

Cognitive Decision Making and Reasoning with Eating Behaviors

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Abstract

The purpose of this paper is to discuss eating behaviors and decision making styles from a cognitive psychology perspective. Eating disorders, such as binge eating, contributes to poor health and weight related illnesses. Specifically, decision making and impulsivity, judgment processes such as deductive reasoning and inductive reasoning, inferring causality will be discussed. Social cognition models will be investigated as well as areas for future research.

### Cognitive Decision Making and Reasoning with Eating Behaviors

An area of interest in psychological research includes health psychology and weight related health disorders. Obesity has become the focus of research in the United States in areas such as understanding compulsivity and impulsive behaviors with a greater focus on health related disorders. For example, The American Obesity Association (AOA) stated that 64.5 percent of Americans are obese and that obesity is a chronic illness which increases the probability of developing high blood pressure, type 2 diabetes, and additional heart diseases and soon will overtake smoking as the leading cause of death due to these obesity related health disorders (2008). Additionally, cognitive processes such as thinking patterns and emotional responses have been investigated for most clinical eating pathologies (Johansson, 2006). A specific topic area of interest is eating behaviors and decision making styles from a cognitive psychology perspective.

### Cognitive Psychological Applications to Eating Behaviors

The National Institute of Health (2008) defines clinical eating disorders as being anorexia nervosa, bulimia nervosa, or eating disorders not otherwise specified (EDNOS). Non-clinical eating disorders, such as occasional binge-eating or overeating, in conjunction with the positive-incentive theory of eating (eating for pleasure) (Pinel, 2006), the theory of planned behavior (self-efficacy plus social influences) (Ajzen, 2007), and our own individual cognitive style (adaptive versus innovative) (Kirton, 2003), may contribute to our ability to maintain healthy eating programs to avoid illnesses.

Understanding cognitive functioning as it relates to eating behaviors presents an opportunity to improve overall health behaviors for the general population. For example, cognitive behavioral therapies associated with eating disorders have become increasingly popular and successful in both clinical settings and normal populations (Fairburn, 2008). Inductive and deductive reasoning abilities have also been measured to assess obsessive compulsive disorders which have proven to be common in those suffering with clinical eating disorders (Simpson, Cove, Fineberg, Mseft, & Ball, 2007). In further cognitive psychological analyses anorexia nervosa has been associated with specific cognitive limitations (Treasure, Tchanturia, & Schmidt, 2005).

However, understanding the mechanics of decision making in general are important to understanding how individuals make eating behavior choices. Reasoning occurs mainly in the left hemisphere of the brain in the areas of the left inferior frontal byrus, the left middle frontal gyrus, the left middle temporal gyrus, the superior temporal gyrus, and the left cingulated gyrus with limited activity noted in the right hemisphere in neuroimaging studies (Goel, Gold, Kapur, & Houle, 1998). These areas are responsible for the two types of judgment and decision making with are deductive reasoning and inductive reasoning.

#### Decision Making and Impulsivity

The orbitofrontal cortex plays a significant role in the decision making process of selecting foods. The orbitofrontal cortex contains cells that respond in a coded format with reward expectancies and this section of the brain is activated

during the food selection process (Zald & Kim, 1996). Additionally, the reward system controlled by the orbitofrontal cortex is triggered based upon the time frame, or availability, of the potential reward. For example, a person may have a choice between a food that is readily available and that has an immediate gratifying reward but is less healthy and a food that is not readily available but is the healthier choice. The reward system of the orbitofrontal cortex may influence the decision making process of the person so that the less healthy food is selected out of immediate gratification (Zald & Kim, 1996).

Additionally, neuro-imaging studies have noted that there is a relationship between executive functioning and impulsive eating behaviors that are associated with eating disorders (Spinella & Lyke, 2004). Eating behaviors can also be affected by illnesses or injuries in the prefrontal subcortical systems which can result in binge-eating behaviors or impulsive maladaptive eating behaviors.

### Judgment and Decision Making

#### *Deductive reasoning*

Deductive reasoning uses logic to connect assertions to make an overall argument about what the correct conclusion should be. For example, deductive reasoning starts with a well-defined problem that can be solved using information that is readily available (Evans & Thompson, 2004). In the case of deductive reasoning, formal logic requires individuals to make decisions by assuming that the premises of the situation is true and that the solution can be found by choosing the conclusion that would “necessarily” logically follow. Deductive

reasoning is independent of the truth if the conditional processes are followed.

An example of deductive reasoning as applied to eating behavior could be the assumption that “eating pizza makes me full”. If a person has eaten three pieces of pizza and they are not feeling full, deductive reasoning could result in the person concluding that fullness has not been achieved and more pizza will be eaten. The fact that individuals with binge eating behaviors have measurably higher levels of satiety than normal eaters is not even taken into the decision making process (Sysko, Devlin, Walsh, Zimmerli, & Kissileff, 2007).

### *Inductive reasoning*

Inductive reasoning is quite different from deductive reasoning as it is dependent upon using reasoning that is based upon personal observations and making comparisons between potential solutions (Klauer & Phye, 2008).

Inductive reasoning has been referred to as general intelligence, critical thinking, hypothesis testing, concept development, and problem-solving, and it is considered to be the most common way of developing personal knowledge (Csapo, 1997). Inductive reasoning is considered to be a mental tool that is used to acquire new knowledge and is responsible for taking knowledge that is obtained from tests or reading content and turning this information into applicable knowledge (Csapo, 1997).

One major challenge associated with the use of inductive reasoning has been discussed by cognitive psychologists for many decades and it is regarding when wrong responses are obtained. If a person develops a hypothesis and executes the hypothesis with success there is a likelihood that the person will

believe that the correct conclusion was obtained. However, the hypothesis could be wrong and the individual may stop using the inductive process to further assess the significance of the decision making process because of a false belief of success (Morgan, 1945). This challenge has also been referred to as confirmation bias or the discounting error and this may play a role in eating decisions. For example, if a person believes that eating platefuls of bacon will result in a weight loss and they successfully lose weight, the confirmation bias may result in a belief that bacon is low in calories. However, the weight loss may have been associated with malnutrition and that may be the correct hypothesis. Regardless of the challenges associated with inductive reasoning, understanding how it results in inferred causality is beneficial from a cognitive perspective on eating behaviors.

### Bases for Inferring Causality

Causality, or causal inferences, is a subset of cognitive research in the area of inductive reasoning resulting in a person coming to a conclusion that is either a confirmation due to the presence of a behavior or the absence a behavior, or disconfirmation as a result of the presence of possible causal event but absence of outcome or the absence of possible causal event but presence of outcome (Tenenbaum & Griffiths, 2002). Confirmation strategies are used to test inductive reasoning hypothesis by most people and in social situations, when others approve of the causal inference, three types of confirmation bias can occur.

Butera, Caverni, and Rossi (2005) stated that the first type of bias is that people typically look towards positive ideas for solutions. The second type of bias is that the first successful hypothesis is usually selected and sequential hypothesis may not be considered. The third type of bias is that disconfirmation in hypothesis testing is often too difficult for most people so confirmation strategies are used most often, resulting in a loss of potential hypotheses (Butera, Caverni, & Rossi, 2005). The end result of these biases is that there is a loss of alternative solutions in the decision making process.

This could be demonstrated in eating behavior decision making when social influences interact with personal eating behavior. For example, two women could be in front of an ice cream store. One woman may decide that based upon previous experiences eating ice cream for lunch will not impact her glucose levels and the second woman would support her decision. This decision could be a result of confirmation bias and both women may have increased glucose levels because of the absence of feeling as if the outcome (increased glucose levels) did not occur the first time which may have been due to alternative factors. This daily decision making process often comes from intuitive judgments, heuristics, gap assessments that occur quickly and with out data, and underlying reasoning processes based upon past outcomes and it is not always reflective of the best, or right, decision with regard to overall health (Ferreira, Garcia-Marques, & Sherman, 2006).

### Eating Decision Making Behaviors

Cognitive decision making style has been applied to addressing some eating behaviors and the decisions individuals make daily which affect the overall outcome of health. A high level literature review suggests that the majority of the decisions made by those with eating disorders use inductive reasoning. However, current research is assessing a variety of alternative decision making styles. For example, food choice decisions can be both complex and dynamic and are usually made using a decision making model which weighs the costs and benefits of the individual decisions (Furst, Connors, Bisogni, Sobal, & Falk, 1996). Using this model, inductive reasoning accounts for the decision making process based upon social factors, life course events, food choice scripts (rehearsed behaviors) and additional strategies.

Using a more deductive reasoning approach, the family food decision-making model assessed the decision making process of families as units (Gillespie & Gillespie, 2007). In this cognitive decision making style, families make more formal and logical decisions regarding eating behaviors. For example, families choose from foods that are practically available to them, they negotiate food and eating goals with available family resources, they determine how food will be acquired and prepared, they decide socially who will participate in eating, and they assign roles for the overall process (Gillespie & Gillespie, 2007). Additionally, a life course perspective assesses family food decision making processes by understanding the roles of culture and contextual influences, community, social class, and early family life experiences with eating decisions

(Wethington, 2008). However, this theory seems to be capable of uncovering multiple areas of confirmation bias.

Referring back to the role of the reward system controlled by the orbitofrontal cortex, a theory exists called the hot-cool system analysis. This theory assesses what is referred to as hot and cool cognitive systems based upon cognitive rumination, which is the replay of a situation in the mind, as a driver for decision making (Metcalf & Mischel, 1999). The hot-cool system analyses the roles of what a person knows to be fact (the cool system) in comparison to the quick emotional processing (the hot system) that is based upon unconditional or conditional trigger features (Metcalf & Mischel, 1999). When a person is facing an eating behavior decision, these two systems will work to create either an emotional, cognitive, or combined response. Impulsive behaviors also can be associated with unconditional or conditional trigger features due to visceral states such as feeling fatigue or hunger (Nordgren, van der Pligt, & van Harreveld, 2007). For example, when a person is feeling hunger it is more likely that impulsive eating and poor eating decision making can occur.

Lastly, social cognitive models present popular theoretical explanations for cognitive decision making and reasoning for eating behaviors. One of the more popular theories is the theory of planned behavior which emphasizes the rational and cognitive influences on eating behavior (Armitage & Conner, 2001). The theory of planned behavior was created to understand the interactions of beliefs,

attitudes, and social influences on a person's final behavior with regard to their personal intentions and decisions (Aizen, 2007).

The model has three tiers and the first is that a person will have behavioral beliefs surrounding whether or not a specific behavior will result in an outcome which impacts personal attitudes towards a behavior (Armitage, Conner, Loach, & Willetts, 1999). The second tier addresses normative beliefs (which are perceived behavioral expectations of individuals the person feels is important) and subjective norms (which are the perceived social pressure to perform the specific behavior) as they apply to an initial behavioral belief (Aizen, 2007). The third tier consists of control beliefs and perceived behavioral control which is the person's internal and external feeling of how much control they have on the specific behavior (Armitage et al., 1999). This theory has been popularized with the use in a variety of social issues that are related to personal behavior such as understanding the spread of HIV, measuring health behaviors for those with chronic illnesses, and understanding goal directed behaviors for drug abuse recovery treatments and is equally applicable to researching eating behaviors (Young, 1991). It is additionally useful for recognizing impulsive behaviors and the coping techniques used by those with poor eating behaviors (Collins & Lapp, 1992).

#### Areas for Future Research

One cognitive decision making style which has not been substantially investigated in relation to eating behaviors is the Adaption Innovation Theory.

The Adaption Innovation Theory uses the KAI inventory to measure cognitive style with the purpose understanding a person's decision making style on a range from adaptive to innovative. This psychometric tool has been developed and extensively tested and it demonstrates a relationship between the cognitive styles of innovation and adaption (on a bipolar scale) and a person's preferred approach to problem solving (Hutchinson & Skinner, 2007). A person who scores as being more highly adaptive is more likely to make decisions based upon reliability, methodology, efficiency, and in a systematic method with the goal of doing an existing process or behavior better or with more stability (Kirton, 2003). A person who scores as being more highly innovative is more likely to make decisions by addressing the situation from an undisciplined or unpredictable manner and may make behavioral decisions differently or unexpectedly.

Some limited research has already demonstrated a relationship between those suffering from anorexia having adaptive cognitive decision making styles and those suffering from binge eating having innovative cognitive decision making styles (Saggin, 1996). This theory and psychometric instrument (KAI) has been utilized in multiple dissertations and research programs to measure the difference in personal style and cognitive behaviors (Kirton, 2003).

Understanding a person's cognitive decision making style would help to understand additional factors that could be subsets of the inductive reasoning process.

### Conclusion

Cognitive decision making and reasoning with eating behaviors is a complex topic in cognitive psychological research. This area of research will continue to benefit from further research in the areas such as understanding the details associated with inductive reasoning as well as incorporating more effective strategies for eating behavior decision making using deductive reasoning strategies. However, it should be noted that impulsivity associated with maladaptive eating behaviors does leave a great deal of ambiguity as to the decision making process. Additionally, when a person is trying to make a change to an eating behavior it would be beneficial to educate the person about the challenges associated with confirmation bias and the discounting error of using the first available hypothesis.

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