MyFitness Pal: Deciding to Keep Fit

Cognitive Factors Review of a Fitness App

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Introduction to Metacognition

Metacognition is a higher level cognition that may be decribed as the ability to think about our own thoughts in order to plan, monitor, evaluate and correct the steps of any given process that relates with a task or a goal. Flavell who used the term metamemory as the individual's knowledge and awareness of memory (1975) expanded his theme later on and first coined the term, metacognition, referring to it as "the active monitoring and consequent regulation and orchestration of information processing activities in relation to the cognitive objects or data on which they bear, usually in service of some concrete goal or objective" (1976). Reminiscent of Brown's approach to memory phenomena where he made the distinction of "knowing", "how to know" and "knowing about knowing" (1975), Flavell described metacognition briefly as cognition about cognitive phenomena (1979).

Metacognitive Theory

Knowledge of cognition includes at least three different kinds of metacognitive awareness: The first one is declarative knowledge, which refers to knowing about things, the second one is procedural knowledge which refers to knowing how to do things, and the third is conditional knowledge, which refers to knowing the why and when aspects of things related to cognition (Schraw, 1998).

Flavell was influenced by the work of Jean Piaget, who asserted that the cognitive abilities are obtained by two mechanisms, assimilation and accomodation, where the former relates to associating between new information and prior knowledge; and the latter relates to when what is already known does not suffice to solve a current problem, thus it is subordinate to the already existing structures to which the situation must be assimilated (Piaget, 1976). Flavell stated that metacognition consists of both metacognitive knowledge and metacognitive regulation; further, he divided metacognitive knowledge into three categories: knowledge of person variables, task variable and strategy variables (Livingston, 2003).

Metacognitive Strategies

We use metacognitive strategies to control our cognitive activites and to make sure our goal has been met. For example, if our goal is to lose weight and we are using a software app that helps us in reaching our goal, we keep questioning ourselves about the items we come across in the app to make sure we understand the context of the app and how it works. Monitoring strategies helps us achieve our goal-specific strategies, therefore, we keep planning and monitoring our cognitive activities. We also use self questioning as a method to make sure we meet our expectation of having fully understood the innerworkings of the system we are interacting with.

According to Dirkes (1985), there are three basic metacognitive strategies: Connecting new information to former knowledge, selecting thinking abilities deliberately and relating time and degree of certainty to purpose as in planning, monitoring, and evaluating thinking processes. By monitoring and controlling our own thoughts, we use these strategies to define a problem and seek solutions for it by constantly evaluating and deciding on whether we are able to solve our problem or if it demands a higher authority. If our habitual responses are not successful in a given situation, it means that our learned responses are not sufficient to solve the problem, thus, that's where our metacognitive skills are brought into play (Blakey & Spence, 1990).

There are various specific metacognitive skills that one requires over lifetime such as learning and decision making. In this review, I will focus on the decision models and the process of decision making.

Decision Making

Decision making is a cognitive process that deals with the study of identifying and choosing alternatives based on our values and preferences. The study of decision making spans a variety of fields including neuroscience, psychology, economics, statistics, political science, and computer science, and most of our decisions share common elements including deliberation and commitment (Gold, 2007). The study of decisions addresses both normative and descriptive questions. The normative analysis is concerned with the nature of rationality and and the descriptive analysis, in contrast, is concerned with people's beliefs and preferences as they are, not as they should be (Kahneman & Tversky, 1984).

Although we have the ability to evaluate our decisions and are often aware of our mistakes without a need for feedback -as our metacognitive abilities help us to avoid making the same mistakes over and over and avoid overcommitting too much time or resources to decisions based on unreliable evidence (Yeung & Summerfield, 2012), the results of our decisions do not always display the most rational choices for our well-being. Then again, classical decision making examined a varety of methods including Bayesian statistics and multiattribute utility theory-methods that unfortunately are not applicable to many situations requiring support; people make mistakes when they use naturalistic strategies while making a decision (Klein & Calderwood, 1991).

In utility based models where maximizing the benefit of the decision is the common starting point, the assumption was that the decision maker intends to maximize their benefits; whereas, there are many variables that misguide us from making a good decision and cause us to fail to respond to our incentives in a more rational way, such as cognitive biases. Cognitive biases have a negative effect and may lead to systematic deviations on our judgment. Some of the cognitive biases affect our decision making and behaviours, such as attentional bias where our perception is affected by recurring thoughts (Bar-Haim et al, 2007), or negativity bias where we have a greater recall of unpleasant memories compared to our

positive memories (Hazilip, Julie et al, 2012). Some of the cognitive biases are labeled as attributional biases such as halo effect that is defined as the influence of a global evaluation on evaluations of individual attributes of a person (Nisbett, 1977) or projection bias where we assume that others share our current emotional values (Hsee, 2006). And some of the biases are related to memory such as illusory correlation where we remember an inaccurate relationship between two events (Tversky & Kahneman, 1974) or recency effect where the items we recall depend on the sequence (Martin, 2007).

Another significant cognitive bias is the framing effect that deals with how people react to a specific choice depending on the way it is presented. It has been found that the dependence of preferences on how the problems are formulated change the decision significantly (Tversky & Kahneman, 1981). Framing a problem in a negative way tends to result in more risk taking and framing the same problem in a positive way results in less risk taking. This phenomena may be better described with another theory by the same researchers, prospect theory, which is an alternative model of decision taking under risk and where economic behavior has less emphasis on utility maximization and rational presuppositions. “People underweight outcomes that are merely probable in comparison with outcomes that are obtained with certainty. This tendency, called the certainty effect contributes to risk aversion in choices involving sure gains and to risk seeking in choices involving sure losses” (Kahneman & Tversky, 1979).

Satisficing is also a noteworthy decision theory based on optimization. Contrary to aspiring to an idealized rationality and described as “behavior appropriate to the ends of the system and adaptive to the demands of the environment” by Newell and Simon, it is an effective use of resources to come up with plans of action for decision making (Winograd, 1991) and enables us to find an adequate way to make an optimal decision in a world of infinite choices.

There are also times when we make decisions without fully appreciating how those decisions will affect our future perceptions and behavior: procrastination, another issue in decision making that leads individuals to postpone their tasks until the next day, and when the next day comes, the required actions are delayed again (Akerlof, 1991). Contrary to the conventional economic theory where people act when they believe the benefits outweigh the costs, “models with present-biased preferences posit that people use a sort of immediate-cost/immediate-benefit analysis in deciding whether to do something now while formulating their plans; a challenge to the traditional economic notion that behavior reflects one’s preferences” (O’Donoghue & Rabin, 2001).

Altough there are many variables that affect the quality of our decision making, the procrastination effect has remarkable importance for this paper, because the costly procrastination of starting a diet and delaying the unpleasant task of keeping a healthy lifestyle is directly related to the case examined in this expert review.

MyFitnessPal

MyFitnessPal is a free smartphone app that helps people keep track of their calories by entering it to an online diary and also keep track of their exercise data, by this means, enables the user to determine the optimal nutrients and calorie intake parallel to their goals. It is a widely popular app with over 80 million users -with 80% of them outside US- and was purchased by Under Armour on February, 2015 (Techcrunch.com, 2015).

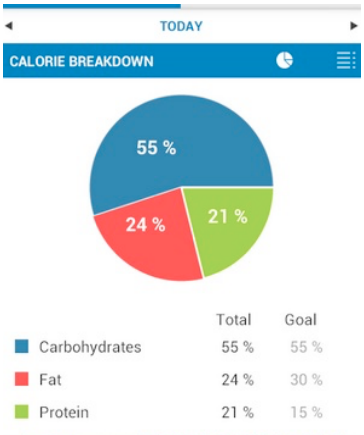

Fig. 1 Calorie Breakdown Chart

MyFitnessPal empowers users by assisting them in their journey through their decision of living a healthier lifestyle by keeping track of their daily nutrition data –even scan the barcodes of the products at a market- and their exercise behavior and showing the user the overall picture of what they should continue to do and what to avoid; which in turn helps them in their future decision making towards what to eat, how much to eat, how to distribute daily intake of fat, carbohydrates and protein, how to achieve physical improvement and which exercise to choose in order to burn more calories (Fig. 1). Thus, the app helps users make decisions based on what is relevant to them.

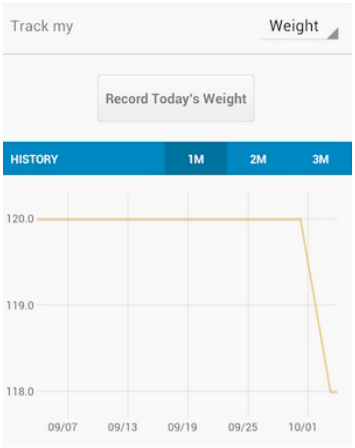

Fig. 2 Tracking weight

The success of MyFitnessPal among other diet apps is that it provides a very easy way to keep track of the progress made in terms of calorie awareness, thus, it offers support to the user in self monitoring regarding their daily intake and how much weight they lose (Fig. 2). Dieters balance weight loss against other factors to which a diet is sustainable or easy to follow, which is an indicator of why MyFitnessPal ranks first in surveys as well (DailyMail.co.uk, 2013). The layouts contain simplicity and the commands are easy to understand, therefore, even users with low literacy will have no difficulty using the app.

We are living in a social network and we are all connected to each other, and how we are perceived is important. The app supports that need as well and encourages the user to be more connected to their social network by offering a chance to share their progress and see how their friends are doing within the system. It is beneficial, especially to externally guided decision makers in a social situation who need validation from their friends they share their progress with.

Fig. 3 Keeping track of our network

Another perspective of externally guided intention may be described in the light of mirror neuron literature, based on the findings that neurons are active not only when an action is being performed but also when that action is being observed performed by other individuals, as an external trigger (Bunge & Wallis, 2008). Fig. 3 depicts how triggering mechanism works; observing the results of the progress of our friends in the network may trigger us to adopt into a healthier lifestyle.

Another benefit of the app in terms of how it supports metacognitive skills is its success in framing the context. The user exactly has a clear mental model of the system and knows where they are inside the system at any given time. From tracking weight loss to daily calorie intake, the interface offers the user effective cues and affordances throughout the whole experience.

Although there are many positive aspects of the app, there are also a few discrepancies that are worth mentioning in terms of metacognitive skills regarding the app. An important negative issue that may frustrate the user who decided to use this app for tracking calories is the inconsistency of access to data due to mobile dependability. When there's no internet connection, the system does not let the user search within the system. The user won't be able to keep track of the records may which may cause the user to stop calculating calories and decide not to use the app in the long term.

Another problem is related to inconsistent data due to multiple entries of the same products by different users. It operates like wikipedia, but there is so much difference in calories of the same nutrient added by multiple users that it discourages the user to find the most accurate calorie for a given nutrient to choose from, which adds extra cognitive load to the already existing calculations of calories of every meal. Besides, there's no way to find how much calories are burned during a weight exercise, so the users have to add the data themselves and it not only is exhausting but also raises questions on how accurate the data might be. As a result, it again adds more to the cognitive load, as it is difficult to calculate which exercise burns how many calories.

And lastly, portion sizes are determined by the diet maker, which may flaw the results regarding the total calories consumed, which in turn may result in not being able to balance the diet accurately and give up using the system. The cons of the app stated above may negatively effect the user's consistency in continuing to use the app as there are many diet apps out there and a determined user may lose weight by using any of them; however, the difference between a good app and a great app lies in the fact that people do not gain or lose weight in one day. Therefore, the more sustainability and simplicity the app offers, the less cognitive load it will add to the user experience in the long run.

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