participated in order to fulfill an Introductory Psychology research participation requirement. To satisfy this requirement, the subjects had a choice of participating in one of several research projects. They chose the present dissertation project by printing their name on the corresponding sign-up sheet.

The study was approved by the Human Subjects Committee of Brooklyn College and the City University of New York Graduate Center.

Purpose and Overview

The purpose of the pilot study was twofold. On the one hand, judges were required to rate cartoons for funniness, bluntness and subtleness, in order to select five blunt and subtle jokes for use in the main study. It was planned that of the original pool of 42 cartoons, the five most blunt and subtle, with middling funniness ratings, would be used in the main study. Subjects were also needed, however, to demonstrate the effectiveness of both the positive-affect

manipulation, as well as the word-list rating task in assessing mood indirectly.

It should be noted that although there is no single, widely used measure of either appraisal, amusement or bluntness/subtleness, there have been many humor studies using cartoons as humor stimuli, along with rating scales (e.g., Chapman, 1973; Gavanski, 1987; Strack et al., 1988; Suls, 1975).

Pilot Study I

Procedure. Nine subjects were run individually. After signing a consent form, they were simply asked to complete the cartoon rating form, which contained the following directions:

"In this study, we need your opinions about certain comic strips. After you read each one, we would like you to give THREE ratings to each cartoon.

"FIRST, tell us whether you get the joke; that is, whether you understand why it is funny. For some of the cartoons, the joke will be easy to get; for others, it may be quite difficult. Indicate this by circling the appropriate number: 1= I definitely get it; 2= I probably get it; 3= maybe I get it; 4= I probably don't get it; 5= I definitely don't get it.

"SECOND, rate each cartoon on a scale of one to 10 according to how funny you think it is. Rate it a one if

you think it is not funny at all; rate it a 10 if you think it is one of the funniest you have ever seen, and so forth. Even if you don't get the joke, we are still interested in how funny you think it is.

"THIRD, rate the joke according to how blunt or subtle it is. Some of the jokes you read will contain humor that is very obvious, or BLUNT. Jokes like this require very little thought or mental effort to appreciate. Others may have humor that is less obvious, or SUBTLE. Jokes of this type are more challenging, and require more mental effort. Keep in mind that bluntness and subtleness have nothing to do with how funny a cartoon may be--they are independent of each other. Please rate each cartoon on the following scale: 1= very subtle; 2= fairly subtle; 3= neither blunt nor subtle; 4= fairly blunt; 5= very blunt".

The cartoon booklet contained 42 single-frame, or panel cartoons, of "Ziggy", "Herman", or "The Far Side". Subjects then gave three ratings to each of the cartoons.

Analysis of these ratings revealed that while several cartoons qualified for use as blunt stimuli, virtually none of the jokes qualified as subtle stimuli--almost all the jokes were rated as very or fairly blunt, and were gotten by most subjects. Clearly, a second pool of much more subtle cartoons was needed.

Pilot Study II

Purpose and Overview. The second pilot study had two objectives: 1) to find at least five cartoons which were suitable for use in the main study as subtle humor stimuli; and 2) to demonstrate the efficacy of the chosen PA induction by using the word-rating method.

Issues in affect induction. In recent years psychological researchers have developed a number of techniques for inducing positive affect in the laboratory. Among these methods have been providing feedback as to success on a task, giving free gifts, having subjects find a dime in the coin return of a public telephone, playing pleasant music, providing refreshments, asking subjects to remember or imagine emotion-producing events, and hypnosis (Isen & Forgoglione, 1983). As of yet there is no single, agreed-upon method considered to be superior. Each method has its drawbacks. For example, one widely used method of affect induction is the Velten Mood Induction Procedure (Velten, 1968), in which the subjects are presented 50 statements designed to put them in a good, bad, or neutral feeling state. One problem with this method has to do with demand characteristics; in many cases the intentions of the experimenter are obvious to the subjects, and so the subjects may behave according to what they believe are the experimenter's wishes or expectations.

Another matter of concern is the duration of the change

in affective state. Studies indicate that the resulting change in affect is relatively brief (20 minutes, Isen, Clark & Schwartz, 1976; only 10 minutes, Frost & Green, 1982).

A third question which arises is the external validity of the procedures. For example, just how happy does a person become merely upon finding a dime in a coin slot, or being given an inexpensive gift? Although such manipulations have been used with success in the past (e.g., Isen et al., 1987), for the present study, it was felt the chosen manipulation should be as internally valid as possible without making obvious its purpose.

Yet another issue has to do with the confounding of arousal with affect. For example, playing lively music may arouse subjects in addition to putting them in a positive state. In this experiment it was necessary to use a method that arouses subjects as little as possible.

Positive-affect induction. It was decided to induce positive affect by using a combination of two methods. The first consisted of temporarily increasing the subjects' self-esteem. This has been employed successfully in several studies as a method of inducing positive affect (e.g., Isen, 1970; Fisher, DePaulo and Nadler, 1981). For example, Isen (1970) found that success on a task of perceptual-motor skills enhances positive affect.

The second method is by giving the subjects a gift, as a token of the experimenter's appreciation. The gift need not be expensive, as Isen et al. (1976; 1987) have shown that receiving gifts as unimpressive as free samples and candy is enough to enhance positive mood.

Accordingly, subjects in the positive-affect condition were first given profuse thanks for participating in the study. They were then presented with a lottery ticket as a token of the experimenter's gratitude.

In order to ascertain the effectiveness of the induction, all subjects were asked to perform a very brief word-evaluation task immediately after the induction (if they received one), and right before being presented with the humor stimuli. It is believed that such tasks may be more sensitive to positive affect than self-report mood scales (Kuykendall, Keating & Wagaman, 1988). Subjects were asked to rate a series of neutral words along a pleasant/unpleasant dimension on a scale of one to 10. The list consisted of the following words: letter, window, sign, room, secret, speech, step, station, chair, stone, paper, smell, public.

Procedure. At the beginning of each session, the experimenter greeted the subject, explained the purpose of the study, and asked him or her to sign a consent form. Subjects in the PA condition were then thanked effusively

for participating, and given a lottery ticket as a token of appreciation. All participants were then requested to evaluate the 13 neutral words as an indirect method of assessing mood. It was hypothesized that the subjects in the PA condition would rate the words as more pleasant than the control subjects. This would then provide the rationale for the use of this method of positive-affect induction in the main study.

The subjects were then asked to rate, as in the previous pilot study, a series of 38 cartoons which were selected to be more subtle than the first pool. Finally, a subject was given a lottery ticket if he or she had not yet received one.

Results of Pilot Study

Efficacy of positive-affect induction. The mean word-ratings for the two experimental groups are displayed in Table 4. The difference between the means of the two groups of scores was in the hypothesized direction, but was not statistically significant (see Table 4). The list of neutral words, however, was 13 words long. Seeing as it was desirable to make the list even shorter in order to get the subjects to perform the actual experiment as soon as possible after the induction, the data for only the first half of the word list were analyzed. In this case, the difference between the means was significant t (19) = 1.96,

$p < .05$.

Interestingly, in the studies carried out by Isen and her colleagues, the manipulation checks were often exceedingly brief (e.g., a five-item mood scale).

Based on these findings it was decided to employ a six-word scale immediately after the PA induction, and to use six of the other seven words as a separate scale at the end of the session, in order to ascertain the continued presence (or waning) of positive affect.

Cartoon Ratings. From the original pool of approximately 80 cartoons, five blunt and subtle cartoons were identified and selected for use in the main study according to the following criteria: 1) a blunt joke must have received an average understanding score of at least 4.3 on a scale of 1 to 5; 2) a subtle joke must have received an average understanding score as low as possible, preferably around 3.0; 3) Jokes must have received a middling mean funniness rating, in order to avoid floor and ceiling effects, and so as not to be so funny as to increase positive affect; 4) subtle jokes must have been rated as subtle not because of the cartoon's obscurity, but because of the reasoning necessary to get the joke. Thus jokes requiring special knowledge did not qualify. Pilot data of the ten cartoons selected for use in the main study are presented in Appendix A.

Table 4

t-tests Comparing Mean Word Ratings of Control and Experimental Groups (Pilot Study 2)

	Entire 13-Word List				
	n	M	SD	t	p
CONTROL	10	5.35	.50	.94	.185
POSITIVE AFFECT	11	5.70	.90		
	First Six Words				
	n	M	SD	t	p
CONTROL	10	5.34	.41	2.14	.030
POSITIVE AFFECT	11	5.87	.76		

Note: t-tests were one-tailed.

Main Study

Subjects

A total of 65 undergraduate students (29 men, 36 women) who were enrolled in Psychology and Anthropology classes at Baruch College served as subjects for the main study. Those students taking psychology participated in the study in order to fulfill part of an Introductory Psychology research participation requirement. As members of the Baruch College Subject Pool, the subjects had a choice of participating in one of several research projects. They chose the present study by writing their name and phone number on a sign-up sheet. The anthropology students were recruited during class time and were offered $5.00 for their participation.

The data of five subjects were excluded from analysis: one reported not feeling well at the outset of the study; one foreign student could not understand the cartoon captions; one subject in the arousal condition reported perspiring during the step test--his subsequent discomfort may have brought on negative affect. And for two other subjects, the arousal manipulation (step test) did not increase their pulse rate. The exclusion of these five subjects left *ns* of 20 in each of the three conditions (see Table 5).

Stimulus Materials

Subjects were presented with a booklet of 10 randomly

ordered cartoons: five subtle and five blunt. While this may seem a small number, it should be noted that the duration of the arousal effects do not last a very long time--probably from about 10 minutes (Frost & Green, 1982) to 20 minutes (Isen et al, 1982). Furthermore, the two experiments in the Strack et al. (1988) study used only four cartoons.

Design

Each subject was randomly assigned to one of three experimental conditions: positive affect, arousal, and control. There were 20 subjects in each condition.

Procedure

The experiment involved running subjects one at a time. Sessions typically lasted 15-20 minutes. Subjects were addressed in the following manner at the beginning of the session:

"Hi. My name is Bill Tierney and I'm a student at the CUNY Graduate Center. I'm doing a study about physical fitness and cognitive processes. In this study you'll be required to take your own pulse, rate a list of words and rate some panel cartoons, like Ziggy and the Far Side. (Arousal condition only: You will also be asked to step up and down from a cement block. This is much like climbing a flight of stairs. If climbing stairs is

Table 5

Number of Subjects in Each Experimental Condition by Sex and Subject-Pool Membership

		CONDITION			
		Control	PA	Arousal	Total
Subject-Pool Membership					
POOL	Male	9	4	6	19
	Female	7	12	4	23
NON-POOL	Male	1	2	5	8
	Female	3	2	5	10

something you do not ordinarily do, you may wish to disqualify yourself from the study). Feel free to ask questions at any time." Subjects were presented with the following tasks in order:

Consent form

Fifteen second pulse count

PA induction (PA subjects only)

Step test (Arousal subjects only)

Neutral-word list rating

Cartoon rating

Second neutral-word list rating

Final fifteen-second pulse count

PA Condition

As a manipulation check, to demonstrate the presence (or absence) of positive affect, all subjects were given the neutral-word rating task, as described in the pilot study, just before rating the jokes. PA subjects were presented with a lottery ticket immediately after the first pulse count (this was the affect induction procedure used in the positive-affect pilot study).

For subject pool subjects, the following explanation was given: "I have to do this study as part of my doctoral dissertation, and the hardest part is finding people to help me out. I know you could have signed up for other studies, and that you didn't have to pick mine, so I decided to give

everybody a lottery ticket as a surprise, just to show how grateful I am". For the paid participants, the pretext was slightly different: the part about being able to sign up for other studies was omitted. Instructions and descriptions of the tasks are presented on the following pages. The cartoons are described in Appendix C.

Arousal Condition

Upon giving their consent, subjects were asked to perform a physical exercise by stepping upon and down from a cement block for 30 seconds at a time, until either a target heart rate of 120 beats per minute was reached, or until they spent a total of two minutes performing the exercise. This method has been effective in producing a state of heightened arousal in subjects for at least ten minutes (Isen et al., 1987), which is enough time for subjects to read and evaluate 10 cartoon stimuli.

Just before being shown the humor stimuli (and after the arousal induction or PA induction had been performed), all subjects were asked to perform the neutral-word rating task described earlier. Whereas in the pilot study this task was needed to prove that the PA induction procedure actually was effective, in this study it was used to demonstrate that the PA group was in fact feeling more positive affect than the two other groups.

Each subject was then given a booklet containing the 10

humor stimuli of the study. Following the procedure of Strack et al. (1988), subjects were instructed that cartoons such as the ones they would be rating could be evaluated according to either a cognitive or affective criterion. The cover sheet was read aloud to the subject: "In this study, we ask for your opinions about certain cartoons. After you look at each one, we would like you to give THREE ratings to each cartoon.

"1. FUNNINESS: Rate each cartoon on a scale of one to 10 according to how funny you think it is. Rate it a one if you think it is not funny at all; rate it a 10 if it is one of the funniest you have ever seen, and so forth.

"2. AMUSEMENT: Tell us how AMUSED you feel after reading the cartoon. Again, if you feel no amusement at all, rate it a one. If you feel extremely amused, rate it a 10, and so forth.

"It is important to realize that the amusement rating is not the same as the funniness rating. The funniness rating asks what you think about the cartoon. When you rate the cartoon for funniness, you must be objective, like a judge or a critic--feelings do not come into play. But the amusement rating has to do with your feelings--the kind you experience, for example, when you are being entertained or occupied in a pleasant or laugh-provoking manner.

"So for the first rating, rely on your thinking; for

the second one, tell us how you feel.

"Finally, there is a third rating.

"3. CONFIDENCE THAT YOU 'GOT' THE JOKE: Tell us whether you understand what the cartoonist intended to be funny. For some of the cartoons, the joke will be easy to get; for others, it may be quite difficult. Indicate this by circling the appropriate number: 1= definitely don't get it; 2= probably don't get it; 3= maybe I get it; 4= probably get it; 5= definitely get it."

Because of the social nature of smiling and laughter, the behavioral expressive response was considered to be less sensitive a measure of amusement. Nevertheless, a behavioral response scale was also employed as an auxiliary measure. The experimenter recorded the subjects' facial responses to each cartoon on the following scale: 0= no response; 1= attenuated smile; 2= full smile; 3= audible chuckle (fewer than two "ha's"); 4= laughter (two or more "ha's"). Following the humor ratings, six additional neutral words were rated. The purpose of the study was then explained to the subjects.

Summary of Design

Sixty subjects were randomly assigned to one of three experimental conditions: positive affect, arousal, and control. There were 20 subjects in each condition. There were two types of cartoon stimuli: blunt and subtle. This

therefore yields a 2 x 3 factorial design. There were three main dependent variables: understanding the joke of a cartoon, appraisal of each cartoon, and self-report amusement ratings. Observer ratings of facial response served as an auxiliary measure.

Chapter III

Results

Manipulation Checks

Table 6 presents the mean ratings for both word lists for each experimental condition. Contrary to the findings in the pilot study, there was no difference among the groups in their ratings of the first word list, $F(2, 57) = .06$, $p = .941$, or of the second word list, $F(2, 57) = .097$, $p = .908$.

It was possible that the positive-affect manipulation was effective for either males or females only, and that the data from subjects of the other sex washed out any significant difference. The mean word ratings for each sex are shown in Table 7. For the first list, an ANOVA showed that there was no significant difference among the means either for females, $F(2,30) = .552$, $p = .581$, or for males, $F(2,24) = 1.473$, $p = .249$. Similar analyses on data for the second list also revealed no significant differences: for females, $F(2,30) = .335$, $p = .718$; for males, $F(2,24) = .440$, $p = .649$.

It was also possible that, because of its verbal nature, the word rating task may not have been effective with Asian-American subjects. This notion derives from the potentially emotional nature of the meaning of the words on the list. While no hard data were collected on

Table 6

Comparison of the Word-Rating Totals for Each Word List for Each Condition

CONDITION	n	FIRST	M	SECOND	M
Positive Affect	20	36.85	6.14	30.55	5.09
		(9.18)		(9.91)	
Arousal	20	36.25	6.04	31.70	5.28
		(6.10)		(7.27)	
Control	20	36.00	6.00	31.05	5.18
		(8.23)		(7.40)	

Note: Each list contained six words. Means for each total are presented, along with the corresponding mean word rating. Standard deviations are presented in parentheses. Words were rated for pleasantness on a scale of one (extremely unpleasant) to 10 (extremely pleasant), thus a true neutral point would be 5.5.

Table 7

Mean Word-Ratings by Sex

	FIRST LIST		SECOND LIST	
	Sex		Sex	
	Male	Female	Male	Female
CONDITION				
Control	36.50	35.50	33.50	28.60
	(6.36)	(10.10)	(6.52)	(7.72)
	n=10	n=10	n=10	n=10
PA	31.33	39.21	30.83	30.43
	(4.63)	(9.74)	(2.40)	(11.89)
	n=6	n=14	n=6	n=14
Arousal	34.18	38.78	31.27	32.22
	(5.30)	(5.61)	(7.64)	(7.20)
	n=11	n=9	n=11	n=9
All Subjects	34.41	37.97	32.00	30.36
	(5.96)	(8.83)	(6.30)	(9.44)
	n=27	n=33	n=27	n=33

Note: Standard deviations for each cell mean are in presented in parentheses. N's are unequal due to random assignment.

subjects' nationality, 15 subjects (25%) were identified as Asian-American judging from their last names. The word ratings from these subjects were then analyzed separately from the rest of the sample. Table 8 shows the mean word-ratings for each condition of subjects with Asian-American and non-Asian-American names. The Asian-American subjects' ratings of the first word list were significantly lower than those of the non-Asian-Americans, $F(1,58) = 5.96$, $p = .018$. However, even if we were to consider the ratings of the non-Asian-Americans only, we still find virtually no difference in ratings among subjects in each condition (see Table 8). For the second word-list, the ratings were even more uniform across condition and nationality. Therefore, it cannot be assumed that the PA manipulation worked only for the non-Asian-Americans and not for the Asian-Americans.

Table 9 presents the mean pulse rates (in beats per 15 seconds) for subjects in the Arousal condition. The baseline pulse was taken at the beginning of the session; the pulse recorded just after the end of the step test is the second pulse, and the final pulse was taken at the very end. It was found that the step exercise increased heart rate by an average of 30.0%. However by the time of the recording of the final pulse, the increase had dropped

Table 8

Mean Word-Ratings by Last Name

	FIRST LIST		SECOND LIST	
	Last Name		Last Name	
	Asian	Non-Asian	Asian	Non-Asian
CONDITION				
Control	31.29	38.53	30.14	31.52
	(8.96)	(6.88)	(10.16)	(5.85)
	n=7	n=13	n=7	n=13
PA	27.67	38.47	31.67	30.35
	(2.52)	(8.99)	(3.51)	(10.71)
	n=3	n=17	n=3	n=17
Arousal	36.40	36.20	27.60	33.07
	(3.21)	(6.90)	(4.04)	(7.69)
	n=5	n=15	n=5	n=15
All	32.27	37.73	29.60	31.60
Subjects	(7.03)	(7.66)	(7.29)	(8.44)
	n=15	n=45	n=15	n=45

Note: Standard deviations for each cell mean are in presented in parentheses. N's are unequal due to random assignment.

Table 9

Comparison of the Mean Pulse Rates at Various Points of the Experiment for Subjects in the Arousal Condition (n=20)

	Beats per 15 seconds	SD
Baseline Pulse	21.3	4.14
Second Pulse	27.7	4.79
Final Pulse	21.7	3.63

Note: For eight of the 20 subjects whose data are included in the study, the final pulse was actually equal to or lower than the baseline pulse. There were two subjects whose second pulse was lower than the first--their data were not included in the analyses. Overall, the manipulation increased pulse rate by 30.0%.

to a mere 1.9%. Thus although the manipulation was successful in increasing arousal level, we cannot be sure of the duration of the effect, seeing as pulse rates had virtually returned to baseline level by the end of the sessions.

Appraisal Ratings

The means and standard deviations of appraisal ratings for blunt and subtle humor stimuli are presented in Table 10. The table indicates that, contrary to predictions, the positive-affect manipulation did not serve to enhance humor appraisal as predicted in the first hypotheses. A one-way ANOVA was nonsignificant for total appraisal scores, $F(2, 57) = 2.07$, $p = .14$; for subtle jokes only $F(2, 57) = 2.55$, $p = .09$, and for blunt jokes only, $F(2, 57) = 1.089$, $p = .343$.

Amusement Ratings

In order to test the second hypothesis, the amusement ratings for blunt and subtle stimuli were analyzed by way of ANOVA. Although the means were in the hypothesized direction, the results were once again nonsignificant, for total amusement scores, $F(2,57) = 2.25$, $p = .114$, and for blunt jokes only, $F(2,57) = 0.27$, $p = .75$. The ANOVA did show a significant difference among the means for subtle jokes only, however it was counter to the direction hypothesized--the PA group showed significantly less

Table 10

Comparison of the Mean Appraisal Ratings for the Blunt and Subtle Cartoons for Each Condition

CONDITION	n	BLUNT	SUBTLE	ALL
Positive Affect	20	30.95	18.10	49.05
		(7.60)	(8.84)	(13.57)
Arousal	20	33.80	24.05	57.85
		(8.99)	(10.07)	(17.33)
Control	20	30.20	21.40	51.60
		(7.75)	(5.41)	(10.53)

Note. Funniness scores ranged from one (not funny at all) to 10 (extremely funny). There were five blunt cartoons and five subtle. Standard deviations are shown in parentheses.

amusement for the subtle stimuli than did the other two groups, $F(2,57) = 5.141$, $p = .009$ (see Table 11).

Understanding

In order to test the third hypothesis, mean understanding-scores for blunt and subtle jokes were obtained for each experimental group (see Table 12). As expected, the understanding scores for blunt jokes were quite high, no matter what the experimental condition. Contrary to expectations, however, the PA subjects came in third place with respect to getting all 10 jokes, and the subtle jokes in particular. An omnibus MANOVA was performed on these data, and it was discovered that there was no significant difference among any of the three sets of means: not for all cartoons, $F(2,57) = 1.51$, $p = .229$; not for blunt cartoons only, $F(2,57) = 0.657$, $p = .522$; and not for subtle cartoons, $F(2,57) = 1.12$, $p = .309$.

Facial Response

As with the three main dependent variables, three ANOVAs were carried out for mean facial response score: over all conditions, for subtle jokes only and for blunt jokes only. No significant results were found, however, as the analysis for all jokes, $F(2,57) = .429$, $p = .653$; for blunt only, $F(2,57) = .496$, $p = .612$; and for subtle only, $F(2,57) = .158$, $p = .855$, were all nonsignificant (see Table 13).

Table 11

Comparison of the Mean Amusement Ratings for the Blunt and Subtle Cartoons for Each Condition

CONDITION	n	BLUNT	SUBTLE	ALL
Positive Affect	20	30.50	15.50	46.00
		(8.29)	(6.60)	(10.67)
Arousal	20	32.50	22.85	55.35
		(10.14)	(10.11)	(18.17)
Control	20	30.55	20.85	51.40
		(10.04)	(4.76)	(11.95)

Note: Amusement scores ranged from 1 (no amusement) to 10 (extreme amusement). Standard deviations are shown in parentheses.

Table 12

Comparison of the Mean Understanding Scores for the Blunt and Subtle Cartoons for Each Condition

CONDITION	n	BLUNT	SUBTLE	ALL
Positive Affect	20	21.30	12.85	34.15
		(3.28)	(4.21)	(6.29)
Arousal	20	22.35	14.65	37.00
		(2.46)	(4.12)	(5.09)
Control	20	21.20	13.20	34.40
		(4.50)	(3.30)	(5.77)

Note: Understanding-scores ranged from one (definitely don't get it) to five (definitely get it). Standard deviations are presented in parentheses.

Table 13

Comparison of the Mean Facial Response Scores for the Blunt and Subtle Cartoons for Each Condition

CONDITION	n	BLUNT JOKES	SUBTLE JOKES	ALL JOKES
Positive Affect	20	3.85	2.50	6.35
		(3.17)	(2.52)	(4.74)
Arousal	20	3.45	2.25	5.70
		(2.39)	(2.05)	(3.97)
Control	20	4.45	2.65	7.10
		(3.86)	(2.23)	(5.51)

Note: Facial responses were coded from zero (no response) to four (laughing out loud). Standard deviations are presented in parentheses.

Relationships Among Variables

Table 14 displays the mean within-subject correlations (across cartoons) for all four dependent variables (appraisal ratings, amusement ratings, understanding scores, and facial response) by experimental condition. The correlations were obtained by transforming each *r* to a *z*-score, averaging the *z*-scores, and then converting this average back to an *r*. These data help in examining the issue of the difference/similarity between funniness ratings and amusement ratings: are they the same thing, or, as Strack et al. (1988) and Gavanski (1987) might predict, somewhat different? In fact, the F/A correlation coefficients are rather high, suggesting that perhaps the subjects did a poor job of distinguishing between funniness and amusement. Each correlation coefficient represents an average, either of five correlations (in the case of blunt- or subtle-joke analysis), or 10 correlations. It is apparent that the correlations between appraisal and amusement are strongest, regardless of condition, while correlations involving understanding, amusement, and facial response are weakest, again without respect to condition.

An additional analysis was performed to see if the relationship between appraisal-ratings and amusement ratings depended upon whether or not a joke was blunt or

Table 14

Mean Within-Subject Correlations for all Four Dependent Variables by Condition

		Condition		
	ALL	CONTROL	PA	AROUSAL
Dependent Variables				
F/A	.86 (60)	.77 (20)	.89 (20)	.87 (20)
F/U	.76 (60)	.73 (20)	.79 (20)	.74 (20)
F/R	.55 (56)	.49 (19)	.61 (19)	.54 (18)
A/U	.75 (60)	.71 (20)	.78 (20)	.75 (20)
A/R	.51 (56)	.48 (19)	.55 (19)	.49 (18)
U/R	.37 (56)	.34 (19)	.48 (19)	.28 (18)

F= Appraisal ratings (funniness); A= Amusement ratings; U= understanding score; R= facial response Note: Number of correlations is shown in parentheses. N's are not uniform because four subjects did not show any facial responses.

subtle. The three most blunt and subtle jokes were selected based on understanding scores (see Appendix B). The bluntest jokes were numbers 6, 8, and 9. The three most subtle jokes were numbers 3, 4, and 10. The correlations for the blunt jokes, respectively, were .80, .65 and .72; for the subtle jokes, the correlations were .69, .73 and .75. Both sets of correlation coefficients were extremely similar. Therefore there was no difference in the relationship between appraisal and amusement among blunt or subtle humor stimuli.

It was also interesting to examine between-subject correlations between the dependent variables and joke type considering all subjects, and breaking the analysis down by condition. These correlations appear in Table 15. These analyses were of interest because different psychological processes are believed to be responsible for differences in humor appreciation between those subjects experiencing positive affect and those experiencing autonomic arousal. Therefore we must examine and compare these intercorrelations by experimental condition, one correlation at a time. Because there are three main dependent variables (facial response was used only as an auxiliary measure, and was therefore excluded from these analyses), there would thus be three pairs of correlations. In each case we expected the correlations

Table 15

Average Between-Subject Correlations of Four Dependent Variables by Joke Type and Condition

	ALL JOKES			BLUNT JOKES			SUBTLE JOKES		
				CONTROL n=20					
	A	U	R	A	U	R	A	U	R
F	.73	.49	.36	.75	.45	.37	.71	.53	.34
A		.41	.40		.45	.45		.36	.35
U			.34			.42			.28
				POSITIVE AFFECT n=20					
	A	U	R	A	U	R	A	U	R
F	.68	.54	.51	.67	.41	.50	.70	.67	.52
A		.59	.46		.55	.37		.64	.55
U			.29			.20			.38
				AROUSAL n=20					
	A	U	R	A	U	R	A	U	R
F	.75	.43	.46	.76	.26	.31	.73	.60	.60
A		.48	.25		.30	.25		.66	.25
U			.19			.10			.28
				ALL SUBJECTS n=60					
	A	U	R	A	U	R	A	U	R
F	.73	.51	.44	.73	.37	.39	.72	.60	.49
A		.49	.37		.44	.36		.58	.38
U			.28			.24			.31

Note: F= appraisal ratings (funniness); A= amusement ratings; U= understanding-scores; R= facial response.to be

highest for the PA condition, lowest in the arousal condition, and somewhere in the middle for the control group.

Consider, for example, the correlation between amusement and appraisal. This was expected to be strongest for the PA group, and weakest or nonexistent for the arousal group. This is because aroused people were thought to feel amusement in part because they are aroused, not only because they think the jokes are so funny, whereas people in a good mood both feel amusement and think things are funny because of the positive affect they are experiencing. Whereas both appraisal and amusement are presumably being raised in the PA group, in the arousal condition only the amusement is being elevated, thus creating greater disparity between the two measures.

As shown in table 15, these correlations ranged from .68 (PA condition) to .75 (Arousal condition). Our hypotheses about these correlations were incorrect in two respects: the correlation coefficients were extremely similar, and the coefficient for the PA condition was lowest instead of highest.

Consider now the correlation between amusement scores and understanding-scores. Again we may expect the correlation for the PA condition to be stronger than that for the arousal condition. This is because arousal enhances

only the amusement response, while the experiencing of positive affect would enhance both understanding the joke and expressive response. In fact, the correlations ranged from .41 (Control) to .59 (PA). While the range was greater than in the previous case, the correlations were not in the hypothesized order because the arousal condition's $\underline{r}$ was as high as .48.

Turning now to the correlations between understanding and appraisal scores, it was expected that the PA correlations would be higher. The reason for this was that while aroused people find the joke funny because they understand it, PA subjects may find the joke funny simply because they are in a good mood. Once again, we might expect the corresponding correlations for the C group to be somewhere in the middle of the other two. All three correlation coefficients were of middle range (.43 for the Arousal subjects, .49 for the controls, and .54 for the PA group). In this last case, the correlations were in the hypothesized order. Of course this very likely may have been merely a random occurrence, given that there are only six possible outcomes. Of the three sets of correlations, only one came out in the hypothesized order. Therefore we may once again say that there was no observed significant difference in the processes by which the subjects in the three experimental groups appreciated the humor.

Supplementary Analyses

Appraisal ratings. Because of the lack of group differences in the word ratings, additional analyses were carried out using only the 10 PA subjects who gave the highest word ratings for the first word list. Also deleted were the eight subjects whose end-of-session pulse rates were not higher than their baseline rates. This left 42 subjects on whose data the first hypothesis was tested again. The results were once again nonsignificant, $F(2, 39) = 1.59$, $p = .214$.

Amusement ratings. As before, the results were again examined, this time removing from consideration the arousal-condition subjects whose final pulse rate was not higher than the baseline rate. This left 12 arousal-condition subjects. Still, the results were no more promising, $F(2,49) = 1.656$, $p = .204$.

Chapter IV

Discussion

The purpose of this study was to separate and examine the contributions of positive affect and arousal to the process of humor perception. In so doing, careful consideration was given to methodological issues and past studies. Yet in spite of all the care taken, the present data suggest that neither the positive-affect manipulation nor the arousal manipulation was effective in bringing about the desired state. There was no evidence that the PA subjects were any happier than the other subjects; the effects of the arousal manipulation, though significant, were certainly briefer than had been expected. Presumably this is why none of the hypotheses received empirical support. Perhaps if the manipulations had been stronger, or otherwise more successful in bringing about a change in state, the results of the study would have been more meaningful. Nevertheless our hypotheses are still plausible and cannot be dismissed on theoretical grounds. Indeed, with certain methodological improvements, a replication could very well provide further insight into humor perception.

Positive Affect

Much of the study was predicated on the assumptions that a) being given a lottery ticket would enhance positive

affect, and b) this would be demonstrable through the ratings of neutral words. The results of the pilot study only served to strengthen these beliefs. But for reasons that are not entirely clear, the word ratings during the main study did not reflect any change in mood state. So why the difference? There are no ready answers, because for both studies, the conditions were very similar, even though different college samples were employed. The pilot study was conducted at Brooklyn College during the end of Spring Semester--the main study at Baruch during October. And although no data were recorded for ethnicity, there seemed to be no appreciable difference in the samples with respect to sex, nationality, age or race.

It is important to note that many of the subjects were quite effusive in their expression of pleasure and/or surprise upon being given the lottery ticket. Of course, to show a certain amount of gratitude is de rigueur, and it could be argued that these subjects were only doing what they thought was proper and polite. But in most cases their responses exceeded the "thank you" which is usually sufficient. Based on these candid verbal and nonverbal responses to receiving the lottery ticket, it must be assumed that, while there is no tangible proof, the gift did in fact enhance these people's feeling states.

But for how long? According to Isen (1990) as modest

a gift as a bag of candy (which may or may not be of any hedonic value to the subject), or finding a dime in a phone booth can bring about an increase in positive affect which may last for up to 20 minutes. In the pilot study, the effect presumably began to wane sometime during the word rating task (or after approximately one minute). In the main study, the duration must have been just a few seconds. The reason for this may lie in one of the few differences in the way in which the two studies were conducted. In the pilot study, it was made clear to the subject that there would be only one task to perform--namely evaluating the cartoons. They were not asked to do a list of things, as was the case in the main study. There would be no step climbing, and no ostensibly gratuitous activities like taking their pulse or rating word lists--things were clear-cut and simple. In the main study, however, it was made clear at the beginning of each experimental session that the study would involve a series of tasks, and this probably caused the subjects to prepare to allow their attention to shift from one task to another. During the pilot sessions, the subjects had only one thing to think about, and the thought of having a new lottery ticket had fewer other thoughts to compete with. In the main study, however, the effect quickly faded when the subject was required to begin what may have sounded like a complex or

arcane series of activities.

Arousal

In the present study, exercise consisting of stepping up and down from a block of cement, eight inches in height, brought about a 30 percent increase in pulse rate, from an average baseline rate of approximately 85 beats per minute, to an average peak of about 111 see Table 6). In the Isen et al. (1987) study, however, the step test resulted in an average pulse increase of 66%. Assuming a baseline rate of 85 (as found in this study), this would mean that by merely stepping up and down from a block for two minutes, the subjects' pulse rate soared to an average of 140 beats per minute! In fairness to Isen it must be noted that unlike in her study, the present subjects had several brief rest periods during the exercise. It was during these brief rests (typically 25-30 seconds long) that subjects took their pulse to serve as a "progress report" of their arousal state. This was done to prevent subjects exceeding a heart rate of 30 beats per 15 seconds, (or 120 beats per minute). This rate was chosen for two reasons. The first was to prevent the subjects from straining themselves--it was felt that elevating a person's heart rate above 120 beats per minute may have been too strenuous or dangerous. The second reason was that, assuming the average baseline pulse would be 72 beats per minute, and assuming that the exercise would

increase pulse rate by 66%, then 120 seemed to be a reasonable rate at which to place a limit. (Surprisingly, the subjects' baseline pulse was found to be much higher than expected.) Unfortunately Isen provides no information about baseline or final pulse rates.

Furthermore, not all subjects were required to perform the exercise for the full two minutes. This was because their pulse rate met or exceeded 120 before the final 30 second interval of exercise. Except for that, however, the present study still followed Isen's procedure as closely as possible, given its brief and undetailed description. This was done, of course, in order to bring about an effect which was as similar in magnitude as possible. Perhaps a stronger arousal manipulation, one that resulted in a 66% increase in heart rate, would have resulted in the confirmation of the hypotheses. Perhaps the moderate effect that was obtained did not endure long enough to have a meaningful effect upon the subjects' perception of the humor stimuli. But seeing as how two subjects' data had to be dropped because their pulse actually decreased after the exercise, it is once again difficult to reconcile the disparity between Isen's data and those of this study. Isen's manipulation, however similar to the one used in the present study, must have been far more strenuous, and quite possibly resulted in extremely high, almost dangerous heart rates.

Intercorrelations of Humor Ratings and Responses

The strong correlation between appraisal and amusement ratings across conditions suggests either that subjects had difficulty distinguishing between how they felt about a joke and what they thought, or, that their affective responses were in strong agreement with their cognitive responses. Of course, some positive correlation must have been expected at the outset, but the two sets of ratings could scarcely have been more alike.

Why such strong correlations? These data do not correspond to those obtained by other researchers (e.g., Strack et al., 1988), whose data suggested more moderate correlations. The obvious reason is that the manipulations were not effective in influencing humor perception. Therefore subjects did not report significantly different cognitive and affective responses. This is to be expected under normal circumstances, because only under experimental conditions, when subjects are successfully induced to distinguish between what they think and how they feel, do we get a significant disparity (Gavanski, 1987; Strack et al., 1988).

Data from facial responses proved to be of little value, as they provided little insight into the humor response. Correlations with facial responses to appraisal and amusement data were very similar. This suggests the

presence of a monolithic humor response, unlike the two-component process that was expected. However these data were collected only as an auxiliary measure, so they were not of primary concern.

Tentative Conclusions and Speculation

This study in part considered the notion of an additive effect of affect, specifically the combination of positive affect plus a humorous stimuli. If we are to assume that subjects were no longer experiencing heightened positive affect at the time of the humor ratings, then this idea remains untested. The challenge of finding a PA manipulation which is effective and enduring, one which is subtle yet whose effects are demonstrable, remains a problem. As of now there is still no perfect solution to this methodological issue. The results of this study suggest that further methodological improvements are necessary before this hypothesis can be tested in a reliable manner.

Although the arousal manipulation was perhaps not as strong as it could have been, hypotheses involving the arousal component of humor perception were in the hypothesized direction, albeit nonsignificant. Perhaps the use of a stronger or more constant manipulation (e.g., riding a stationary bicycle while rating humor) in future research could prove more fruitful.

Appendix A

Pilot Ratings of Cartoons Used in Main Study

	Cartoon				
	1	2	3	4	5
Name	Ziggy	Far Side	Herman	Ziggy	Far Side
Type	Blunt	Subtle	Subtle	Subtle	Subtle
Get it?	5.0	3.35	2.35	3.35	3.40
How Funny?	4.44	4.50	3.55	4.70	3.70
S.D.	(2.35)	(2.74)	(2.19)	(2.90)	(1.75)
Blunt/ Subtle	1.56	3.05	4.20	3.25	3.15

Appendix A (cont.)

	Cartoon				
	6	7	8	9	10
Name	Ziggy	Ziggy	Herman	Far Side	Ziggy
Type	Blunt	Blunt	Blunt	Blunt	Subtle
Get it?	5.0	4.78	4.78	5.0	3.15
How Funny?	5.55	4.67	5.22	5.11	3.30
S.D.	(2.46)	(1.87)	(2.82)	(2.30)	(2.32)
Blunt/ Subtle	1.56	1.89	1.67	1.89	3.70

Cartoons were rated for understanding on a scale of 1 ("definitely don't get it) to 5 ("definitely get it). Thus the higher the score, the easier the joke was to get.

Cartoons were rated for funniness on a scale of 1 (not funny at all) to 10 (extremely funny). Thus the funnier the joke, the higher the rating. The midpoint was 5.50.

Cartoons were rated on a scale of 1 ("very blunt") to 5 ("very subtle"). The midpoint was 3 ("neither").

Appendix B

Mean Ratings for Each Cartoon

Dependent Variable	Cartoon 1	2	3	4	5
Appraisal	4.98	4.73	3.40	3.83	4.88
	(2.48)	(2.93)	(2.68)	(2.83)	(2.72)
Amusement	4.87	4.37	3.10	3.73	4.72
	(2.74)	(2.89)	(2.51)	(2.95)	(2.85)
Under-standing	4.13	2.85	1.92	2.67	3.47
	(1.24)	(1.50)	(1.11)	(1.37)	(1.21)
Facial Response	.67	.72	.55	.42	.55
	(1.02)	(1.03)	(.98)	(.67)	(.91)

Appendix B (cont.)

Dependent Variable	Cartoon 6	7	8	9	10
Appraisal	6.27	5.75	7.53	7.12	4.33
	(2.49)	(3.00)	(2.23)	(2.66)	(3.04)
Amusement	6.27	5.63	7.58	6.83	3.82
	(2.87)	(2.97)	(2.36)	(2.66)	(2.77)
Under-standing	4.50	3.92	4.63	4.43	2.67
	(.98)	(1.22)	(.76)	(1.05)	(1.55)
Facial Response	.67	.67	1.07	.85	.23
	(.90)	(.99)	(1.13)	(.92)	(.53)

Appraisal and Amusement ratings were on a scale of one to 10; understanding scores were on a scale of one to five; facial response scores on a scale of one to four. In every case, the higher the rating indicated greater humor response. Standard deviations are shown in parentheses.

Appendix C

Description of Each Cartoon

1. Car salesman is showing Ziggy a car which has a television on the front grille, a toaster on the hood, and a variety of objects attached to the car. The salesman tells Ziggy, "this baby is loaded with extras."

2. A man stands at the doorway of a house. Answering the door is an unusual looking animal, about nine feet tall, with a thin three-foot neck, enormous feet, glasses, a propeller on his head, and other weird features. The man at the door says, "I wonder if you could help me...I'm looking for 523 West Cherry and...Oh! Wow! Deja vu!"

3. Two space aliens are at the counter of a restaurant. One of them, reading a menu, tells the man behind the counter, "Which way to the railway station...both with sugar."

4. Ziggy is driving along a road and passes a sign which reads "Suddenly...".

5. A boy is placing his pet hamster inside a cage that closely resembles high-security prison.

Appendix C (cont.)

6. Ziggy is looking out the open window of his apartment, which is filled with popcorn. A man below asks, "You the guy who called about the faulty popcorn popper?"

7. Ziggy reads a sign at a bus stop which says: "On this spot on Sept. 17th, 1977, Earl J. Wheeler said to hell with it, and never went to work again."

8. A nurse is putting Herman's arm in a sling, but has also caught his leg inside the sling. He is standing on one leg, with his knee up to his chest. The nurse asks, "That too tight?"

9. Two men are sitting outside a saloon in the Old West. They observe a gunslinger float by, several feet off the ground. One says to the other, "Looks like some drifter comin' into town."

10. Ziggy is admiring a complex painting of a woman whose face is broken in half. However, Ziggy is closely examining her elbow.

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