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Weight Status and Decision Making in a Food Selection Task

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Weight Status and Decision Making in a Food Selection Task

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I would like to dedicate this dissertation to Sofia,

whose love and continued support has helped me so much through this long journey,

and to William,

whose recent arrival helped me move so quickly at the end.

Thank you both!

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ABSTRACT

Americans are the most overweight and obese individuals in the world, and these conditions are associated with many negative physical and psychological conditions. Health psychology research has adequately explained intention and initiation of weight-loss behaviors, but has had less success with their long term maintenance. Additionally, the psycho-social mechanisms that translate intention into action remain hidden and health psychology research relies on time-general designs relating baseline construct assessments to later behavioral performance. The purpose of this study was to examine the relationships among weight status, decision-making, and nutritional outcomes in an immediate, in-the-moment food selection task to determine whether obese and normal weight individuals make food-related decisions in fundamentally different ways.

Twenty-four obese and 23 normal weight participants received instructions about verbalizing decisions and, after two practice tasks, asked to talk aloud as they selected dinner items from a simulated menu from a well-known fast food restaurant. Following protocol analysis guidelines, the verbalizations were recorded, transcribed, and segmented into discrete "thought units", which were coded as one of six possible decision processes. Group differences in the proportions these single units comprised of group totals and, following sequential analysis guidelines, proportional distributions of conditional two-unit sequences were analyzed using chi-square analyses. Results indicated significant differences between the groups in terms of their use of "opposing arguments" in their decision process. Results also indicated significant differences between the groups in terms of two-thought sequences. After proposing an item for consideration, normal weight participants offered more supporting and opposing arguments while obese participants delayed decision making and rejected items.

Results indicated that normal weight and obese participants made food-related decisions differently. These findings shed light on cognitive processes involved when individuals decide among food items. Future research can build upon this topic and these methods to eventually develop a thorough understanding of in-the-moment food selection. These findings have clinical relevance as they may be used to help obese individuals make food decisions differently. Clinicians may help clients understand how they make food decisions and help them change their food decisions style in order to increase their chances of long term weight loss success.

INTRODUCTION

Social Problem

Americans are among the most overweight and obese individuals in the entire world, and this condition is associated with many physical and psychological conditions. The Centers for Disease Control (CDC, n. d.) describes obesity as a known risk factor for diabetes, heart disease, stroke, hypertension, gallbladder disease, osteoarthritis, sleep apnea and other breathing problems, and some forms of cancer (uterine, breast, colorectal, kidney, and gallbladder). In addition, the National Institute of Diabetes, Digestive, and Kidney Diseases (NIDDK, n. d.) has found obesity to be also associated with high blood cholesterol, complications of pregnancy, menstrual irregularities, hirsutism (excess body and facial hair), stress incontinence, and increased surgical risk. Obesity also has serious psychological and social effects. The NIDDK states that obese individuals are more likely to be depressed and often feel unattractive when comparing themselves to American stereotypes of beauty. Obese individuals often face prejudice or discrimination in a variety of social settings and often experience rejection, shame, and depression.

According to the 1999-2000 National Health and Nutrition Examination Survey (as cited by NIDDK, n. d.), nearly two-thirds of adult Americans are overweight (62% of women and 67% of men), and 30% are obese (33% of women and 28% of men). Among children the rate of overweight is 16%. According to the United States Department of Health and Human Services (USDHHS, 2001; as cited by NIDDK, n. d.), approximately 300,000 adults die in the United States each year due to obesity, and the cost of health care directly related to obesity is nearly $61 billion dollars.

Clearly, obesity is an important social problem, and the trend is growing more perilous. In the forty-year period of 1960 to 2000 the prevalence of overweight has increased from 32 to 34% (Pastor, Makuc, Reuben, & Xia, 2002; as cited by NIDDK, n. d.), and the prevalence of obesity has risen from 25-33% (Jeffery et al., 2000) with the majority of increase occurring in just the last twenty years (Flegal, Carroll, Ogden, & Johnson, 2002; as cited by NIDDK, n. d.). Furthermore, the rate of overweight is increasing in children as well: since 1980 the overweight rate in kids between 6 and 19 years of age has tripled to 16% (CDC, n. d.). Finally, the prevalence of extreme obesity (i.e., having a body mass index quotient, BMI, > 40) has increased from 0.8% in 1960 to 4.7% in 2000 (Flegal, Carroll, Kuczmarski, & Johnson, 1998; Flegal, Caroll, Ogden, & Johnson, 2002; both as cited by NIDDK).

Professional Problem

During the last 3 decades the study of health behaviors has become increasingly prevalent in psychology, largely due to the evolving understanding of chronic disease as rooted in lifestyle choices, and the role of the individual in these choices (Nezu, Nezu, & Geller, 2003; Salovey, Rothman, & Rodin, 1998). According to the CDC (n. d.), obesity is attributed to a number of factors including genetics, physiology, social environment, psychological and emotional factors, and behavior. Research offers varying estimates as to the amount of variance in obesity attributable to each of these factors, but there is strong evidence that lifestyle factors play an important etiological role (Wing, 2000). Stice (2002), noting that rates of obesity have increased from 4% to 30% in just the last century, astutely pointed out that genes do not change this quickly. Thus lifestyle is likely a major culprit behind obesity's rising rates.

Lifestyle refers to an individual's way or style of living (Oxford English Dictionary, 1989). It is a generally consistent and integrated pattern of attitudes, choices, and, most overtly, behaviors. It may be said that an "overweight" lifestyle consists of attitudes, choices, and behaviors that, individually, promote weight gain, and, cumulatively, promote being overweight and obese. For example, a person with such a lifestyle likely eats foods that are relatively high in calories in most eating situations. Over time the results of these continual choices contribute to that person being overweight. In contrast, a person with what might be called a "normal-weight" lifestyle likely eats foods that are relatively low in calories in most eating situations. Over time the results of these continual choices contribute to that person being normal-weight. Gaining weight, then, is partially due to the accrual of nutritional outcomes of many discrete and individually unimportant food decisions that, in total, produce obesity. To a large extent obesity is no more than the sum of these choices, but, over time, there are many choices. Linde, Rothman, Baldwin, and Jeffery (2006) offered a similar take on weight loss, describing it not as a behavior but a consequence of a series of enacted behaviors. A major goal in the developing battle against obesity, and one for which psychologists are particularly well-suited (Nezu et al., 2003), is understanding the nature and dynamics of the thoughts, emotions, and behaviors underlying the continual choices to which obesity (and, likewise, weight loss) is linked.

Much of the research in health psychology and obesity has operated at what may be described as the "lifestyle level". It has focused on relatively broad, stable constructs believed to underlie health behaviors. Expectancy beliefs regarding the likelihood of health behaviors to bring about certain outcomes, and value beliefs about the desirability of these outcomes, have been the dominant foci of research. Beliefs regarding perceived behavioral control and social norms have also had roles. To some extent this expectancy-value research tradition has been fruitful; over the last 20 years behavioral scientists have made large advances to understanding the factors that produce *intention* to engage in and *initiation* of health behaviors. The factors underlying health behavior *maintenance*, however, have so far eluded most research endeavors (Jeffery et al., 2000; Wing, 2000).

This study examined the problem of obesity but rather than examining the relationships between general psychological constructs and weight management behaviors, this study "zooms in" on the moment of choice. It examined how and why individuals choose one combination of food items as opposed to another combination of food items. Specifically, the purpose was to examine the decision making process that occurs during a food selection task in order to determine whether there is are significant relationships among weight status and both food-related decision making style and nutritional outcome. In essence, this study combines two domains of psychological research – health psychology and decision making – and examines the problem of obesity from their intersection. It is proposed that the relationships discovered between weight status and both food-related decision making style and nutritional outcome will stand as important components to the broader understanding of the psychological aspects of weight status. As food selection is a dynamic adaptive process subject to change (Krondl & Coleman, 1988), understanding these relationships will help practitioners assist overweight and obese individuals learn to make healthier food decisions, and thus be more successful in their weight loss and weight management efforts.

Assumptions and Delimitations

1. This study rests on a cognitive theoretical foundation. It assumes that thoughts and beliefs are meaningful for phenomenological experience, are useful subjects for analysis, and that they can be identified and analyzed.

2. The research question investigated in this study examines decision making in a food-selection task. This assumes that the decisions made in this task are cognitively available to the subject making them.
3. The method used in this study was protocol analysis, which assumes that food-related decisions verbalized by the subject are the actual food-related decisions that the subject makes.
4. Participants were students of a large university in the Midwest and were between 18-22 years of age, thus the generalizability of the study's findings may be limited.
5. Participants performed an analog version of an everyday task, and thus the degree to which their performance in this study accurately reflects their performance in a natural setting is unknown.
6. The task materials and setting were designed to minimize demand characteristics, but the degree to which the design does so is unknown.

Definitions of Terms

1. Decision making process – a "macro" process of events, often considered "mental" or "cognitive", that leads a decision maker to a selection of one choice among many options.
2. Decision making processes – the "micro" events that occur within the relatively more "macro" decision making process.
3. Two-event sequence/two-process transition – a pair of events/processes, separated by a transition, that occurs within a longer sequence of events/processes.
4. Conditional transitions – a specific kind of two-event transition in which the first event is defined. The transition refers to the second event of the pair, given the occurrence of the first event (the "condition) of the pair.
5. Conditional probabilities – the relative probabilities of possible second events, given the occurrence of the first event. In other words, if event A occurs, what are the relative transitional probabilities that event B, C, or D will occur next.
6. Body Mass Index (BMI) – a standardized number representing the relationship between a person's weight and height. It is used to classify people as "underweight", "normal weight", "overweight", or "obese".

CHAPTER I: LITERATURE REVIEW

Psychology's History and Recent Role in the Problem of Obesity

Health psychology began in earnest in the 1970s, when psychologists joined their social science colleagues in economics, anthropology, and sociology in attacking the major medical problems of the time (Salovey et al., 1998). Conceptions of health and well-being had long been localized within the domain of physical medicine but evolved to include economic and political forces and also the individual's role in the prevention of illness and the promotion of well-being (Nezu et al, 2003; Salovey et al., 1998). According to Nezu et al. and Salovey et al., the ensuing 30 years brought the belief that the major causes of many chronic diseases are rooted in lifestyle choice, and that making healthy choices is a major pillar in health promotion and disease prevention (USDHHS, n. d.). Health psychologists have accepted the charge of understanding the individual's role in illness and well-being, and of assisting at-risk individuals in making healthy lifestyle changes. They perform this mission by applying psychological theory, methods, and research to health, physical illness, and health care. In terms of obesity-related health risks, if health psychologists can contribute to a 10% weight loss in the population, it is estimated that there would be a 20% decrease in coronary artery disease, and similar reductions in stroke, diabetes, other heart disease, and some cancers (Salovey et al.).

Theoretical Foundation of Health Psychology

Health psychology research is generally guided "…by a view of people as active processors of information capable of self-reflection and self-regulation rather than as responding passively to environmental contingencies" (Salovey et al., 1998). This "active processing" paradigm stems from 17th century rationalism, which promoted the active role of the mind in constructing experience and knowledge as opposed to passive, "mind as white paper", empiricism (Goodwin, 1999). Recently this paradigm gained prominence through the information-processing, connectionist, and constructivist movements, which comprised the cognitive revolution of the post-war 20th century. More recent developments in the cognitive paradigm (Goodwin, 1999) are Mischel's cognitive theory of personality (later formulated with Shoda, 1995, as a cognitive-affective theory of personality), and Bandura's (1986) social-cognitive theory. Together these latter theories may be considered the backbone of current clinical psychology, and certainly they are the most influential to health psychology research (Abraham, Sheeran, & Johnston, 1998; Abraham & Sheeran, 2000; Rutter & Quine, 2002).

Social-cognitive theory reflects its rationalist roots in its view of individuals as active agents in their developmental and everyday phenomenological experience (Pervin & John, 2001). Perhaps its defining feature is the idea of reciprocal determinism, that human experience is the outcome of the dynamic interaction of personal factors and environmental factors. The personal factors are primarily one's beliefs regarding one's self, while the environmental factors are the beliefs one has about important social relationships; the person responds to situations but also actively constructs and influences them (Pervin & John, 2001). Social-cognitive theory applies reciprocal determinism to the development of personality as well. According to social-cognitive theory, people have distinctive patterns of behaving in particular situations (Pervin & John); patterns that develop out of continual interactions of personal factors, social factors, behaviors, and behavioral outcomes. Health psychology researchers investigate these patterned relationships as they relate to health behavior. This study investigates these patterned relationships as they relate to obesity.

The Development of Obesity – A Case of Habit

It is doubtful that anyone intends to become obese. The more likely case is that obesity develops from a long history of unhealthy eating behaviors that are performed with little conscious awareness. The habitual nature of food selection has been widely discussed – "Specific food choices lay the groundwork for long term food habits" (Furst, Connors, Bisogni, Sobal, & Winter Falk, 1996), and Krondl and Coleman (1988) noted that food selection decisions are largely intuitive and subconscious. Habits, which James (1890/1950) so famously brought to light, are acquired patterns of action or thought. Habits have many benefits. As James wrote, a habit "*…simplifies the movements required to achieve a given result, makes them more accurate and diminishes fatigue*" (p. 112) and "*…diminishes the conscious attention with which our acts are performed*" (p. 114). They are problematic, however, when they produce unintended negative consequences. The challenge for health psychologists, then, is to assist obese individuals in becoming aware of their obesity-promoting lifestyle habits and to help them *intentionally* change these habits to ones that promote a normal weight status.

Health Psychology's Approach to Investigating Obesity

Health psychologists have often employed social-cognitive models in their attempts to understand and explain health behavior. Ogden (2003) noted that 21% of articles published in four prominent health psychology journals[1] between 1997 and 2001 focused on health-related cognitions. Salovey et al. (1998) explained that the social-cognitive models that have been applied to health behavior have been developed via three strategies: (1) applying formal theory (i.e., broad theories developed for general use in psychology) to the health domain, (2) developing grounded theory generated specifically for the health field, and (3) problem-focused research addressing specific social and personality processes relevant to health behaviors.

Using these strategies researchers have developed two basic types of behavior models: continuum and stage models. Continuum models generally propose a set of social-cognitive variables that, when combined in a particular manner, lead to behavior via the mediating variable of intentions (Greve, 2001). In contrast, stage models describe an individual's status in relation to a health behavior in terms of the degree to which the individual performs the health behavior. Because continuum models are the predominant framework within health psychology, their basic premise will be more fully discussed here; readers interested in learning more about stage models are referred to Marshall and Biddle (2001), and Weinstein, Rothman, and Sutton (1998).

Examples of popular social-cognitive continuum models (Ogden, 2003) include the Theory of Reasoned Action (TRA; Ajzen & Fishbein, 1980; Albarracin, Johnson, Fishbein, & Muellerleile, 2001), the Theory of Planned Behavior (TPB; Schifter & Ajzen, 1985; Ajzen, 2002), the Health Belief Model (HBM; Becker, 1974; Strecher & Rosenstock, 1997), the Protection Motivation Theory (PMT; Rogers, 1975; Floyd, Prentice-Dunn, & Rogers, 2000), Subjective Utility Theory (Ronis, 1992), and Bandura's Social-Cognitive Theory (Bandura, 1986). Full explanations of each model are beyond the scope of this paper (interested readers are referred to Salovey et al., 1998 for a review). Instead, a conceptually generic "core model" (proposed by Abraham et al., 1998) is described here. The core model identifies four broad psychological variables that, in some form or another, appear in most of the models and combine in some manner to produce an individual's behavioral intentions. The first variable, attitude, is conceived of as the degree of relative benefit anticipated to come if a behavior is performed.

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[1] Health Psychology, British Journal of Health Psychology, Psychology and Health, and Journal of Health Psychology

Self-representations are generally conceived of as the degree to which performing the behavior is perceived as congruent to one's self-concept. Norms are generally conceived of as the degree to which performing a behavior is congruent to valued social norms. Self-efficacy refers to the certainty one has about his/her capability of performing the behavior successfully. The social-cognitive health models contend that when levels of these four variables are sufficiently high, intentions will form and these intentions will lead the individual to perform the behavior.

Typical Research Design of Continuum Models

Continuum models typically employ a "time-general" approach; that is, they focus on relationships between baseline values of social-cognitive variables and performance of target health behaviors in some subsequent time period. Greve (2001) described this approach in his description of a TPB-based article by Armitage and Connor (1999), which focused on eating a low-fat diet.

- To assess baseline behavioral intention participants were asked to indicate the extent to which they endorsed the following statement: "I intend to eat a low-fat diet over the next month."
- To assess baseline attitude toward behavior participants were asked to indicate the extent to which they endorsed the following statement: "My eating a low-fat diet in the next month is…[bad/good, harmful/beneficial, etc…]"
- To assess baseline subjective norms participants were asked to indicate the extent to which they endorsed the following statement: "People who are important to me think I should eat a low-fat diet."
- To assess baseline perceived behavioral control participants were asked to indicate the extent to which they endorsed the following statement: "How much personal control do you feel you have over eating a low-fat diet in the next month?"
- To assess actual performance of the target health behavior participants were asked how often they ate a low-fat diet in the month since baseline assessments were performed.

In this example (representative of most social-cognitive studies of health behavior), the social-cognitive variables are assessed at time zero in relation to performing the target behavior sometime in an upcoming specified time period (4/6/8/etc… weeks). After the time period elapses participants are asked to report how often they performed the target behavior. Their performance is regressed onto their baseline social-cognitive variable and intention values and the relationships among the variables are described.

This research design has been useful, and remains so, but it is reasonable to wonder about its completeness for health behavior research. It would seem that research focusing on one's beliefs about future health-related decisions addresses only part of the issue but what about the decision making one performs in immediate, in-the-moment health-related situations? After all, while many important health-related decisions will be made in the future, one (and only one) is made in the present, and since the totality of these individual decisions generates one's health status, it would seem important to understand the process producing this immediate decision. Booth (1981) addressed this very issue. Noting that a food's acceptability for an individual is dynamic, restructurable, and polyadic Booth suggested that understanding an individual's choice of a particular food or drink item in particular circumstances at a moment in time is an important focus for research.

No studies have answered Booth's call to employ an "immediate-choice" framework in weight-related health psychology research but some are moving slightly in this direction. Jeffery, Kelly, Rothman, Sherwood, and Boutelle (2004), in their attempt to understand how easy weight-loss initiation turns to maintenance difficulties, tracked the relationship between participants' thoughts and feelings, and their satisfaction during a 26-week weight loss intervention. At weekly intervals the researchers assessed weight, perceptions of time and effort expenditure, negative reactions to losing weight, positive reactions to losing weight, dietary goal attainment, objective weight loss outcomes, and degree of satisfaction given effort. They found that as weeks passed participants lost weight at a decelerating rate, and their associated experiences were mixed; perceptions of time and effort expenditure decreased significantly over the time span as did positive reactions, dietary goal attainment, and degree of satisfaction given effort. In contrast, participants' reports of how frequently they were complimented on appearance, and how frequently their clothes fit better increased significantly during the course of the intervention. The researchers interpreted the results as suggesting that, "lack of sustained reward, especially reward for weight loss behavior, rather than increased negative outcomes over time, may be the primary cause of the failure of people to maintain weight loss efforts beyond an initial period of rapid loss" (p. 105). Jeffery et al.'s study is indicative of this group's focus on understanding maintenance processes, and it also supports the need to move from the "time-general" approach of traditional health psychology research to a more immediate, in-the-moment focus.

Recently, there has been a spate of articles questioning the viability of the social-cognitive models as explanations for health behavior (Albarracin et al., 2001; Ajzen & Fishbein, 2004; Greve, 2001; Odgen, 2003). The main impetus for this discussion seems to be the finding that the social-cognitive models generally explain widely differing (14% to 92% according to Ogden, 2003), but usually rather small, amounts of variance in behavioral intention and behavioral performance (1% to 65% according to Ogden). Greve (2001) also proposed that separating intention from behavior in this sort of research is theoretically impossible; he posits that intention is an inherent part of so-called "planned behavior" such as the weight-loss, smoking cessation, and breast examination behaviors studied in health psychology, and thus cannot be considered its own construct. It seems that the social-cognitive models, while providing a useful conceptual framework for research, apparently leave some important gaps in explaining health behavior performance. Up until now this gap has been perceived as the "intention-action" gap, and has been addressed by "action control" researchers. Action control researchers concentrate on variables they perceive as having more proximal effects on action performance than the relatively distal variable of intention.

One such model is Schwarzer's Health Action Process Model (HAPA; Schwarzer, 2002), which is perhaps the most comprehensive model of health behavior because it combines the motivation process with a proposed action control process. The motivation phase begins with three of the social-cognitive variables discussed in many of the stage models – self-efficacy, outcome expectancies, and risk perceptions. It assumes that when the intensities of these three variables reach a certain level, the combination will generate goals to perform health behaviors in the individual. The model then moves to the action phase by adding variables that serve to translate intention into action and maintain that action. See Figure 1.

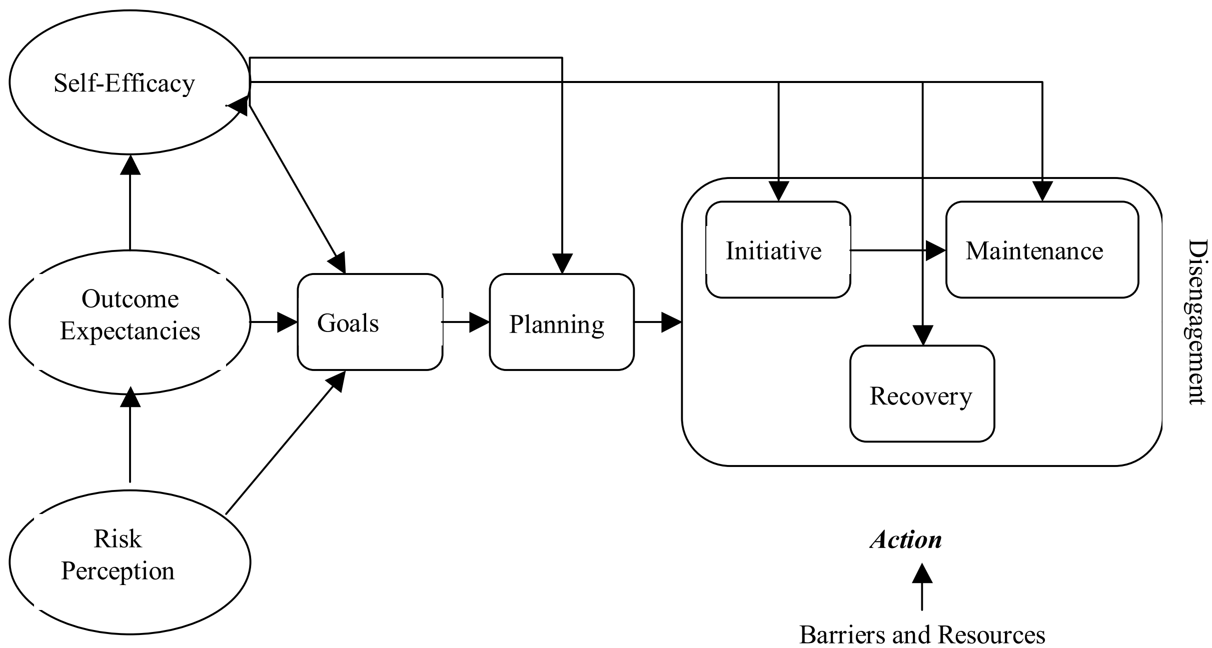


Figure 1. Health Action Process Model. Adapted from *Modeling health behavior change: The health action process model (HAPA)* by R. Schwarzer, 2002, retrieved March 1, 2005, from http://userpage.fu-berlin.de/~health/hapa.htm.

Schwarzer divides the action phase into "action plans" and "action control". Action plans refer to narrower, proximal action goals and algorithms of action sequences; the what, where, when, how, and how often (action plans reside in the Goals, Planning, and Initiative boxes in the model). Once the individual begins action it must be maintained through action control processes in order for change to occur (theorized to reside in the Maintenance box in the model). Schwarzer proposes that these action control processes largely consist of metacognitive activity that supports the primary activity and suppresses diversionary activities. Schwarzer argues that self-efficacy is the strongest predictor of health behavior maintenance; if an individual possesses high self-efficacy for the behavior, he or she is likely to continue it. It seems then, and it can be seen in the model graphic, that in Schwarzer's model self-efficacy works at all levels of the process: distally to generate intention, and proximally to initiate and maintain action. The distinguishing features of the model, however, are the action control processes.

A second way of supporting the performance and maintenance of health behavior are through "implementation intentions" (Gollwitzer, 1999). Implementation intentions refer to deciding, *ahead of time*, when, where, and how one will perform goal actions. Gollwitzer contends that waiting to decide on action performance until related situations arise is ineffective. For example, it would be difficult for an obese person to eat healthily at a buffet if she had not decided how to do so beforehand. Instead, Gollwitzer recommends that individuals specify when, where, and how they will perform goal actions; "When situation *x* arises, I will perform response *y*" (Gollwitzer, p. 494). Gollwitzer proposes that implementation intentions work by activating mental representations of challenging situations and desired behaviors; when the individual recognizes the situation the behaviors will be very likely. While implementation intentions address action control they also employ the time-general approach.

Conclusions Regarding Health Psychology's Approach to Obesity

Health psychology's social-cognitive approach to obesity has been successful in identifying factors that produce *intention* to engage in and *initiation* of health behaviors. The factors underlying health behavior *maintenance*, however, have eluded most research endeavors. Health psychology has adopted general psychological theories for its research, and has developed grounded theories specific to health psychology. Generally these theories and their models focus on the antecedents of intention, in terms of relatively broad psychological constructs such as self-efficacy, value, and risk perception. This antecedent focus has left the intention-action link largely unexamined. Schwarzer's HAPA model and Gollwitzer's implementation intentions provide useful conceptual descriptions of links between action intention and action performance. They move health behavior research toward the action end of the basic health behavior model, while retaining important social-cognitive variables that lead to intention formation. In terms of research method, health psychology has persisted in a "time-general" approach in which baseline assessments are related to later behavioral performance. In the last year alone, the American Psychological Assocation's journal Health Psychology published three articles dealing specifically with relationships among social-cognitive variables and weight control, each employing a time-general research framework (Anderson, Wojcik, Winett, & Williams, 2006; Finch et al., 2005; Linde, Rothman, Baldwin, & Jeffery, 2006).

This study addressed these shortcomings by investigating the decision-making process of individuals while in a food selection situation. Whereas much health behavior research employs the time-general temporal focus, this study employed an immediate, in-the-moment focus. It was expected that this focus would illuminate the nature of the metacognitive activity discussed by Schwarzer (2002) and the adaptive decision making alluded to by Gollwitzer (1999). More specifically, this study sought to identify important relationships among weight status, decision making style, and nutritional outcomes within a food selection task. In short, this study begins where previous health psychology research ends – when the individual makes the decision.

Decision Making in a Food Selection Task

The purpose of this study was to examine decision making during a food selection task to determine whether there are significant relationships among weight status of the decision makers, food selection decision making styles, and the nutritional outcomes of resulting food choices. This section establishes the theoretical and research foundations of this study, and develops its research questions and related hypotheses. It begins with a discussion of decision making and its sub-topics, introduces the specific decision making framework for this study, and states the research questions and hypotheses to be investigated and tested.

Decision making research is formally referred to as "Judgment and Decision Making" (JDM; Goldstein & Hogarth, 1997). It consists of researchers from a variety of related disciplines investigating two primary research foci – judgment and decision making. Judgment refers to the process by which individuals "…integrate multiple, probabilistic, potentially conflicting cues to arrive at an understanding of a situation" (Goldstein & Hogarth, 1997, p. 4). Decision making, in contrast, refers to how people decide on a course of action, particularly in the face of often uncertain consequences and conflicting goals (Goldstein & Hogarth). This study, being centered on the choices individuals make in a fast food context, lies more within the latter research focus.

Goldstein and Hogarth (1997) described three broad research areas of decision making research: "(1) What model(s) can do a better job than utility theory at capturing the trade-offs that people make among conflicting goals? (2) What information are people attending to and using? (3) What is the sequence of mental operations by which people arrive at their choices?" (p. 15). These areas have generated a vast amount of information related to decision making and the reader is referred to Goldstein and Hogarth for a presentation of these results. This study resides within the third area as applied to a heretofore unexamined intersection of health psychology and decision making – the nature of decision making in food selection.

Decision making begins when a problem is detected by the decision maker. The problem is perceived as a discontinuity or gap between the existing state of affairs and mental model of the desired state of affairs (Johnson-Laird, 1983; as cited in Peterson, Sampson, & Reardon, 1991). It is theoretically preferred (but practically difficult, and somewhat uncommon) that the decision maker expends some resources and develops a thorough understanding of the initial problem state, the sought-after goal state, and the possible solutions to the problem. After performing these three actions, the decision maker then uses a decision making strategy to bring about the goal state, thus eliminating the problem. The strategy involves selecting one or more alternatives from among a group of alternatives, each described by one or more attributes and/or consequences (Bettman, Luce, & Payne, 1998). The set of alternatives, termed the "choice set," consists of conceptually similar items that differ in minor ways. The number of alternatives in a choice set can vary from one (in which the decision is simply to select or not select the alternative) to an infinite number (which again permits the nonselection option). The attributes of the alternatives are the general dimensions or characteristics that define the alternatives, and these attributes may vary in a number of ways, e.g., in their potential consequences, their desirability to the decision maker, and the decision maker's willingness to trade off less of one for more of another (Bettman et al., 1998).

The classic example of a decision task is buying a new car. There are several new cars to choose from and all share a number of common attributes but differ in their respective levels of these attributes. For example, all cars have horsepower, safety features, and reliability, but the cars differ in their respective amounts of horsepower, number of safety features, and frequency and complexity of necessary repairs. A decision maker may strongly desire high horsepower, moderately desire some safety features, and have no desire for high reliability. He may be willing to accept a car with fewer safety features if it has more horsepower (although this may not be a wise trade off).

Decision tasks may be complicated by several characteristics inherent to the task, including the number of alternatives, the number of relevant attributes, the availability of attribute information, the understandability of attribute information, and the uncertainty of consequences. The first two, number of alternatives and number of relevant attributes, is easy to understand; the more of either, or both, increases decision task complexity. Information availability and understandability varies by the nature of the attribute. Some attributes, such as a car’s horsepower, are quite available and understandable because they are well defined, simple, and objectively measured. Other attributes, such as reliability, may not be available until a car model has been around for a few years, and even then a car’s reliability is draped in a hazy repair history. Finally, the uncertainty of consequences for selecting a particular alternative complicates decision making because consequences, in terms of in costs and benefits, may be more or less certain, and this uncertainty also affects how decision are made.

Theoretical Foundation of This Research Study

As Johnson-Laird and Shafir (1993) stated there is a need to examine decision making in realistic problems – of which overweight and obesity is certainly one – in order to account for the relevant mental processes involved in such problems. This study’s goals were to identify the mental operations used in food choices, the sequencing of these operations and to determine whether these processes vary by individuals’ weight status. The study does so from the vantage point of a reason-based analysis of decision making (Shafir, Simonson, & Tversky, 1993).

Reason-based Analysis of Decisions

A reason-based analysis of decisions “…identifies various reasons and arguments that are purported to enter into and influence decision, and explains choice in terms of the balance of reasons for and against the various alternatives” (Shafir et al., 1993; p. 13). Such an analytical model has several attractive features (Shafir et al., 1993). First, its focus on reasons is explicitly congruent to the way people actually think – people produce reasons for and/or against certain options rather than calculating expected utilities. Second, it provides a way to understand the conflict that is inherent to decision making involving choice among multiples alternatives, each with its pros and cons. Finally, a reason-based choice model allows the inclusion of psychological factors that often remain outside the domain of utility-based models. Several researchers have adopted a reason-based framework in their work on how decisions are made. Rips (1998), in presenting his theory and model of informal arguments, noted that reasons and principles of argumentation are “…relevant to individual deliberation and reasoning…Reasoning, in this sense, is often a process of internal argumentation in which a person considers the potential challenges, refutations, and justifications of an initial position” (pp. 413-414). Green and McCloy (2003) stated that when choosing among courses of action in unclear circumstances individuals argue with themselves in order to make decisions. And Johnson-Laird and Shafir (1993) reported that reason-based decision analyses have been used in many practical investigations, such as doctors' decisions about treatments, gamblers in casinos, and customers in shopping malls.

Sequential Analysis

Considering decisions from a reason-based perspective affords the use of sequential analysis in decision analysis. Sequential analysis is the formal examination of events that unfold over time (Bakeman & Gottman, 1997). It allows researchers to investigate rates and frequencies of particular events occurring within a sequence, and also the transitions among these events.

In generic terms, a sequence of events could look like this (example adapted from Bakeman & Gottman, 1997, p. 96):

B C A A A B B C B C A C

In this case, each of three possible events – labeled A, B, and C – occurred 4 times and thus, within the sequence, the events are equiprobable. An additional question that may be asked is about the transitions among events. A "moving time-window" (Bakeman & Gottman, 1997, p. 96) may be applied to the sequence as follows to identify transitions among events:

(B C) A A A B B C B C A C

B (C A) A A B B C B C A C

B C (A A) A B B C B C A C

The first transition is from event B to event C, the next is C to A, then A to A, and so on. A transition matrix may be constructed to represent these two-event transitions (see Table 1).

Table 1

Frequencies of Two-event Transitions

	Second Event			
	A	B	C	Totals
First-Event				
A	2	1	1	4
B	0	1	3	4

Table 1 - Continued

C	2	1	0	3
Totals				11

Note. Matrix values represent the number of times specific two-event transitions occurred. Adapted from *Observing Interaction: An Introduction to Sequential Analysis* (p. 97), by R. Bakeman and J. M. Gottman, 1997, Cambridge, UK: Cambridge University Press. Copyright 1997 by Cambridge University Press.

The frequencies of the two-event transitions may be transformed to probabilities by dividing the frequencies by the total number of two-event transitions. These probabilities are shown in Table 2.

Table 2

Probabilities of Two-event Transitions

	Second Event			
	A	B	C	Totals
First-Event				
A	.18	.09	.09	.36
B	.00	.09	.27	.36
C	.18	.09	.00	.27
Totals				1.00

Note. Matrix values represent the proportion specific two-event sequences occurred out of the total number of such sequences.

Finally, the concepts of conditional transitions and probabilities may be considered. Conditional transitions are similar to the two-event transitions previously introduced but rather than being considered in relation to the *entire* collection of two-event transitions, they are considered only in relation to other two-event transitions *having the same first event*. For example, in Table 1 the values in row A represent the two-event transitions whose first event was an A. Another way of saying this is that these values represent the frequencies of “A” conditional transitions, with A being the condition since it is the first event of these sequences. Likewise, the values in row B of Table 1 represent the frequencies of “B” conditional transitions and the values in row C represent the “C” conditional transitions. The probabilities of conditional transitions, “conditional probabilities”, are determined by dividing cell values by *row* totals. These conditional probabilities represent the proportion of conditional transitions in which the second event was A, B, or C. Considering the information in Table 1, the probability of A, given a previous A, was .50; the probability of B, given a previous A, was .25; and the probability of C, given a previous A, was also .25. “B” conditional probabilities and “C” conditional probabilities are similarly derived. Table 3 displays these conditional probabilities.

Table 3

Conditional Probabilities of Two-event Transitions

		Second Event		
	A	B	C	Totals
First-Event				
A	.50	.25	.25	1.00
B	.00	.25	.75	1.00
C	.67	.33	.00	1.00

Note. Matrix values represent the probabilities of specific two-event sequences that occurred within their row. Adapted from *Observing Interaction: An Introduction to Sequential Analysis* (p. 98), by R. Bakeman and J. M. Gottman, 1997, Cambridge, UK: Cambridge University Press. Copyright 1997 by Cambridge University Press.

Conditional probabilities may also be described graphically as in Figure 2. In the Figure, circles represent events (e.g., events A, B, and C) and arrows represent transitions among the events. The arrow densities and associated numbers represent the probability magnitudes of the conditional transitions occurring among the events.

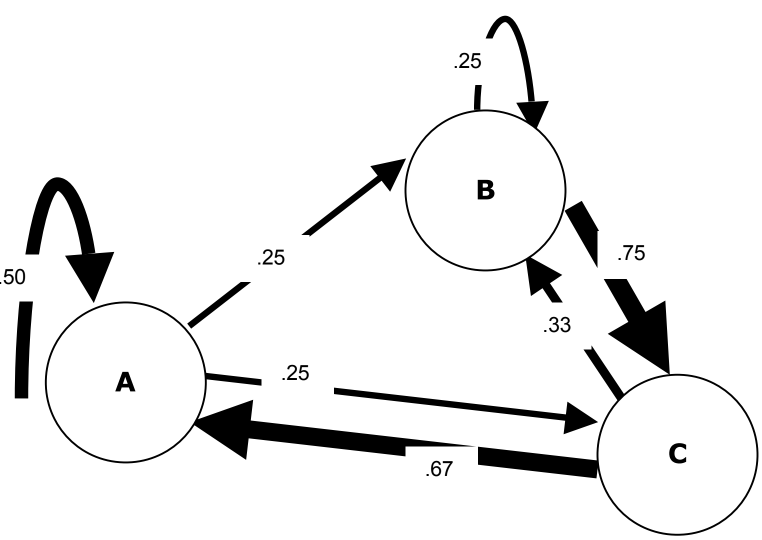


Figure 2. Conditional probabilities among events.

To set the stage for this study, the arguments of a decision process are analogous to the generic A, B, and C events discussed above. Thus, the sequence of “events” in one’s decision process may be analyzed. To go a step further, consider the example event data as representing the sequence of *one person’s* decision making. Another person’s decision making may consist of the same three events but have a very different sequence. Likewise, these two people may have very different patterns of conditional transitions; that is, the probabilities of any particular event, given a previous event, may be very different between the two individuals. Finally, it may be that a particular group of individuals may have a similar sequence of decision-making that may be very different than that of another group of individuals.

Decision Making in a Food Selection Task – A Reason-based Choice Scenario

In a food selection task such as deciding what to eat in a restaurant, the problem is generally how best to satisfy one's appetite. The challenge for the decision maker is how to move from hunger to satiety given the alternatives (in the form of food items) available. A food selection task is often quite complex: there is usually a large array of food items with varying levels of attributes such as price, taste, and nutrition, and the availability and understandability of attribute information also varies widely. In addition, personal factors such as values and preferences play meaningful parts in making the decision. These aspects demonstrate that decision making in a food selection task fits the reason-based choice model. Rather than calculating and comparing the expected utilities of specific food based on their value and probability of "occurring", individuals decide based on reasons and arguments they develop for and against the various options available. As noted above, developing a thorough understanding of the elements and process of decision making is sometimes difficult or deemed unnecessary; rising obesity rates suggest that this is the case for decision making in food selection task. But the dire consequences of these very obesity rates demonstrate that there are large benefits to understanding how and why some individuals make healthy food decisions while others do not. It is proposed herein that making a food-related decision is a process of manipulating information; that is, the various arguments and reasons involved are transformed by a series of information processes (Ericsson & Simon, 1993). It is these information decision processes (essentially "micro" processes that operate within the "macro" decision-making process), and how different groups of people use them in food selection, that were the subjects of this study.

Research Questions and Hypothesis

The purpose of this study was to investigate the nature of the decision making process that individuals use when selecting food, and to determine whether normal weight and obese individuals make food-related decisions differently. The units of analysis were the decision processes that transform the arguments and reasons considered by the decision maker. Six types of decision processes were used in this study. These processes are fully defined in the Methods section but are introduced now for clarity. The types are: Propose, Support, Oppose, Deliberate, Reject, and Accept. These processes are considered to be the events in a decision making process. Also analyzed were the conditional transitions among these decision processes.

While some previous research has framed eating as a decision task (Davis, Levitan, Muglia, Bewell, & Kennedy, 2004; Sbrocco, Nedegaard, Stone, & Lewis, 1999), none has studied these decision processes nor used the "in-the-moment" methodology proposed herein. Due to this lack of similar past research there was little basis for developing formal hypotheses about decision making for this study. Instead, several non-directional research questions about differences in food-related decision making between normal weight and obese individuals were investigated. One directional hypothesis was offered about the caloric totals of items ordered by participants.

Research Question 1: Individual Decision Processes by Normal Weight versus Obese Participants

Are there differences between normal weight and obese participants in the distributions of observed decision process frequencies across decision types?

Research Question 2: "Propose" Conditional Transitions by Normal Weight versus Obese Participants

Within the set of two-process sequences beginning with Propose, are there differences between normal weight and obese participants in the distributions of observed decision process frequencies across "Propose" conditional transitions?

Research Question 3: "Support" Conditional Transitions by Normal Weight versus Obese Participants

Within the set of two-process sequences beginning with Support, are there differences between normal weight and obese participants in the distributions of observed decision process frequencies across "Support" conditional transitions?

Research Question 4: "Oppose" Conditional Transitions by Normal Weight versus Obese Participants

Within the set of two-process sequences beginning with Oppose, are there differences between normal weight and obese participants in the distributions of observed decision process frequencies across "Oppose" conditional transitions?

Research Question 5: "Deliberate" Conditional Transitions by Normal Weight versus Obese Participants

Within the set of two-process sequences beginning with Deliberate, are there differences between normal weight and obese participants in the distributions of observed decision process frequencies across "Deliberate" conditional transitions?

Research Question 6: "Reject" Conditional Transitions by Normal Weight versus Obese Participants

Within the set of two-process sequences beginning with Reject, are there differences between normal weight and obese participants in the distributions of observed decision process frequencies across "Reject" conditional transitions?

Research Question 7: "Accept" Conditional Transitions by Normal Weight versus Obese Participants

Within the set of two-process sequences beginning with Accept, are there differences in the distributions of observed decision process frequencies across "Accept" conditional transitions?

Hypothesis: Calories Ordered by Normal Weight versus Obese Participants

It was expected that obese participants would select food items with significantly higher calorie totals than those selected by normal weight participants. This hypothesis is based in part on theory that increased calorie consumption is associated with increased weight and also on the findings of Ebberling et al. (2004) who found that overweight participants ate significantly more calories than normal weight subjects during a fast food meal.

CHAPTER II: METHODS

Participants

Participants were recruited and managed according to the ethical guidelines set forth by both Florida State University's Internal Review Board and the Internal Review Board of Bowling Green State University (see Appendix A for related paperwork).

Forty-seven participants took part in this study. All participants were volunteers at least 18 years old (M_{Age} = 19.04, SD = 1.16). They were recruited from among undergraduate psychology students at a major university in the Midwest. All participants received one-half course credit for their participation. The participants were grouped according to their Body Mass Index category[2]. Twenty-three were normal weight (M_{BMI} = 21.66, SD = 1.48) and thus placed in the normal weight group. Twenty-four participants were obese (M_{BMI} = 31.44, SD = 3.67) and thus placed in the obese group. These groups differed significantly in their BMIs, $t(47) = -11.90$, $p < 0.05$. Gender, race/ethnicity, year in school, and marital status information is provided in Table 4.

Table 4

Gender, Race/Ethnicity, Year in School, and Marital Status of Participants by Group

	Normal Weight (n = 23)	Obese (n = 24)	Total Sample (N = 47)
Gender			
Male	6	3	9
Female	17	21	38
Race/Ethnicity			
Asian-American	1	0	1
African-American	3	10	13

[2] Body Mass Index is a value that describes an individual's weight relative to his or her height. The Centers for Disease Control divides resulting BMI values into four weight status categories: underweight (BMI < 18.5), normal weight (BMI: 18.5 - 24.9), overweight (BMI: 25.0 - 29.9) and obese (BMI > 29.9).

Table 4 – Continued

Caucasian	18	14	32
Hispanic/Latin	1	0	1
Year in School			
First year	20	22	42
Second year	2	2	4
Third year	1	0	1
Marital Status			
Single, never married	23	24	47

Instruments and Equipment

Informed Consent (Appendix A). The Informed Consent form informed participants of their rights as participants during their participation in this study.

Demographic Questionnaire (Appendix B). This questionnaire collected data on participant's age, gender, race/ethnicity, body mass index (in terms of weight and height), year in school, martial status, and hours since last meal. Gender, race/ethnicity, and hours since last meal were considered in assessing the similarity of the normal weight and obese groups while the other questions were intended to "camouflage" the BMI questions and reduce the likelihood that participants would react to these questions in ways that might bias the study.

Simulated Menu (Appendix C). Participants made food selections from a menu that simulated the menu of a McDonald's restaurant. A McDonald's restaurant menu was chosen because it is familiar to most people and was highly likely to be familiar to the participants of this study. This familiarity is likely to reduce any chance of confusion in the food selection activity. The simulated menu that was used in this study was developed to mimic the menu of a McDonald's restaurant in the local community. The menu consisted of pictures and text that were downloaded from the McDonald's website and placed on paper in a manner that closely resembled the menu as it appeared in the actual restaurant. The menu was laminated to ensure that it would last throughout the data gathering stage.

Think-Aloud Protocols. Details of participants' decision making processes were gathered via think-aloud protocols and analyzed using the process of protocol analysis (Ericsson & Simon, 1993). Protocol analysis is a method of uncovering the thought processes used by individuals as they perform certain activities. It has been an important method of gaining insight into cognitive activities in a variety of disciplines, including data analysis (Austin & Mawhinney, 1999), systems analysis (Bainbridge & Sanderson, 1995), learning and cognition (Chi, 1997), and human problem solving and decision making (Ericsson & Simon, 1993). Following the recommendation of Ericsson and Simon about how to familiarize participants with the activity of talking aloud while making decisions, participants were asked to make three decisions and to verbalize their thoughts while doing so (see Appendix D). Their verbalizations were recorded, transcribed, and then segmented into meaningful thought units. The thought unit segments were intended to capture one complete functional thought. Thought units do not have a specific number of words or time length but instead are considered in terms of their function in the protocol. They were usually defined by pauses in speech. Three sample protocols are presented in Appendix G displaying how these thought units are identified. These protocol segments were then coded by independent judges as one of six possible decision processes (see "criterion variables" for an explanation and description of types of decision processes). Before transcription the protocols were separated from their corresponding demographic information so that the primary investigator was blind as to which group a protocol belonged. After the protocols were coded they were re-united with their group through a key and analyzed to test the research questions presented earlier.

Recording Device. Participant verbalizations were recorded using an iRiver H10, a portable mp3 player with a built-in microphone. The individual recordings were stored on the researcher's computer with appropriate security measures (i.e., firewall), and managed via a common audio jukebox program.

Procedure

Individuals were recruited from undergraduate psychology students at a major University in the Midwest. They were asked to participate in a study about decision making in everyday tasks. Those that chose to participate met with the researcher at an arranged time in a graduate student office in the University psychology department to complete the questionnaires and the decision making tasks. Participants first completed an informed consent form (see appendix A), which explained to them that their participation would be voluntary and confidential, and that they may cease participation at any time.

Participants then received a verbal description of the task scenario and verbal instructions on how to properly verbalize their decision making process (see Appendix D). The primary message to participants was that they would say out loud everything that they might say to themselves as they performed the tasks. Participants then performed three decision making activities; the first two were intended as verbalization practice opportunities, the last was the food selection task. The first practice task consisted of solving the equation 7 x 34 while talking through the process. This task was intended to familiarize participants to talking aloud as they solved a problem. The second practice task was to look at a photographic array of movie posters and select one for viewing while verbalizing the decision making process. This task was to familiarize participants to the structure of the food-selection task they were about to perform. The third task was the food selection task and it involved selecting a "meal" from a photographic array of McDonald's menu items. After the participants completed the food selection task they then completed the demographic questionnaire. After completing the demographic questionnaire the participants were debriefed (see Appendix E) and their participation ended.

Task Manipulation

The task of interest in this study was selecting a meal consisting of a few food items from a menu of food items. The food items and menu matched those of a well-known national fast food restaurant. While the task was created by the researcher, the decision making processes employed by the participants were entirely created by the participants. That is, each participant determined which items he or she would consider, which attributes he or she would consider, how to compare the alternatives and/or attributes against one another, and, finally, which items to choose. This task context differed from most decision making research in that these other studies usually present a highly pre-determined task consisting of a few specified alternatives, a few specified attributes, and specified values for each alternative on each attribute.

The units of interest in this study were the processes of reason-based decision making used by the participants (the decision types introduced earlier). For example, rather than being presented with specific items, participants had to *propose* items for consideration; rather than being presented with reasons supporting or reducing the importance of items, participants had to *support* or *oppose* items or attributes themselves. It is these decision making processes and their sequencing that were of interest in this study.

Predictor Variable

Weight status was the primary predictor variable in this study. It was considered to be a dichotomous variable consisting of two levels: normal weight and obese. Weight status was determined using the Centers for Disease Control Body Mass Index (BMI) calculator (CDC, n. d.). This on-line calculator uses the formula (weight / [height] ^{2}) x 703 to determine BMI. The Centers for Disease Control divides resulting BMI values into four weight status categories: underweight (BMI < 18.5), normal weight (BMI: 18.5 - 24.9), overweight (BMI: 25.0 - 29.9) and obese (BMI > 29.9). This study used the normal weight and obese levels of weight status as the levels of predictor variable.

Criterion Variables

Individual Decision Processes. Individual decision processes are the aforementioned information processes involved in manipulating arguments and reasons in the “macro” decision process. For statistical analysis purposes, “decision making processes” was considered one categorical variable with six levels: Propose, Support, Oppose, Deliberate, Reject, and Accept. These levels represent the types of processes that are theorized to occur during decision making; in the terms of the earlier introduction to sequential analysis they are the “events” to be considered. These process types were developed through an iterative process of literature review and pilot study. Several previous researchers have proposed decision making frameworks with similar decision making processes, ranging from the logical problem solving procedures outlined in Newell and Simon’s (1972) classic work on human problem solving to Bettman’s Information Processing Theory of Consumer Choice (1979) to Payne, Bettman, and Johnson’s (1993) Elementary Information Processes for decision making. This study’s decision making framework combined relevant portions of these earlier proposals with concepts from Shafir et al’s (1993) reason-based choice framework. Specifically, the concept that a decision process is an internal debate consisting of arguments and counterarguments eventually reaching a conclusion.

The pilot study consisted of three iterations of coding preliminary decision protocols using the food selection task, and discussing the codes and thought units. Three complete protocols having a total of 117 segments were coded by two different research associates at three different times, with a different pair of coders each time. After these iterations of coding and code refinement, inter-rater reliability of this procedure was assessed with Cohen's Kappa (Sheskin, 2004). Cohen's Kappa is a measure of association used with contingency tables to indicate the degree of agreement between two judges (Sheskin, 2004). It also corrects for chance agreement between the judges. Cohen's Kappa is determined by the following equation:

$$\kappa = \frac{\Sigma O_{ij} - \Sigma E_{ij}}{n - \Sigma E_{ij}}$$

Wherein i represents the number of rows and j represents the number of columns (these are equal in Cohen's kappa procedure); O_{ij} represents the observed frequency of the cell in the i^{th} row and j^{th} column; E_{ij} represents the expected frequency of the cell; and n represents the total number of observations/judgments recorded in the summary table.

The resulting Cohen's Kappa for the pilot study coding procedure was .98, which indicates a 98% agreement rate between the two coders (Sheskin, 2004). The processes Propose, Support, Oppose, Deliberate, Reject, and Accept were established. Two additional processes, Metacognition and Interrupt, were identified but removed from this analysis because they were not considered primary decision making processes and the Data Analysis Tool could not accommodate more than six codes. Appendix F provides a complete description of the processes, but a brief description follows here:

- Propose – any statement establishing a tentative course of action
- Support – any statement that supports, promotes, strengthens, solidifies, judges positively, or justifies another decision process.
- Oppose - any statement that negates, demotes, judges negatively, or counters another decision process.
- Deliberate - any process in which the participant seems to be performing a "sub-routine"; that is, doing some decision making at a more micro-level than what is visible in the verbal protocol.
- Reject – any statement eliminating a possible course of action from consideration.
- Accept - a final decision; the point at which, in the restaurant, the cashier would be certain that the person is ordering the item as opposed to considering the item as a possibility.

In the actual study, each thought unit within all forty-seven protocols was coded by the primary investigator. The inter-rater reliability of the process labels was assessed a second time for the main study. The primary investigator met with a research assistant twice for about two hours each time to explain and discuss the definitions of the six process labels as presented in Appendix F. The assistant coded the pilot study protocols and the coding was compared to that of the primary investigator and yielded a Cohen's Kappa of .85. To assess the inter-rater reliability of the main study protocols, five complete protocols having a combined total of 361 thought units (26% of the total number of decision processes) were randomly selected from each group (normal weight and obese). This amount of thought units exceeds Cone and Foster's (1993) recommendation that at least 20% of all items coded be subjected to inter-rater reliability analysis. These ten randomly selected protocols were also coded by the research assistant. This second set of protocol codes was then compared to the corresponding codes produced by the primary investigator and the two sets yielded a Cohen's Kappa value of 0.88, which indicates an 88% agreement rate between the two coders (Sheskin, 2004). In a large sample the distribution of Cohen's Kappa is approximately normal and so the significance of its magnitude is tested by an ordinary z ratio (Wickens, 1989). The results of this Cohen's Kappa analysis suggest that the two sets of coded protocols were significantly correlated ($z = 29.81$, $p < .05$) and thus the null hypotheses that the coders' ratings correlate no better than chance was rejected.

Conditional transitions. Conditional transitions are two-process sequences in which the first process is pre-specified, or given. Because any of the six processes may occur first and any of the six processes may occur second (given the first process, "the condition") there are thirty-six possible conditional transitions (i.e., 6 x 6 = 36). These conditional transitions were organized by their first process resulting in six sets of conditional transitions.

Calories ordered. Caloric totals of food selections were determined using the online nutritional calculation tool provided by McDonald's (n. d.). This tool enables users to select a combination of food items and calculate the nutritional content (in terms of calories; grams of total fat, saturated fat, trans fat, carbohydrates, dietary fiber, and protein; and milligrams of cholesterol and sodium.

Data Analyses

All analyses were performed using Statistical Package for the Social Sciences (SPSS), version 10. Graphical representations of conditional probabilities (i.e., panels A & B of Figure 3) were generated using Jeong's (2005a) Data Analysis Tool (DAT), version 1. Preliminary analyses of the data gathered, including descriptive statistics, analyses of missing data, unusual cases, and the assessment of validity of assumptions associated with specific statistical analyses employed, are presented. All statistical analyses were performed using an alpha level of .05.

Research question 1. The question of whether the groups would differ in their distributions of observed decision process frequencies across decision types was tested with a chi-square (χ^2) test of homogeneity. Categorical data of two variables can be organized in row x column "contingency" tables. Table 5 is a generic contingency table with two rows and six columns presented for explanatory purposes. Typically, the rows represent the levels of the predictor variable (in this case the weight groups) and the columns represent the levels of the criterion variable (in this case the decision process types). The body of the contingency table consists of cells that contain the observed frequencies of the units of analysis for the corresponding levels of the predictor and criterion variables. The observations are defined by their subscripts: the first element represents the row, the second represents the column. "Dots" represent either row or column total, depending on their elemental placement.

Table 5

Example 2 x 6 Contingency Table

	Criterion Variable						
	Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Total
Predictor Variable							
Row 1	O_{11}	O_{12}	O_{1c}	...		...	$O_{1\cdot}$
Row 2	O_{21}	O_{22}	O_{r3}	...		...	$O_{2\cdot}$
Total	$O_{\cdot 1}$	$O_{\cdot 2}$	…			…	n

Table 6 displays these elements in the terms of this study.

Table 6

Weight Group by Decision Process Contingency Table

	Decision Processes						
	Propose	Support	Oppose	Deliberate	Reject	Accept	Total
Group							
N. W.	O_{11}	O_{12}	O_{1c}	…		…	$O_{1\cdot}$
Obese	O_{21}	O_{22}	O_{r3}	…		…	$O_{2\cdot}$
Total	$O_{\cdot 1}$	$O_{\cdot 2}$	…			…	n

Note. "N. W." stands for normal weight.

For example, cell O_{11} represents the number of Proposes generated by the normal weight group and O_{12} represents the number of Supports generated by the normal weight group. Cell O_{21} represents the number of Proposes generated by the obese group and O_{22} represents the number of Supports generated by the obese group.

Table 7 displays a "proportional" 2 x 6 contingency table. In this table the cell values represent the proportion of the total row frequencies that appear in that column. Thus, p_{11} represents the proportion of the normal weight group's total number of decision processes that were Proposes, and p_{12} represents the proportion of the same total that were Supports. Likewise, p_{21} represents the proportion of the obese group's total number of decision processes that were Proposes, and p_{22} represents the proportion of the same total that were Supports.

Table 7

Proportional Weight Group by Decision Process Contingency Table

	Decision Processes						
	Propose	Support	Oppose	Deliberate	Reject	Accept	Total
Group							
N. W.	p_{11}	p_{12}	p_{1c}	…		…	$p_{1\cdot}$
Obese	p_{21}	p_{22}	p_{r3}	…		…	$p_{2\cdot}$
Total	$p_{\cdot 1}$	$p_{\cdot 2}$	…			…	–

The chi-square (χ^2) test of homogeneity tests for significant differences between rows in terms of the rows' distributions of proportions; in other words, are the two proportional distributions homogeneous (Sheskin, 2004)? The null hypothesis tested is that the row proportions are the same in each column (Sheskin, 2004). The alternative hypothesis is that the row proportions are not equal in at least one column.

Three assumptions are inherent to the χ^2 test of homogeneity (Sheskin, 2004). The first is that categorical/nominal data are used in the analysis. For χ^2 tests in this study this assumption is satisfied because the data are categorical. The second assumption is that these data consist of a random sample of independent observations. This assumption is satisfied in the first analysis, that of individual decision processes. The third assumption is that the expected frequency of each cell is greater than 5. The third assumption is not strictly met by some of the analyses in this study. However, the generally accepted "looser" version of this assumption, that the expected frequencies of at least eighty percent of the cells be at least five and none of the remainder less than 1 (put forth by Cohen, 1952, and cited by Sheskin, 2004), is satisfied by these analyses.

The χ^2 test is considered to be an omnibus test (Bakeman & Gottman, 1997). As with *F* ratios in multiple analyses of variance, if its value is significant further comparison are performed to identify which group differences among the decision processes contribute significantly to the χ^2 value. Several researchers (Bakeman & Gottman, 1997; Everitt, 2001;

Haberman, 1973; Jeong, 2005b; Sheskin, 2004) have suggested that adjusted residuals be examined for this follow-up analysis. Adjusted residuals are interpreted as normally distributed variables (Bakeman & Gottman, 1997; Haberman, 1973; Sheskin, 2004) and thus in χ^2 analyses any adjusted residual with an absolute value equal to or greater than 1.96 is significant at the .05 level (Sheskin, 2004; for more information on adjusted residuals, including their calculation, see Appendix H). The valence signs of the adjusted residuals (i.e., whether they are positive or negative) indicate whether the observed value was more than or less than its expected value.

The χ^2 statistic indicates significant differences between observed and expected frequencies but it does not accurately indicate the degree of association between two variables. It relies on both total sample size and the proportions of observations in the cells of the table; if sample size changes while relative observation proportions remain constant, the χ^2 value changes while the degree of association between the two variables remains constant (Glass & Hopkins, 1996; Sheskin, 2004). Measures of association for contingency tables rely only on relative observation proportions and the appropriateness of a specific measure depends on the structure of the contingency table. For tables larger than 2 x 2 the appropriate measure of association is Cramer's Phi (φ_C; Cohen, 1988; Sheskin, 2004). Cramer's phi is determined by the following formula: $\varphi_C = \sqrt{\chi^2 / (n[k-1])}$, wherein k represents the smaller of the two values of r and c in the contingency table. Cramer's phi is interpreted in the same way as a Pearson correlation coefficient (Connor-Linton, 2003). For this hypothesis it is somewhat difficult to intuit this interpretation because both variables are nominal. The null hypothesis evaluated by Cramer's Phi is that the degree of association between the variables in the underlying population is zero; the alternative hypothesis is that the degree of association between the variables in the underlying population is some value other than zero (Sheskin, 2004). A Cramer's Phi value is significant if the corresponding computed chi-square value for the contingency table is statistically significant at a given alpha level (Sheskin, 2004).

Research questions 2-7. Multiple chi-square tests of homogeneity were performed to examine significant differences between normal weight and obese participants in their respective proportional distributions of conditional transitions. For these analyses the second assumption of χ^2 tests, that of independence of observations, may be violated because the last process of a conditional transition is necessarily the first process of the next conditional transition. In these analyses, however, this assumption is considered robust to such violation as explained in

Appendix I. For these analyses, examinations of adjusted residual absolute values were the follow-up tests to χ^2 significance and Cramer's phi is noted where appropriate. A χ^2 test was not performed for "Oppose" conditional transitions because these data did not satisfy the third assumption of minimum expected frequencies. This resulted in the research questions presented after Oppose to be re-numbered as follows: research question 4 referred to "Deliberate" conditional transitions, research question 5 referred to "Reject" conditional transitions, research question 6 referred to "Accept" conditional transitions, and research question 7 referred to calories ordered.

Hypothesis. Group differences in calories ordered were tested using a *t* test for two independent samples. The *t* test for independent samples determines whether two groups containing different subjects differ in respect to an interval or ratio variable. The null hypothesis evaluated is whether the mean of the population represented by Group 1 equals the mean of the population represented by Group 2 (H_0: $\mu_1 = \mu_2$; Sheskin, 2004). The generic directional alternative hypothesis evaluated by the *t* test for independent samples is that the mean of the population represented by one group is greater than that of the population represented by the other group. In this study the specific directional alternative hypothesis was that obese participants would ordered significantly more calories than normal weight participants (H_1: $\mu_{\text{Obese}} > \mu_{\text{Normal Weight}}$).

Three assumptions are inherent to the *t* test for two independent samples (Sheskin, 2004). The first is that each group is randomly selected from the population it represents. This assumption may be violated in this study because the only available method of participant recruitment was participant self-selection, not random selection. The second assumption is that the distribution of data in the underlying populations from which each the samples is derived is normal. Skewness, or the degree of asymmetry (Glass & Hopkins, 1996), and kurtosis, a measure of extreme scores (Glass & Hopkins, 1996), are two important measures of the degree of normality of a distribution of values. For this analysis (and all other *t* tests performed in this study) skewness values and kurtosis values for the distributions of calorie scores in both participant groups lie within the commonly accepted range of plus/minus two times their respective standard errors (Price, 2000), indicating that both distributions are approximately normal. The third assumption is that variance of the underlying population represented by sample 1 is equal to that of the underlying population represented by sample 2. Whether this assumption is violated is commonly evaluated using Levene's Test for Equality of Variances. The null hypothesis of Levene's test is that the variances are homogenous and thus if the results of Levene's test are not significant the null is retained. For this analysis $F_{\text{Levene}} = 2.697$ and $p = 0.107$, indicating nonsignificance at the 0.05 level and thus the hypothesis of homogeneity of group variances is retained. All Levene's tests performed in this study were not significant.

CHAPTER III: RESULTS

Demographic Characteristics

Between-group statistical analyses were performed to determine whether normal weight and obese participants differed significantly on age, hours since last meal, number of processes produced, and race/ethnicity. In terms of race/ethnicity, expected values were too small to include each category in a chi-square analysis so first nonwhite participants were grouped together and their between-group frequencies were compared to that of Caucasian/Whites. Results indicated no significant relationship between Caucasian/non-Caucasian and weight status, χ^2 (1, N = 47) = 2.15, p > .05 (two-tailed). Because African-Americans seem to make up a rather large proportion of the obese group in this study a second chi-square analysis comparing the frequencies of African-Americans and non-African-American participants. Results indicated a significant relationship, χ^2 (1, N = 47) = 4.81, p < .05 (two-tailed).

Gender was not analyzed because the low number of males violated the expected value assumption of chi-square. Likewise, year in school was not analyzed because the low number of participants not in their first year violated the expected value assumption of chi-square. Finally, marital status was not analyzed because all participants were single resulting in overly low numbers in the other statuses. No cases or data were missing in these analyses and the respective preliminary analyses suggested that no outliers nor individual values exerting excessive influence on the results were present.

Table 8 displays group statistics of age, hours since last meal, and number of processes.

Table 8

Statistics of Age, Hours Since Last Meal, and Number of Processes by Group

	Normal Weight (n = 23)		Obese (n = 24)				
	Mean	*SD*	Mean	*SD*	t	C I (95%)	
Age	19.04	1.11	19.04	1.23	0.005	-0.69	0.69

Table 8 – Continued

Hours Since Last Meal	2.96	2.06	2.96	1.86	-0.003	-1.16	1.15
Number of Processes	30.22	13.89	27.7	9.43	0.727	-4.44	9.46

Research Question 1: Individual Processes by Normal Weight versus Obese Participants

The first research question examined differences between normal weight and obese participants in the proportional distributions of individual decision processes. Table 9 displays frequency and proportion data for this analysis.

Table 9

Frequencies and Proportions of Individual Decision Processes by Group

	Decision Processes						
	Propose	Support	Oppose	Deliberate	Reject	Accept	Totals
Groups							
N. W. (*n* = 23)	135.0	175.0	26.0	241.0	50.0	77.0	704.0
%	19.2	24.9	3.7	34.2	7.1	10.9	100.0
Obese (*n* = 24)	108.0	158.0	11.0	238.0	65.0	84.0	664.0
%	16.3	23.8	1.7	35.8	9.8	12.7	100.0
Total (*N* = 47)	243.0	333.0	37.0	479.0	115.0	161.0	1368.0
%	17.8	24.3	2.7	35.0	8.4	12.0	100.0

Note. "N. W." stands for normal weight.

Results of the omnibus chi-square analysis indicated significant differences in proportional distributions of individual processes between normal weight and obese participants,

χ^2 (5, $N = 47$) = 11.07, $p = .05$ (two-tailed). Follow-up inspection of the adjusted residuals of the individual processes indicated that group differences in Oppose proportions significantly contributed to the overall χ^2 value (adjusted residual value for the normal weight group was 2.3, for the obese group it was -2.3). See Table 10.

Table 10

Chi-square Statistics of Individual Decision Processes by Group

	Decision Processes						
	Propose	Support	Oppose	Deliberate	Reject	Accept	Totals
Group							
N. W.							
Observed	135.0	175.0	26.0	241.0	50.0	77.0	704
Expected	125.1	171.4	19.0	246.5	59.2	82.9	704
Residuals	9.9	3.6	7.0	-5.5	-9.2	-5.9	
Stan. Res.	0.9	0.3	1.6	-0.4	-1.2	-0.6	
Adj. Res.	1.4	0.5	2.3*	-0.6	-1.8	-1.0	
Obese							
Observed	108.0	158.0	11.0	238.0	65.0	84.0	664
Expected	117.9	161.6	18.0	232.5	55.8	78.1	664
Residuals	-9.9	-3.6	-7.0	5.5	9.2	5.9	
Stan. Res.	-0.9	-0.3	-1.6	0.4	1.2	0.7	
Adj. Res.	-1.4	-0.5	-2.3*	0.6	1.8	1.0	

Note. “Stan. Res.” stands for “Standardized Residuals”. “Adj. Res.” stands for “Adjusted Residuals”.
* $p < .05$

Because the overall χ^2 value is significant at the 0.05 level, the φ_C value is also significant at the 0.05 level, indicating that weight status and decision processes are significantly correlated. The φ_C value for this analysis is 0.09 (1368, k = 2) and its squared value of 0.008 suggests that approximately 0.8% of the variance in weight status is accounted for by variance in individual decision processes.

Research Questions 2-6: Conditional Transitions by Normal Weight Versus Obese Participants

Figures 3 and 4 provide visual representations of the normal weight and obese groups' conditional transitions, respectively.

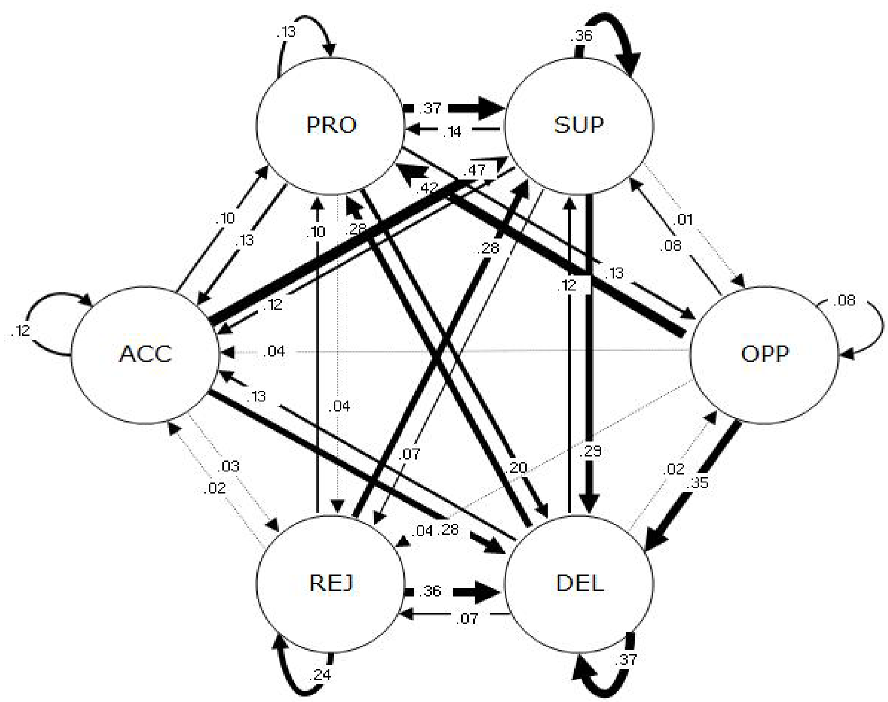


Figure 3. Conditional probabilities among processes within the normal weight group. In the diagram circles represent processes (e.g., "PRO" represents Propose, "SUP" represents Support, "OPP" represents Oppose, "DEL" represents deliberate, "REJ" represents Reject, and "ACC" represents Accept); path densities and numbers represent proportions of conditional transitions emanating from a condition, or given, process.

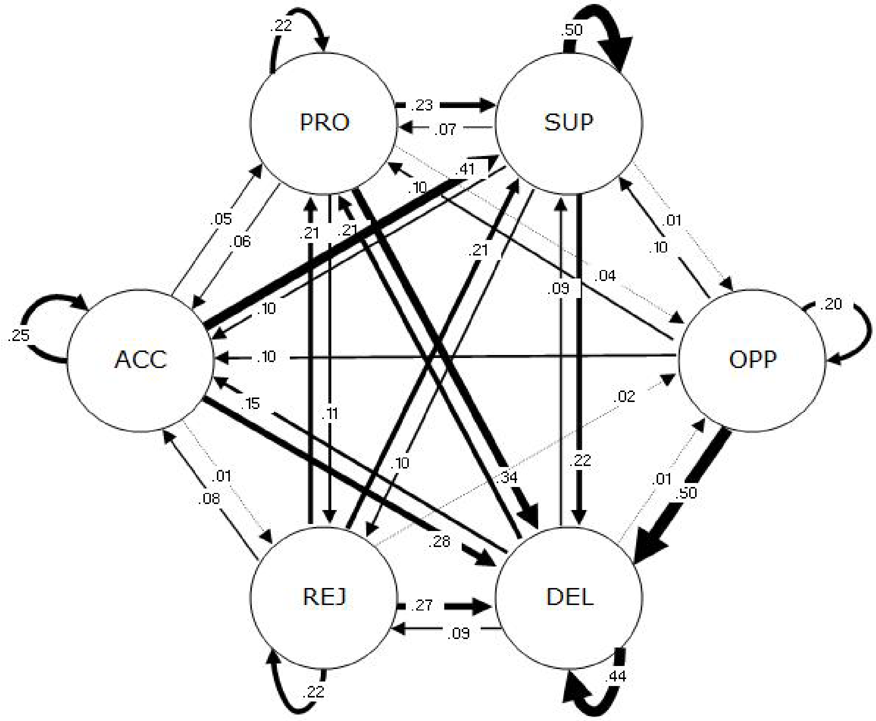


Figure 4. Conditional probabilities among processes within the obese group.

Comparing corresponding paths and their respective values between the two figures suggests where differences between the two groups lie in terms of conditional transitions. For example, in Figure 3 the value of path PRO-DEL is 0.20 whereas it is 0.34 and correspondingly thicker in Figure 4. Chi-square analyses were used to test the differences in conditional transitions between the two groups.

Research Question 2: "Propose" Conditional Transitions by Normal Weight versus Obese Participants

The second research question examined whether or not the proportional distributions of "Propose" conditional transitions differed significantly between normal weight and obese participants. Table 11 displays frequency and proportion data for this analysis.

Table 11

Frequencies and Proportions of "Propose" Conditional Transitions by Group

	Propose Conditional Transitions						
	Pro-Pro	Pro-Sup	Pro-Opp	Pro-Del	Pro-Rej	Pro-Acc	Totals
Groups							
N. W. (*n* = 23)	16.0	47.0	17.0	26.0	5.0	16.0	127.0
%	12.6	37.0	13.4	20.5	3.9	12.6	100.0
Obese (*n* = 24)	21.0	22.0	4.0	33.0	11.0	6.0	97.0
%	21.6	22.7	4.1	34.0	11.3	6.2	100.0
Totals (*N* = 47)	37.0	69.0	21.0	59.0	16.0	22.0	224.0
%	16.5	30.8	9.4	26.3	7.1	9.8	100.0

Note. "Pro" = Propose, "Sup" = Support, "Opp" = Oppose, "Del" = Deliberate, "Rej" = Reject, "Acc" = Accept.

Results of the omnibus chi-square analysis indicated significant differences in proportional distributions of "Propose" conditional transitions between normal weight and obese participants, χ^2 (5, N = 224) = 11.07, p = .001 (two-tailed). Follow-up inspection of the adjusted residuals of the Propose conditional transitions indicated that group differences in the proportions of the following conditional transitions significantly contributed to the overall χ^2 value: Pro-Sup (normal weight = 2.3; obese = -2.3), Pro-Opp (2.4 and -2.4, respectively), Pro-Del (-2.3 and 2.3, respectively), and Pro-Rej (-2.1 and 2.1, respectively). See Table 12.

Table 12

Chi-Square Statistics of "Propose" Conditional Transitions by Group

	"Propose" Conditional Transitions						
	Pro-Pro	Pro-Sup	Pro-Opp	Pro-Del	Pro-Rej	Pro-Acc	Totals
Group							
Normal							
Observed	16.0	47.0	17.0	26.0	5.0	16.0	127
Expected	21.0	39.1	11.9	33.5	9.1	12.5	
Residuals	-5.0	7.9	5.1	-7.5	-4.1	3.5	
Stan. Res.	-1.1	1.3	1.5	-1.3	-1.4	1.0	
Adj. Res.	-1.8	2.3*	2.4*	-2.3*	-2.1*	1.6	
Obese							
Observed	21.0	22.0	4.0	33.0	11.0	6.0	97
Expected	16.0	29.9	9.1	25.5	6.9	9.5	
Residuals	5.0	-7.9	-5.1	7.5	4.1	-3.5	
Stan. Res.	1.2	-1.4	-1.7	1.5	1.5	-1.1	
Adj. Res.	1.8	-2.3*	-2.4*	2.3*	2.1*	-1.6	

* $p < .05$

Because the overall χ^2 value is significant at the 0.05 level, the φ_C value is also significant at the 0.05 level, indicating that weight status and "Propose" conditional transitions are significantly correlated. The φ_C value for this analysis is 0.31 (224, $k = 2$) and its squared value of 0.096 suggests that approximately 10% of the variance in weight status is accounted for by variance in "Propose" conditional transitions.

Research Question 3: "Support" Conditional Transitions by Normal Weight versus Obese Participants

The third research question examined whether or not the proportional distributions of "Support" conditional transitions differed significantly between normal weight and obese participants. Table 13 displays frequency and proportion data for this analysis.

Table 13

Frequencies and Proportions of "Support" Conditional Transitions by Group

	"Support" Conditional Transitions						
	Sup-Pro	Sup-Sup	Sup-Opp	Sup-Del	Sup-Rej	Sup-Acc	Totals
Groups							
N. W. (*n* = 23)	22.0	54.0	2.0	44.0	11.0	19.0	152.0
%	14.5	35.5	1.3	28.9	7.2	12.5	100.0
Obese (*n* = 24)	9.0	67.0	1.0	30.0	13.0	14.0	134.0
%	6.7	50.0	0.7	22.4	9.7	10.4	100.0
Totals (*N* = 47)	31.0	121.0	3.0	74.0	24.0	33.0	286.0
%	10.8	42.3	1.0	25.9	8.4	11.5	100.0

Results of the omnibus chi-square analysis did not indicate significant differences in proportional distributions of "Support" conditional transitions between normal weight and obese participants, χ^2 (5, *N* = 286) = 9.66, *p* = .085 (two-tailed). Because this omnibus chi-square value for "Support" conditional transitions was not significant at the .05 level no further contrasts were warranted to identify group differences among these conditional transitions.

Research Question 4: "Deliberate" Conditional Transitions by Normal Weight versus Obese Participants

The fourth research question examined whether or not the proportional distributions of "Deliberate" conditional transitions differed significantly between normal weight and obese participants. Table 14 displays frequency and proportion data for this analysis.

Table 14

Frequencies and Proportions of "Deliberate" Conditional Transitions by Group

	"Deliberate" Conditional Transitions						
	Del-Pro	Del-Sup	Del-Opp	Del-Del	Del-Rej	Del-Acc	Totals
Groups							
N. W. (n = 23)	63.0	27.0	5.0	82.0	16.0	30.0	223.0
%	28.3	12.1	2.2	36.8	7.2	13.5	100.0
Obese (n = 24)	47.0	20.0	2.0	98.0	21.0	34.0	222.0
%	21.2	9.0	0.9	44.1	9.5	15.3	100.0
Totals (N = 47)	110.0	47.0	7.0	180.0	37.0	64.0	445.0
%	24.7	10.6	1.6	40.4	8.3	14.4	100.0

Results of the omnibus chi-square analysis did not indicate significant differences in proportional distributions of "Deliberate" conditional transitions between normal weight and obese participants, χ^2 (5, N = 445) = 7.00, p = .221 (two-tailed). Because this omnibus chi-square value for "Deliberate" conditional transitions was not significant at the .05 level no further contrasts were warranted to identify group differences among these conditional transitions.

Research Question 5: "Reject" Conditional Transitions by Normal Weight versus Obese Participants

The fifth research question examined whether or not the proportional distributions of "Reject" conditional transitions differed significantly between normal weight and obese participants. Table 15 displays frequency and proportion data for this analysis.

Table 15

Frequencies and Proportions of "Reject" Conditional Transitions by Group

	"Reject" Conditional Transitions						
	Rej-Pro	Rej-Sup	Rej-Opp	Rej-Del	Rej-Rej	Rej-Acc	Totals
Groups							
N. W. (n = 23)	5.0	14.0	–	18.0	12.0	1.0	50.0
%	10.0	28.0		36.0	24.0	2.0	100.0
Obese (n = 24)	13.0	13.0	1.0	17.0	14.0	5.0	63.0
%	20.6	20.6	1.6	27.0	22.2	7.9	100.0
Totals (N = 47)	18.0	48.0	5.0	35.0	26.0	6.0	113.0
%	15.9	23.9	0.9	31.0	23.0	5.3	100.0

Note. Dashes indicate no occurrences of the conditional transitions for the group(s).

Results of the omnibus chi-square analysis did not indicate significant differences in proportional distributions of "Reject" conditional transitions between normal weight and obese participants, χ^2 (5, N = 113) = 6.03, p = .304 (two-tailed). Because this omnibus chi-square value for "Reject" conditional transitions was not significant at the .05 level no further contrasts were warranted to identify group differences among these conditional transitions.

Research Question 6: "Accept" Conditional Transitions by Normal Weight versus Obese Participants

The sixth research question examined whether or not the proportional distributions of "Accept" conditional transitions differed significantly between normal weight and obese participants. Table 16 displays frequency and proportion data for this analysis.

Table 16

Frequencies and Proportions of "Accept" Conditional Transitions by Group

	"Accept" Conditional Transitions						
	Acc-Pro	Acc-Sup	Acc-Opp	Acc-Del	Acc-Rej	Acc-Acc	Totals
Groups							
N. W. (*n* = 23)	7.0	34.0	–	20.0	2.0	9.0	72.0
%	9.7	47.2		27.8	2.8	12.5	100.0
Obese (*n* = 24)	4.0	31.0	–	21.0	1.0	19.0	76.0
%	5.3	40.8		27.6	1.3	25.0	100.0
Totals (*N* = 47)	11.0	65.0	–	41.0	3.0	28.0	148.0
%	7.4	43.9		27.7	2.0	18.9	100.0

Note. Dashes indicate no occurrences of the conditional transitions for the group(s).

Results of the omnibus chi-square analysis did not indicate significant differences in proportional distributions of "Accept" conditional transitions between normal weight and obese participants, χ^2 (5, *N* = 148) = 4.78, *p* = .310 (two-tailed). Because this omnibus chi-square value for "Accept" conditional transitions was not significant at the .05 level no further contrasts were warranted to identify group differences among these conditional transitions.

Hypothesis: Calories Ordered by Normal Weight versus Obese Participants

In contrast to prediction, obese participants did not order significantly more calories (*M* = 1102, *SD* = 446) than calories normal weight participants (*M* = 1138, *SD* = 324), *t*(45) = .304, *p* = .762 (one-tailed), 95% Confidence Interval for the difference = -195.27, 264.74.

CHAPTER IV: DISCUSSION

The purpose of this study was to investigate the nature of the decision making process that individuals use when selecting food and to determine whether normal weight and obese individuals make food-related decisions differently. It answers Laird and Shafir's (1993) call to account for mental processes involved in the real-world problem of obesity. This study introduced an "in-the-moment" perspective on the relationship between weight status and psychological constructs; a relationship that could be the mechanism sought by researchers such as Linde, Rothman, Baldwin, and Jeffery (2006) that links social-cognitive variables (such as self-efficacy) with weight control. The units of analysis were the decision making processes that transform the arguments and reasons considered by the decision makers and the conditional transitions among these processes. The study tested several non-directional research questions about differences in food-related decision making that may exist between normal weight and obese individuals. It also tested whether normal weight participants ordered meals with higher calorie content than those ordered by obese participants. This chapter summarizes and interprets the results of the study, places them in clinical contexts, describes the study's limitations, and advances suggestions for future research. Finally, unexpected and interesting phenomena that occurred during this study are discussed.

Interpretations of Results

The most salient result of this study is that normal weight and obese participants did not differ much in the overall frequencies of individual decision processes they used to make food selections, but they did differ somewhat in *how* they used these processes. Statistical analysis revealed that the two groups were remarkably similar in the overall number of processes they used to make food selections. Normal weight participants generated 704 processes while obese participants generated 664. This suggests that both groups put forth about the same amount of cognitive effort in the food selection task (Newell & Simon, 1972; Payne, Bettman, & Johnson, 1993). From the reason-based perspective of decisions (Shafir et al., 1993), the groups were similar in the total numbers of arguments used in their respective decision making. Additionally, aside from the Oppose process, the groups did not differ significantly in terms of the proportional distributions of their respective decision processes. Overall, this surface view of the groups' decision making suggested they make food-related decisions in a generally similar manner. A deeper look, however, reveals some differences between the groups in terms of the sequencing of decision processes.

Findings Regarding Individual Processes

As mentioned above, the two groups were generally similar in their respective proportional distributions of individual processes. The groups were significantly different, however, in the proportion Opposes comprised of their decision making, with Oppose being a significantly bigger proportion of the normal weight participants' total process than of the obese participants' total processes. In the food selection process, an Oppose essentially demotes or lowers the subject to which it refers (often this subject is something that has been proposed), making that subject less of a factor in the process. From the reason-based perspective of decisions (Shafir et al., 1993), Opposing refers to a counterargument. Thus, normal weight participants were significantly more likely to engage in internal counterarguments than obese participants. This finding may have important implications. The goal of the food selection process is to choose items and the process continues until items are selected. An individual who uses more counterarguments will likely end up sifting through, and thus considering, more items during selection. This increased range of considered items may allow the individual to "find" and choose healthier items. By teaching obese clients to incorporate more opposing thoughts in their food selection process, they may be better able to make healthy food choices. This finding may be functionally similar to the findings of Davis, Levitan, Muglia, Bewell, and Kennedy (2004). These researchers found that obese participants performed significantly worse in decision making as operationalized by a validated gambling task. Davis et al. said that their results may suggest that obese participants are less attentive to future consequences while making decisions and instead are more influenced by immediately gratifying behaviors, of which eating is likely one. Foods with low nutritional value can easily be described as "immediately gratifying" while their future consequences, in terms of weight, are negative. The relatively low number of opposing counterarguments on the part of obese participants seem congruent with the Davis et al. results. Few counterarguments may indicate less attention to the obesity producing consequences of poor eating choices. The total number of Opposes was rather small relative to the total number of processes (Opposes appeared only 37 times out of a total of 1368 processes) and thus the reader may wonder how important they could be. However, focusing only on the number of

Opposes ignores the psychological impact they may have in the food selection process, a concept unfortunately beyond the scope of this study but ripe for future research.

Findings Regarding Conditional Transitions

Conditional transitions of thought processes are essentially the links in the thought chain; they can be likened to forks in the road. The questions asked here were: (1) how do participants go from one thought process to another and (2) Do normal weight and obese individuals employ different thought paths? Due to certain restrictions in the data it was not possible to identify and compare “typical” thought paths for both groups. Instead, the sets of conditional transitions for normal weight and obese participants were compared.

As discussed earlier, decision tasks involve choosing among alternatives that vary across salient attributes. As defined in this study, the Propose process is defined as establishing a tentative course of action, be it a general strategy, choice criteria, attributes, or consideration of an item. The results of this study indicated that the groups did not differ in the proportions the Propose process comprised of their decision process totals, but rather they showed that after employing the Propose process normal weight and obese participants differed significantly in terms of their next process. Normal weight participants were significantly more likely than obese participants to follow Proposals with both Supports *and* Opposes while obese participants were significantly more likely than normal weight participants to follow proposals with either Deliberations or Rejections. Support thoughts essentially promote or raise their subject (typically an item or choice criterion) while Oppose thoughts essentially demote or lower their subject. Deliberations don’t necessarily raise or lower their subject but instead are a sort of sub-process within the explicit decision process whose function is unknown. At the very least they appear to slow down or delay a final decision. Finally, Rejections are about removing something from the consideration process altogether. With these ideas in mind, it seems reasonable to interpret these findings as suggesting that normal weight participants were more likely to mentally retain and “act” on proposed subjects (again, typically a food item) by either supporting or opposing them. In effect, they offer arguments for and against the subjects of their Proposals. Obese individuals, on the other hand, are more likely to engage in sub-processes that delay decisions and to discard proposals. These findings may be very useful in working with obese clients on weight loss issues. For example, by learning to consider supporting and opposing arguments to items more frequently and learning to deliberate and reject them less frequently, obese individuals may have more success with weight loss. This suggestion seems to be supported by the findings of Sbrocco, Nedegaard, Stone, and Lewis (1999). The researchers compared the weight loss effects of two behavioral weight loss treatments. They found that the treatment in which eating was framed as a decision and participants were encouraged to consider the adaptiveness of different food alternatives lost significantly more weight at 6 months and 12 months. Considering the adaptiveness of different food alternatives is analogous to following Proposals with Supports or Opposes and it seems that normal weight individuals, the experts in eating healthily, do this more than obese individuals.

Findings Regarding Calories Ordered

Contrary to the hypothesis, there was no significant difference between the groups in the amount of calories they ordered and, in fact, on average normal weight participants ordered slightly more calories than their obese counterparts. This finding contradicts what might be expected by conventional wisdom and results from Ebberling et al. (2004) who found that overweight adolescents ate significantly more fast food than normal weight adolescents. At first glance this would seem to support the hypothesis that obesity is due more to biological and genetic factors rather than eating behaviors. But because this study was limited to examining calories *ordered*, not calories *eaten*, these results can not be readily applied to either side of this debate. It may be that obese people, on average, *ingest* more calories than normal weight people but this study was unable to observe this. This is a potent area for future research.

Findings Regarding Group Characteristics

The groups did not differ in terms of personal characteristics such as age, hours since last meal, number of processes produced, and race/ethnicity. This suggests that, for these participants at least, these demographic variables are not associated with decision making style, thus supporting the interpretation that weight status has an important relationship to food-related decision making.

Practice Task Observations

For those interested, the most popular method, by far, of solving the multiplication task (7 x 34) was to mentally: (1) place 34 above 7, (2) multiply 4 by 7 to get 28, (3) place the 8 below and carry the 2, (4) multiply 3 by 7 to get 21, (5) place the 21 below, to the left of the 8, (6) and finally, to add the carried 2 to the 1 in the answer to get 238. The most frequent error was to forget this last step and end up with 218 as the answer.

The most frequently selected movie in the movie selection practice task was “The 40 year-old Virgin”. The teen (middle-age)-sex comedy lives on.

Limitations

Because the participants in this study were volunteers recruited from undergraduate psychology classes at a University in the Midwest there may be some participant selection bias affecting the implications of the study’s results. First, university students and members of the general community may differ in important ways. For example, it is possible that university students may, generally, have a higher socio-economic standing than members of the general community and this difference may have caused the participants to perform the task differently than would members of the general community. Additionally, university students are likely to be more verbally oriented and skilled than members of the general community. This suggests that participant data may be richer than if members of the general community were participants, which might suggest that more cognitive effort goes into a food-selection task than what actually may be the case in the general community. Differences between undergraduate psychology students and the general university population also may have affected the results. For example, being psychologically-oriented, psychology students may have been more susceptible to demand effects. Perhaps they may have tried to guess the research question and intentionally behaved to support or oppose it. Within the population of undergraduate psychology students those that chose to participate in this study may differ from those who did not chose to participate. This particular source of participant selection bias may have been minimized by the study’s generic description as one of “Decision Making in Everyday Tasks” (i.e., performing common activities with no references to health, weight, or food until the food selection task) but, nevertheless, volunteers may have differed from non-volunteers. Surprisingly, the ratio of obese and overweight to normal weight volunteers was rather low. Based on the rates of obesity it was expected that approximately every fifth volunteer would be obese or overweight, even in a college population. It turned out that approximately every tenth volunteer was obese or overweight. Other Psychology Department researchers said they also noticed that rates of participation among overweight and obese psychology students seemed unusually low. It is possible that the obese participants in this study constitute some sort of sub-group of obese psychology students and thus may limit the applicability of these findings. Additionally, the obese group differed significantly from the normal weight group in terms of the number of

African-Americans in it. It is possible that this racial/ethnic difference may act as a confounding variable to the relationships found among weight status and decision making. This study makes no interpretations about this situation as it is outside the scope of the research question. The phenomenon does, however, merit the attention of future researchers. Also, only 20% of the total sample were male, which limits the degree to which the findings can be generalized to males. This participation rate, however, reflects the gender composition of psychology classes.

All the participants knew they were involved in a psychology study and thus possibly were susceptible to "Hawthorne" effects, i.e., their performance in the decision making tasks may have been different from their real-world performance of these tasks simply because they were aware of being studied. Other participant-based potential threats to validity, such as maturation and history, are unlikely because the task was brief and the researcher guided the participants' experience. However, the fact that the researcher was an active guide opened the door for experimenter bias effects. It is possible that the researcher may have unwittingly encouraged obese participants to respond differently than normal weight participants. This also was minimized because the researcher followed a script, but experimenter bias may have existed at some level.

Ecological validity is somewhat problematic in this study. The food selection task was an analog version of a common real-world task. However, it lacked many of the real-world contextual variables that may affect real-world task performance. These variables, such as restaurant sounds, the presence of restaurant staff and patrons, smell, and visual cues such as the restaurant dining room and signage, were not present. These variables may mediate or moderate the relationships investigated. Also, in an actual restaurant, patrons have the opportunity to return to the counter and order more food and repeat orders. This option was not available to participants in this study. Personal variables such as age, hours since last meal, and race/ethnicity were not significantly related to food-related decision making but other unmeasured person variables may affect food-related decision making. Fatigue, emotional state, and money are some additional potentially important personal variables that were not considered in this study. Finally, the process of thinking aloud itself may have produced non-realistic data. It may be that retrospective accounts provided by participants would provide more accurate food-related decision making, but these too would suffer from time delays and potential demand effects.

Implications for Future Research

The social problem of obesity and its effects is so critical that researchers in the field have a strong mandate to pursue all obesity-related avenues. This study offers much to future research. As has been described, obesity research has primarily examined relationships between social-cognitive variables and weight loss and has had some modest success in doing so. A recent meta-analysis of studies examining the effect that a "change in intention" has on subsequent behavior suggests that medium-to-large changes in intention ($d = 0.66$) elicits a small-to-medium change in behavior ($d \surd 0.36$; Webb & Sheeran, 2006). More recently some researchers have requested more investigation of the mechanisms linking social-cognitive variables with weight control (Linde, Rothman, Baldwin, & Jeffery, 2006); Schwarzer's Health Action Process Approach (2002) and Gollwitzer's Implementation Intentions (1999) are excellent answers to this request yet even they do not address discrete health choices. Considering (again) that "…weight loss is not a behavior, but rather the consequence of a series of enacted behaviors…" (Linde, et al., 2006) this study may be considered a first step toward understanding the "in-the-moment" decision making which may lead the individual to one course of weight loss behavior over another. Additional support for this focus comes from Davis et al. (2004) who found that overweight and obese individuals perform significantly worse on a gambling decision making task than normal weight individuals. However, the researchers did not investigate the nature of the gambling decisions as they were made. It is recommended that future researchers continue developing this study's focus on in-the-moment decision making so that we may gain more insight into how and why individuals make the isolated health decisions they make. Additionally, this research topic may be applied to other choice tasks related to obesity (e.g., what exercise to engage in) and certainly to other choice tasks in other public health topics such as alcohol and other drug use, sexual activity, and smoking cessation. Another interesting research topic may be the differences in decision making between the food-selection task and the practice movie selection task employed in this study. It may be that the groups make non-food decisions in the same way as their food decisions.

As alluded to in the Limitations section, future research could replicate this study while adding to the realism of the context. For example, it may be possible to use the actual food offered by the restaurant in order to provide olfactory and visual stimulation. This would also enable a measure of calories eaten by participants, a potentially powerful additional variable. It may also be possible to administer the food-selection task at typical mealtimes to more accurately reproduce the hunger sensations that go along with the typical restaurant experience. The most realistic method would be to perform the food selection task in the restaurant itself although this, as with the other ideas, depends on the resources available to the researcher as well as the costs and benefits to the research design. This study used an open-ended task in which participants were asked to select any and all items they would order for a dinner. Another option would be to administer a closed-end food selection task in which participants order a specific number of items and these items are then analyze for group differences. Finally, in terms of this task, perhaps a different stratification of weight groups would yield a different pattern of results. Might low, medium, and high BMI individuals have significantly different patterns of food-related decision making?

This study introduced the methods of protocol analysis and sequential analysis to the study of obesity. Both of these methods have been used in a variety of fields to identify how people communicate and make decisions, and how sequential processes in general unfold over time. This study opens the door for future research to implement these approaches to the study of obesity. Future obesity researchers are in a position to refine both protocol analysis and sequential analysis as they apply to obesity. In doing so, they may gain a more comprehensive understanding of the cognitive decision making processes related to food choice, weight status and weight loss.

This study also introduced a lexicon of decision making processes to the study of obesity. Decision making has been studied in a variety of disciplines with the goal of identifying how people make decisions and prescribing the best ways to make decisions. Researchers from these disciplines have developed decision making lexica tailored to their research problems and this study introduces a process-based decision making lexicon to the problem of obesity. Future researchers may use this lexicon as a model for investigating obesity-related decision making and the field would greatly benefit from developments future research would bring to this lexicon. In terms of the specific decision processes themselves there are specific questions for future research. In retrospect, the “deliberate” decision process seems to lack precision and clarity. While the other processes seem to identify particular kinds of mental event occurring within the decision making process, Deliberate was used when the coders were unsure of the mental event occurring. Thus, Deliberate acted as a catch-all for pauses, subroutines, non-verbalized automatic thoughts, delays, etc… Uncovering the nature of “Deliberate” events and possibly developing additional codes for these decision processes would likely add valuable insight into food-related decision making. Likewise, it was found that normal weight participants employ significantly more Opposes than obese individuals; it would be interesting to learn more about *what* normal weight participants were opposing compared to what obese participants were opposing. Potentially this could be done by investigating “reverse conditional transitions” (i.e., given a *second* process, what was the first process?). These data show that 65% of the normal weight Opposes occurred after Proposes (no other process occurred more than 20% of the time before an Oppose). Opposes uttered by obese participants were more evenly distributed but this could be expected by chance because their total number was so low (there were 10 reverse “Oppose” conditional transitions in the obese group). The overall frequencies of Opposes in these samples were too low to test this reverse conditional transition question using chi-square analysis. Future researchers with the means to gather more data may find important and significant differences between the groups in terms of the Oppose, and other, reverse conditional transition sequences.

This study employed a “process-focus”; it examined the processes involved in food-related decision making. Future researchers may benefit from considering another focus such as on the content on food-related decisions. For example, the general decision making literature describes decision tasks as consisting of alternatives varying on attributes. One could analyze the differences between normal weight and obese individuals in terms of their respective use of the attributes common to food decisions. Do normal weight individuals consider health more frequently than obese individuals? Do obese individuals consider taste more than normal weight individuals? Do the groups differ in how often they consider price? There are many additional questions to ask about the food-related decision making of normal weight and obese individuals.

Other more mature fields of decision research, such as consumer decisions, have developed several formal models of how individuals make decisions and offer prescriptive suggestions as to how individuals *should* make decisions. The data from this study offer no precise support for any of these formal models (which include the weighted adding, the lexicographic, and the elimination-by-aspects strategies, Bettman, Luce, & Payne, 1998). However they could serve as a first step in applying these formal decision strategies to food selection. It also may be possible to eventually identify typical “thought paths” for normal weight and obese participants. That is, what is the most common first process generated by the groups, the most common second process, third process, etc…? Are there significant differences between the groups in terms of these paths? And are there distinct patterns of transitions across events as the decision process progresses? Future researchers may consider these more complex questions and correspondingly more complex methods of analysis, such as Markov-chain analysis (Berg, 2004), in future work.

Lastly, the participants of this study consisted of a rather small subgroup of students at a Midwestern University; a majority of them were female and a significant proportion of the obese participants were African-American. Future researchers with the means to randomly select participants and gather and analyze more protocols than possible here may find more valid and representative information.

Implications for Practice

Psychological clinical interventions for obesity often focus on increasing participants' self-efficacy for performing weight loss behaviors and increasing the value of performing these behaviors (e.g., Jeffery, Linde, Finch, Rothman, & King, 2006; King, Rothman, & Jeffery, 2002). The programs also typically occur in a group setting, an office or classroom. These programs are undoubtedly beneficial to their clients. However, they may become even more so by incorporating the focus on in-the-moment decision making advocated herein. This is not a new idea. Cognitive psychology and therapy are rooted in "tapping the internal communications" of the individual (Beck, 1976, p. 24). It is, rather, a new application of an old idea. Individuals struggling with obesity may be making errors in their food-related decision making and identifying these errors and eliminating them could help obese and overweight individuals make more healthy food choices. These better choices, in turn, serve as positive performance accomplishments, which, coincidentally, increase self-efficacy for healthy food behaviors (Bandura, 1986). The bulk of obesity research has demonstrated that such an increase in self-efficacy is associated with weight loss.

This study has not identified food-related decision errors per se, but it does suggest that normal weight and obese individuals make food-related decisions differently. By identifying differences between normal weight and obese participants, this study suggests that practitioners may be able to teach obese clients to think more like normal weight people. The results of this study imply that, when facing a food-related decision, obese people may be better off generating more opposing arguments in their decision process. Additionally, they may also benefit from intentionally concentrating on supporting or opposing the proposals they make rather than deliberating about them or simply rejecting them. Admittedly these suggestions may not seem to have much “face validity.” Why, for example, would less deliberation and rejection lead to weight loss? Practitioners and future researchers are invited to build upon the findings herein to more fully explain these findings and eventually develop more useful and valid recommendations on how obese individuals can alter their food-related decision making. As with the “expert-novice” paradigm in which novices progress by learning how experts make decisions, obese people may have more success with weight loss by learning how normal weight people make food-related decisions.

Conclusion

This study sought to identify differences in food-related decision making between obese and normal weight participants in an immediate, in-the-moment setting. Heretofore, food-related decision making has been a neglected area in psychological obesity research, whereas general long-standing personality characteristics such as self-efficacy and goal importance have been studied extensively using a “time-general” approach. The focus of this study was the cognitive decision making by obese and normal weight people at the moment of ordering food as opposed to how these individuals think, generally, about their capability to lose weight and the importance of this goal. This study synthesized techniques such as protocol analysis for data collection and sequential analysis for statistical analysis to evaluate relationships among weight status, food-related decision making, and nutritional outcomes of food decisions. It was found that normal weight and obese participants did not differ in the overall number of cognitions they generated, but they did differ in the number of Oppose cognitions they had when selecting items. Normal weight and obese participants also differed in how their cognitions progressed from Propose cognitions. The methods and results of this study offer intriguing avenues for future obesity research in terms of understanding the elements and processes involved in immediate, in-the-moment food selection. This study also supplies practitioners with a preliminary perspective on a potentially useful way to help obese individuals successfully lose weight. By helping them identify the thought patterns and sequences they typically use when making food-related decisions obese individuals may begin to change them and, perhaps, think more like normal weight people when making food-related decisions.

APPENDIX A

Office of the Vice President For Research
Human Subjects Committee
Tallahassee, Florida 32306-2763
(850) 644-8673 · FAX (850) 644-4392

APPROVAL MEMORANDUM

Date: 11/3/2005

To:
Brian Gray
328 Conneaut Avenue
Bowling Green, OH 43402

Dept.: **EDUCATIONAL PSYCHOLOGY AND LEARNING SYSTEMS**

From: **Thomas L. Jacobson, Chair**

Re: **Use of Human Subjects in Research**
Weight Status and Decision Making in a Food Selection Task

The forms that you submitted to this office in regard to the use of human subjects in the proposal referenced above have been reviewed by the Secretary, the Chair, and two members of the Human Subjects Committee. Your project is determined to be Expedited per 45 CFR § 46.110(b) 9 and has been approved by an accelerated review process.

The Human Subjects Committee has not evaluated your proposal for scientific merit, except to weigh the risk to the human participants and the aspects of the proposal related to potential risk and benefit. This approval does not replace any departmental or other approvals, which may be required.

If the project has not been completed by **11/1/2006** you must request renewed approval for continuation of the project.

You are advised that any change in protocol in this project must be approved by resubmission of the project to the Committee for approval. Also, the principal investigator must promptly report, in writing, any unexpected problems causing risks to research subjects or others.

By copy of this memorandum, the chairman of your department and/or your major professor is reminded that he/she is responsible for being informed concerning research projects involving human subjects in the department, and should review protocols of such investigations as often as needed to insure that the project is being conducted in compliance with our institution and with DHHS regulations.

This institution has an Assurance on file with the Office for Protection from Research Risks. The Assurance Number is IRB00000446.

Cc: F. Donald Kelly
HSC No. 2005.758

Informed Consent Form for participation in the research project:

Decision Making in Everyday Tasks

I am a graduate student under the joint direction of Dr. F. Donald Kelly in the Department of Educational Psychology and Learning Systems of Florida State University and Dr. Ken Shemberg of the Psychology Department at Bowling Green State University. I am conducting a research study to understand how people make decisions in everyday tasks.

Your participation will involve talking through the decisions you make as you perform common, everyday tasks and will last about 15 minutes. Your participation in this study is voluntary. You may choose not to participate or to withdraw at any time and if you do so there will be no penalty whatsoever. The results of this research study may be published, but your name will not be used. Information obtained during the course of the study will remain confidential, to the extent allowed by law.

There are no foreseeable risks or discomforts to you if you agree to participate in the study.

Although there may be no direct benefit to you, the possible benefit of your participation is to help healthcare professionals learn more about how people make decisions that may affect their health and well-being.

If you have any questions concerning this research study, please contact me, Brian Gray, at 419-352-6775 or briancgray@earthlink.net.

Sincerely,

Brian C. Gray, M.S.

I give my consent to participate in the above study. I understand that I will be audio recorded by the researcher. This recording will be stored on a desktop computer with the highest security (i.e., firewall) levels. I understand that only the researcher and the research assistants will have access to these audio recordings and that they will be destroyed by December 31st, 2010.

Signature: ______________________________ Date: ______________

If you have any questions about your rights as a subject/participant in this research, or if you feel you have been placed at risk, you can contact the Chair of the Human Subjects Committee, Institutional Review Board, through the Vice President for the Office of Research at (850) 644-8633.

APPROVED - BGSU HSRB
EFFECTIVE 11/21/05
EXPIRES 11/20/06

FLORIDA STATE UNIVERSITY
Approved: 11.2.05
HS No. 05.758
Void After 11/1/06
INSTITUTIONAL REVIEW BOARD

APPENDIX B

Demographic Questionnaire

Please provide answers to the following questions in the space provided. Please complete all questions as they may be necessary for the study's purposes. Please remember that your answers will remain confidential to the extent allowed by law and that your name will not be directly associated with the answers you provide here.

Age (please indicate in years): _____ **Gender** (please circle): Male Female

Race/Ethnicity (please indicate all that apply with a checkmark or "X"):

American Indian or Alaska Native: _____
Black or African American: _____
Native Hawaiian or Other Pacific Islander: _____
White or Caucasian: _____
Some Other Race: _____
Hispanic or Latino: _____

Height: _____ feet, _____ inches **Weight**: _____ pounds

Year in School (please indicate highest level of education with a checkmark or "X"):

1st Year: _____
2nd Year: _____
3rd Year: _____
4th Year: _____
5th Year: _____
6th Year or more: _____

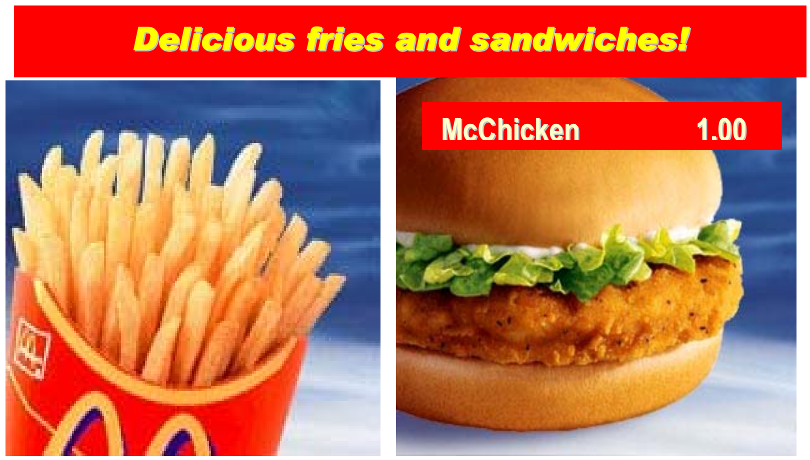
Marital Status: **Hours since last meal: ______**

Single, never married: _____
Married: _____
Divorced: _____

End of demographic questionnaire.

APPENDIX C

Menu Simulation

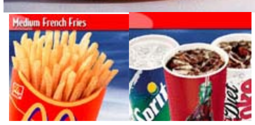


Extra Value Meals –
include medium fries and soft drink;
large fries and soft drink, add $0.60

1


Meal
4.20
sandwich
only
2.60

2

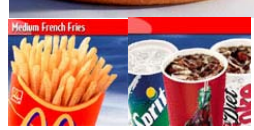



Meal
4.20
sandwich
only
2.60

3

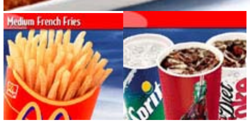

Meal
4.90
sandwich
only
3.30

4

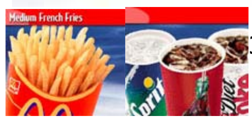
Meal
3.40
Cheese
.30
sandwich
only
1.80

5 Chicken McNuggets (10 piece)



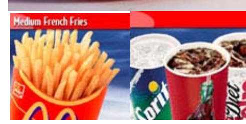
Meal
4.30
nuggets only
2.10

6 Chicken Selects



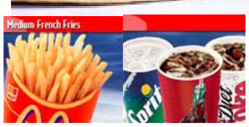
3-pc meal
4.70
5-pc meal
6.30
3-pc only
3.20

7 Filet-O-Fish



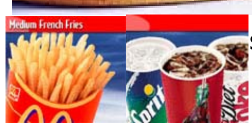
Meal
3.80
sandwich only
2.20

8 Chicken Ranch BLT



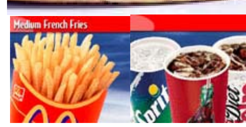
Meal
5.10
sandwich only
3.60

9 Chicken Club



Meal
5.30
sandwich only
3.80

10 Chicken Classic



Meal
4.70
sandwich only
3.20

Premium Chicken Sandwiches!

Fruit & Salad

Fruit & Walnut

- Served with creamy low-fat yogurt 3.00

Crispy or Grilled

Bacon Ranch	4.10
Caesar	4.10
California Cobb	4.10

Newman's Own®

- Cobb Dressing
- Creamy Caesar Dressing
- Ranch Dressing

Low-fat

- Low Fat Balsamic Vinaigrette
- Family Recipe Italian


Dessert Menu
Pies
Delicious Apple!
2 for 1.00, 1 for .80
Milkshake
2.60
2.30
2.00
Choc,
Straw, Vanilla
TRIPLE THICK MILKSHAKE
Sundae 1.00
Hot Fudge
Strawberry
McFlurry 2.50
M&M
Oreo
McFLURRY

Dollar Menu

Double Cheeseburger	1.00	McChicken	1.00
5-Chicken McNugget	1.00		
Fries	1.00	Soft Drink	1.00
Apple Dippers	1.00	Side Salad	1.00
Parfait 1.00	2 Pies 1.00	Sundae	1.00

Sandwiches

Chicken Selects	3-3.00	5-4.75	10-8.50
Chicken McNuggets	10-2.00	20-4.00	
Hamburger .85		Cheeseburger .95	

French Fries

Small	Medium	1.00	Large 1.30

Beverages

Small .95	Medium 1.00	Large 1.30	
Coffee	.90	.85	1.00
Cappuccino	1.10	1.20	1.30
Hot Chocolate	1.10	1.20	1.30

Lowfat Milk choc or white .90

Apple Juice .90 Bottled Water 1.20

APPENDIX D

Decision Making Instructions for Participants

RES: “In this study I am interested in what you say to yourself as you perform some tasks that I give you. In order to do this I will ask you to *talk aloud* as you work on the tasks. What I mean by *talk aloud* is that I want you to say out loud *everything* that you say to yourself silently as you perform the tasks. Just act as if you are alone in the room speaking to yourself. If you are silent for any length of time I will remind you to keep talking aloud by saying “Keep talking please”. Please note that I am *not* interested in whether you correctly perform the tasks and I am also not interested in how quickly you perform the tasks (although I’d like you not to dawdle unnecessarily). The only thing I am interested in is *how* you go about performing the tasks. Do you understand what I want you to do?”

If PAR responds “yes”, then “Good”. If PAR responds with additional questions, answer appropriately.

TASK 1

RES: “We will begin with a math problem. I will ask you to multiply two numbers in your head and I would like you to *talk aloud* as you do so – remember, you don’t have to be right and you don’t have to be fast. Are you ready?”

RES: “Please *talk aloud* while you multiply 7 times 34.” (When they provide their answer say, “Thank you.”)

TASK 2

RES: “For the next task I will show you pictures of 10 well-known movies and your task is to select one *while verbalizing your decision-making process*. Please imagine that you are in a movie-rental store at this very moment and that the movie you select is the one you will watch. To give you a better idea of what you might think about, and thus say, here are two examples:

1. If you enjoy movies that feature a particular actor, you might say, “So-and-so is in this one, I’ll choose *it*.”
2. Another example may be perhaps you don’t like black and white movies. If that is the case you might say, “That one is black and white, I don’t like black and white movies, so I don’t want to see that one.”

Do you have any questions?

RES: “Please *talk aloud* while you select a movie from the following options.” (When finish say “Thank you.”)

TASK 3

For the next task I will present a menu from a well-known fast food restaurant and I would like you to select a meal from that menu *while verbalizing your decision-making process.* Please imagine that you are in the restaurant and that the meal you select will be the one you will eat. Please imagine that it is dinnertime so select any and all items that you will want for your dinner tonight (just your dinner, not anyone else’s in your family). Finally, keep in mind that any information about the food that is available at the restaurant is also available here and that there are no refills on soft drinks. Do you have any questions?

Please *talk aloud* while you select a meal from the following menu of options. (When they finish say, “Thank you.”).

That is the end of the decision-making part of this study.

APPENDIX E

Participant Debriefing

I want to thank you for participating in this research today. This project focuses on the food selection task that you performed and is intended to identify how people make food decisions and whether people of different ages, genders, heights & weights, races and ethnicities, educational levels, and socio-economic classes make these decisions in different ways. I hope to determine how these factors may relate to how people make food-related decisions. More importantly, the things I learn from this study may help other health professionals help people make such decisions differently and possibly improve their life satisfaction.

I also want to reassure you that your personal information will be held in the strictest confidence to the extent allowed by law.

Finally, if you should have any questions about this project please feel free to contact me through the information on my card.

APPENDIX F

Decision Processes

Please use the following list of decision making processes when coding participants' verbal protocols. The definitions and examples will assist you in your coding task but bear in mind that some segments may not be perfectly captured by any specific process; just do the best you can.

When coding please remember that you may consider nearby processes. That is, sometimes the function of a segment (and thus its process type) depends on its relation to segments near it, usually those preceding it but occasionally those coming later. For example, it may seem more logical for a person to propose an item and then offer support for it but, as can be seen in the protocols, a person is just as likely to offer support for an *upcoming* proposal (or rejection or acceptance).

1. **Propose** – any statement establishing a tentative course of action. The course of action may be about a general strategy the individual may use, a choice criterion the individual may consider, or, more specifically, about promoting a particular alternative into a group of alternative "finalists". Propose is equivalent to proposing something.
   - "A Chicken McGrill "
   - "I'll do something"
   - "although I do see there are some salads in there"
   - "if I were going to make a healthy choice"
   - "I would tend toward one of the salads"
2. **Support** – any statement that supports, promotes, strengthens, solidifies, judges positively, or justifies another decision process (i.e., a Propose, Reject, or Accept). Note: always in reference to another process.
   - "which I I do from time to time"
   - "they taste really good"
   - "is probably the best"
   - "I'm not too concerned about that" (supports an earlier Reject segment: "price is not going to be an issue for me here")

- "so that's what I will choose"

3. **Oppose** – any statement that negates, demotes, judges negatively, or counters another decision process (i.e., a Propose, Reject, or Accept). Note: always in reference to another process.
   - "which isn't necessarily good"
   - "even though all those salads have what looks to me like a fried chicken in there" (negates an earlier Propose segment: "I would tend toward one of the salads")
   - "although I don't like that as much as I do"
   - "which is not as good for me"
   - "but I don't know if it's worth the taste versus the calories"

5. **Deliberate** – any process in which the participant seems to be performing a "sub-routine"; that is, doing some decision making at a more micro-level than what is visible in the verbal protocol. The individual may or may not name the subject(s) of deliberation.
   - "I think on balance"
   - "so that would be one possible choice"
   - "and I think maybe the best one"
   - "so I'll have a"
   - "I might go with"

5. **Reject** – any statement eliminating a possible course of action (e.g., general strategy, choice criterion, alternative, alternative group) from consideration
   - "so all the hamburgers and stuff are out"
   - "some of the salads that even look good are out"
   - "I don't usually like the fish"
   - "or the chicken sandwiches very much"
   - "and the price is not going to be an issue for me here"

6. **Accept** – a final decision. This will typically be about a single item (or "value" meal). An Accept is the point at which, in the restaurant, the cashier would be certain that the person is ordering the item as opposed to considering the item as a possibility. The most likely confusing sequences involving Accept are choosing between Propose and Accept near the end of the individual's decision process and choosing between Accept and Support

(for example, an individual may Accept and then repeat their decision, and the repeat would be supporting the decision).

- “a double cheeseburger”
- “and a medium french fry”

APPENDIX G

Three Sample Participant Protocols

Transcript 1

Okay umm I don't know I don't know if I'm really in the mood for chicken since I do live in Mac I eat chicken all the time so I'd have to say I would probably probably get the Quarter Pounder with Cheese 'cause that looks really good and probably get the combo and I'd probably get also a fruit & walnut salad I guess yes and the type of drink that I would probably choose would be Barq's (RES: any dressing with your fruit salad) umm dressing no just plain

Segments & Codes

1.	Okay	Deliberate
2.	umm	Deliberate
3.	I don't know	Deliberate
4.	I don't know if I'm really in the mood for chicken	Reject
5.	since I do live in Mac I eat chicken all the time	Support
6.	so	Deliberate
7.	I'd have to say	Deliberate
8.	I would probably	Deliberate
9.	probably get	Deliberate
10.	the Quarter Pounder	Select
11.	with Cheese	Accept
12.	'cause that looks really good	Support
13.	and probably get	Deliberate
14.	the combo	Accept
15.	and I'd probably get also	Deliberate
16.	a fruit & walnut	Select
17.	salad I guess	Deliberate

18. yes	Accept
19. and the type of drink that I would probably choose	Deliberate
20. would be Barq's	Accept
(RES: any dressing with your fruit salad)	
21. umm	Deliberate
22. dressing	Propose
23. no	Oppose
24. just plain	Support

Transcript 2

Umm well I know I don't like hamburger meat so I'm not going to get hamburger today thinking about a chicken sandwich maybe possibly chicken nuggets should get the fruit salad and try and be healthy but I don't really feel like being healthy so I think I'm going to get the chicken club sandwich the number seven with fries and a pop that comes with it so (RES: and what kind of pop would you like) umm I'll take a diet coke cause that's just what I normally drink it's my usual (RES: okay do you want to stick with the size that comes with it medium) yeah just the normal size medium would be good

Segments & Codes

1. Umm	Deliberate
2. well I know I don't like hamburger meat	Support
3. so I'm not going to get hamburger today	Reject
4. thinking about a chicken sandwich maybe	Propose
5. possibly chicken nuggets	Propose
6. should get the	Deliberate
7. fruit salad	Propose
8. and try and be healthy	Support
9. but	Deliberate
10. I don't really feel like being healthy	Oppose
11. so	Deliberate
12. I think I'm going to get the chicken club sandwich	Accept
13. the number seven	Support
14. with fries	Accept
15. and a pop	Propose
16. that comes with it	Support
17. so	Deliberate

(RES: and what kind of pop would you like)

18. umm	Deliberate
19. I'll take a diet coke	Propose
20. 'cause that's just what I normally drink	Support
21. it's my usual	Support

(RES: okay do you want to stick with the ah size that comes with it medium)

22. yeah	Accept
23. just the normal size	Support
24. medium would be good	Support

Transcript 3

Uhh let's see everytime I go to McDonald's I always choose a Big Mac probably well actually I choose off the Dollar Menu but I get tired of the Dollar Menu so I like to choose a meal umm I really don't like the chicken too much 'cause I don't know it don't seem tender enough seem like it dry out hamburgers just and cheeseburgers are too like ordinary I like to do something different I like sweets so I don't I like the sundae and apple pies umm let's see the salad look healthy I don't really drink Sprite or pop or anything like that so I'll probably get a Hi-C as my drink I'm a college student so I don't have that much money so I'll probably choose something off the Dollar menu and it would probably be fries and the McChicken just 'cause I like the Mac sauce that come on with it and also the yogurt because I gotta eat something healthy as well when I eat and a sundae 'cause I need dessert (RES: okay so the McChicken the dollar fries the yogurt a sundae) mm hmm (RES: what flavor sundae) strawberry (RES: and what size Hi-C) uh medium (RES: medium Hi-C) mm hmm

Segments & Codes

1.	Uhh	Deliberate
2.	let's see	Deliberate
3.	everytime I go to	Deliberate
4.	McDonald's	Support
5.	I always choose a Big Mac	Propose
6.	probably	Support
7.	well actually I choose off the Dollar Menu	Propose
8.	but I get tired of the Dollar Menu	Oppose
9.	so I like to choose a meal	Propose
10.	umm	Deliberate
11.	I really don't like the chicken too much	Reject
12.	'cause	Deliberate
13.	I don't know	Deliberate
14.	it don't seem tender enough	Support
15.	seem like it	Deliberate
16.	dry out	Support

17. hamburgers just	Propose
18. and cheeseburgers	Propose
19. are too like	Deliberate
20. ordinary	Oppose
21. I like to do something different	Propose
22. I like sweets	Propose
23. so I don't	Interrupt[3]
24. I like the	Deliberate
25. sundae	Propose
26. and apple pies	Propose
27. umm	Deliberate
28. let's see	Deliberate
29. the salad	Propose
30. look healthy	Support
31. I don't really drink Sprite	Reject
32. or pop	Reject
33. or anything like that	Reject
34. so I'll probably get a Hi-C	Propose
35. as my drink	Support
36. I'm a college student	Support
37. so I don't have that much money	Support
38. so I'll probably choose something off the Dollar menu	Propose

[3] The Interrupt code was not used in the data analysis. The previous process (Propose) was not connected to the subsequent process (Deliberate).

39. and it would probably be fries	Accept
40. and	Deliberate
41. the McChicken	Accept
42. just ‘cause I like the Mac sauce that come on with it	Support
43. and also the yogurt	Accept
44. because I gotta eat something healthy as well when I eat	Support
45. and a sundae	Propose
46. ‘cause I need dessert	Support
(RES: okay so the McChicken the dollar fries the yogurt a sundae)	
47. mm hmm	Support
(RES: what flavor sundae)	
48. strawberry	Accept
(RES: and what size Hi-C)	
49. uh medium	Accept
(RES: medium Hi-C)	
50. mm hmm	Support

APPENDIX H

Adjusted Residuals

Several researchers (Bakeman & Gottman, 1997; Everitt, 2001; Sheskin, 2004), referring to Haberman, 1973, have noted that *standardized residuals* may be examined to determine which cells contribute to an overall significant chi-square value for a contingency table analysis. In a chi-square analysis the residual is the difference between the observed cell value (O_{rc}) and the expected cell value (E_{rc}). A residual is standardized when it is expressed in a format analogous to a standard deviation score (Sheskin, 2004). For the chi-square analysis, this specifically means dividing the residual by the squared expected value; thus, the following formula yields the standardized residual:

$$R_{rc} = \frac{(O_{rc} - E_{rc})}{\sqrt{E_{rc}}}$$

While the aforementioned researchers referenced Haberman, 1973, in fact Haberman posited that, "…it appears reasonable to base all (follow-up chi-square analyses)…on *adjusted residuals* (italics added)". Haberman mathematically defined adjusted residuals as the standardized residual (see above) divided by the quantity: $(1 - n_{i+}/n_{++})(1 - n_{+i}/n_{++})$ and recommends its use when examining cell by cell contributions to overall chi-square significance.

APPENDIX I

The Assumption of Independence and Conditional Transitions

A primary assumption upon which chi-square analyses is based, is that of independence among observations. That is, each observation should be represented only once in the data and the occurrence of any observation should have no relationship with or effect on the occurrence of any other observation. This assumption seems to be violated in the case of sequential analyses that make use of overlapped sampling. Overlapped sampling refers to identifying sequences that consist of two or more events and the first event of a sequence is also the last event of the previous sequence. For example, using overlapped sampling to identify 2-event sequences in the following event stream – a b c d e f – would produce the sequences a-b, b-c, c-d, d-e, e-f. Since the first event of each sequence (not including the first sequence, obviously) is also the last event of the previous sequence, attempting to use these sequences as observations in a chi-square test would seem violate the test's basic assumption of independence among observations.
This issue was addressed in a simulation study by Bakeman and Dorval (1989). The researchers performed a series of Monte Carlo simulations in which they performed 100,000 trials of producing series of either 500- or 1,000-event sequences containing five different events. The 500-event series were tallied into two-event sequences using overlapped sampling while the 1,000-event series were tallied into two-event sequences using nonoverlapped (i.e., a-b, c-d, e-f, etc…) sampling. For each series length, events in half the series could occur with equiprobability while events in the other half could occur with preset probabilities. For each series the researchers tallied the first event in a sequence as a/not-a and the second event as b/not-b and then computed z scores for each table. Thus they had 100,000 z scores. The researchers created four frequency histograms – one for equiprobable, overlapped series; one for equiprobable nonoverlapped series; one for nonequiprobable, overlapped series, and one for nonequiprobable, nonoverlapped series. The four sets of values were tested against those generated by a normal distribution using the Kolmogorov-Smirnov Goodness-of-Fit Test for a Single Sample, which evaluates whether a distribution of *n* scores that comprise a sample conform to a specific theoretical or empirical population (or probability) distribution (Sheskin, 2004). The Kolmogorov-Smirnov values for each set was below the critical value of 0.005 (adjusted for multiple comparisons) suggesting that none of the four distributions (in particular those produced

via overlapped and those produced via nonoverlapped sampling) generated by the simulations differed significantly from normal. The researchers concluded that while overlapped two-event sequences may violate the assumption of independence, the effect of this violation is inconsequential as it pertains to overlapped sequential analysis.

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BIOGRAPHICAL SKETCH

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