

Review Article: Exploring media multitasking behavior with motivation conflict theory

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ABSTRACT

Media multitasking is an increasing phenomenon in our daily lives and has accumulated considerable research in recent years. This article is based on dual motivational systems and motivation conflict theories to explore the best volume of media multitasking on its primary working efficiency and emotional gratification. A stochastic model of task performance and volumes by combining motivation conflict normal distribution model is proposed. The empirical data is conducted for parameters estimation and model calibration. Finally, the conclusion is useful and helpful for future applications.

Keywords:

Media Multitasking; Motivation Conflict; Dual Motivational Systems, Emotional Gratification.

Introduction

In recent years, due to the frequency and availability of cross-media cross-use, learning, work, entertainment and social interaction are seamless integrated in cross-media switching [1,2]. Simultaneous participation in more than one form of media, known as media multitasking, is an increasing phenomenon in our daily lives and even a way of life for the younger generation [3]. Media multitasking has become the focus of research in recent years [4, 5].

Multitasking refers to simultaneous execution of multiple tasks to accomplish different goals

[6-8]. When media usage involves multitasking, it is called media multitasking. In today's modern society, the multitasking behavior of most adolescents usually involves media multitasking in media use [1, 4, 9, 10].

In the research on media multitasking, it is mostly from the perspective of cognitive load, that multitasking increases cognitive loading [11-13]. Due to the limited cognitive load capacity of each person, media multitasking will cause inefficiency and inattention. However, some studies have found that when comparing light multitasking, people who are used to heavy multitasking handle tasks better than light multitasking because they are familiar

with switching between multitasking tasks [6, 7, 14, 15]. The discussion of relationships between media multitasking volumes and task performance also lead to the moderate amounts of media multitasking are associated with optimal task performance and minimal mind wandering [3]. It is found the relationship between these two variables is an inverted U-shape and shown the performance of heavy and light media multi-taskers does not significantly differ across difficulty levels [3, 11].

From the motivation perspective, subsequent scholars discovered the "Dual Motivational" of multiplexing from the perspective of media use and gratifications theory [1,2]. Dual motivational systems theories assume that experience of positive or negative emotions indicates the appetitive activation or aversive motivational systems, respectively, and perspective separates the positive affective processes from negative ones. It is believed that users of media multitasking may have both aversive and appetitive motives when engaging in media multitasking. To escape the stress and exhaustion caused by accomplishing the primary task (aversive motivate), people approach to media multitasking (appetitive motivate).

On the motivational level of media multitasking behaviors, media multitasking behaviors are motivated by boredom, anxiety, or fatigue; the most common example is college students who often listen to music, browse social media, post back communication software, and do schoolwork or sideline at the same time [4, 11].

The media multitasking behavior can disperse and reduce the negative emotions of not completing the primary task, and promote task achievement. Therefore, from this viewpoint, media multitasking disperses the negative emotions and achieve the goal of the primary task. It is from a different viewpoint to discuss the impact of media multitasking on primary task performance and primary working efficiency.

Base on the mentioned perspective, this research explores under both aversive motivate (to accomplish the primary task) and appetitive motivate (to approach to media multitasking in emotional gratification), the optimal volumes of

media multitasking to reach high primary working efficiency and high emotional gratification.

This article is organized as firstly, the proposed model is conducted by the viewpoint of dual motivational systems. Then, the empirical data is introduced. The detail information of data is described. The data is divided into two parts: Half is for parameters estimation of the proposal model and another half is for model calibration. Finally, the conclusion is made.

Literature Review

This research is based on dual motivational systems theories to explore the best volume of media multitasking on its primary working efficiency and the emotional gratification.

The dual motivational systems propose that emotions are fundamentally organized by two motivational systems: The positivity activation which calls the appetitive system and the negativity activation which calls the aversive system. When the appetitive system is activated by positive stimuli, elicits positive emotions, and fosters approach behavior, whereas the aversive system is activated by negative stimuli, elicits negative emotions, and fosters avoidance behaviors.

Thus, people in media multitasking phoneme can obtain emotional gratification (appetitive motivate) which help to compensate for the aversive motivation of accomplishing primary. The appetitive- aversive motivate can be considered similar as approach-avoidance conflict situations in motivation conflict theory [11, 16].

The motivation conflict theory is discussed conflict situations in decision-making are generated according to the different directions of decision-making of alternatives [16, 17]. It can categorize into three different situations: approach- approach conflict, avoidance - avoidance conflict and approach- avoidance conflict [17, 18]. In approach- approach conflict, all decision options are desirable options, but a choice should be made among them.

In contrast, individuals should choose among alternatives that are all unsatisfactory and undesirable in avoidance -avoidance conflict. In

approach- avoidance conflict, decision-making options contain desirable and undesirable elements and individuals must make choices among these options [5-19]. Huang (2022b) discusses three kinds of motivation conflict in customer indecision behavior [21].

In this research, a normal distribution model is proposed to describe these different motivation conflicts with a variance of threshold level.

For the optimal volumes of media multitasking, there are many previous researches focus on increasing primary task performance and working efficiency in using media multitasking simultaneously. It is found an inverted U-shape relationship between these two variables and shown the performance of heavy and light media multitasks did not significantly differ across difficulty levels [3, 11].

To emphasize on the inverted U-shape relationship, Huang (2022a) proposes a stochastic model to investigate and predict primary task performance under certain volumes of media multitasking. Thus, this research extends Huang (2022a)'s stochastic model of task performance and volumes by combining motivation conflict normal distribution model [20].

Model

In the dual motivational system, people hope to both reach higher primary working efficiency and emotional gratification in media multitasking phenomena. Therefore, the following quantity defines by $g(k)$ as:

$$g(k) = P(Y > y_0 \cap Z > z') \quad (1)$$

Where, Y denotes the primary working efficiency. y_0 is the threshold that the working efficiency should achieve to y_0 level. $Y > y_0$. Z denotes the emotional gratification. z' is the threshold that the emotional gratification

should higher than this threshold level that people have motive to continue the major work, and Z is positive with the volume of media multitasking. However, the working efficiency is negative with the media volume of multitasking.

According to Shin *et al.* (2020) and Huang (2022a), the relationships between working efficiency and the volume of media multitasking is inverted U shape. X is denoted as the volume of media multitasking which is a random variable and its probability density function (pdf) is:

$$f(x) = \frac{1}{\sqrt{2\pi\sigma^2}} \exp\left[-\frac{(x - \mu)^2}{2\sigma^2}\right] \quad (2)$$

Thus, if it achieves $g(k) = P(Y > y_0 \cap Z > z')$, the volume of media multitasking which is considered as α that should meet both higher working efficiency and higher emotional gratification. According to the previous research, the middle volume of media multitasking (α_h) can achieve the highest working efficiency. However for higher emotional gratification, more volume of media multitasking is better. Thus, the level of media multitasking volumes should between α_h and α_k (Figure 1).

Then, we consider the volume of media multitasking is influenced by the motivation. Thus, the parameter μ is a motivate vector which is considered as a random variable for the motivation conflict theory. In the dual motivational systems theory, media multitasking may have both aversive and appetitive motives when engaging in media multitasking. It is attributed to the approach-avoidance conflict situation in the motivation conflict theory. According to Huang (2022b) [21], random variable μ follows normal distribution with parameter θ and ε .

$$m(\mu) = \frac{1}{\sqrt{2\pi\varepsilon^2}} \exp\left[-\frac{(\mu - \theta)^2}{2\varepsilon^2}\right] \quad (3)$$

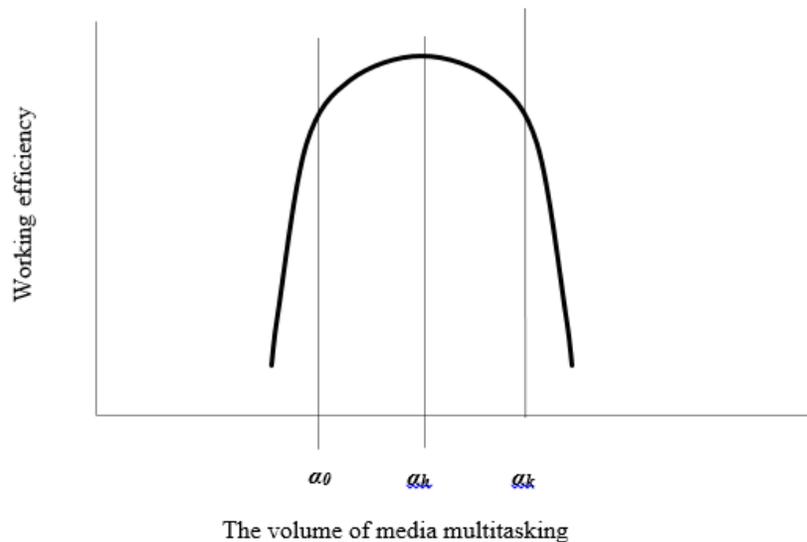


Figure 1: relationships between working efficiency and the volume of media multitasking

Then in motivation conflict theory, δ is a threshold level to demonstrate the difference phenomena of motivation conflict. For approach-avoidance conflicts the situation.

$$P(\mu | \mu = \delta) = \int_0^{\delta} \frac{1}{\sqrt{2\pi\epsilon^2}} \exp\left[-\frac{(\mu - \theta)^2}{2\epsilon^2}\right] d\mu. \quad (4)$$

Full Model

According to Equation (1)-(4), the joint density of $f(x)$ is,

$$f(x | \mu = \delta) = \int_0^{\delta} \frac{1}{\sqrt{2\pi\sigma^2}} \exp\left[-\frac{(x - \mu)^2}{2\sigma^2}\right] \frac{1}{\sqrt{2\pi\epsilon^2}} \exp\left[-\frac{(\mu - \theta)^2}{2\epsilon^2}\right] d\mu. \quad (5)$$

Then, x should meet the suitable volume between α_h and α_k .

$$P(\alpha_h < x < \alpha_k) = \int_{\alpha_h}^{\alpha_k} \int_0^{\delta} \frac{1}{\sqrt{2\pi\sigma^2}} \exp\left[-\frac{(x - \mu)^2}{2\sigma^2}\right] \frac{1}{\sqrt{2\pi\epsilon^2}} \exp\left[-\frac{(\mu - \theta)^2}{2\epsilon^2}\right] d\mu dx = \frac{1}{2\pi\sigma\epsilon} \int_{\alpha_h}^{\alpha_k} \int_0^{\delta} \exp\left[-\frac{(x - \mu)^2}{2\sigma^2} - \frac{(\mu - \theta)^2}{2\epsilon^2}\right] d\mu dx \quad (6)$$

Empirical Data

The empirical data is obtained from experience sampling method [1]. There are 315 college students as participants who are asked for reporting their media-related activities. There are 155 males and 160 females. The age range is between 18 and 22 years old. The data includes the numbers of media they use simultaneously, the period they spend to

complete the primary work, the emotional gratification level, and motivation strength. A pre-test survey is conducted to explore the categories of media multitasking and the primary work. The actives of media multitasking includes radio, phone/portable device, phone/portable device for social media, print, computer-desktop/laptop, computer for social media and video game console. The

primary work includes learning, taking a class, and doing homework/assignments.

Measurement

The primary working efficiency (Y) is measured by the time duration (minutes) it takes subjects to complete their primary work. The emotional gratification (Z) of subjects when they simultaneously participate in more than one form of media simultaneously is measured by questionnaires [1] to ask “to what extent when you simultaneously participate in media use” from positive emotion (rewarding, pleasant, and stimulating) to negative emotion (unpleasant, tiring, boring, and difficult) with 7-point scales (1 = not at all, 7= completely). The motivation is measured both with the orientation of approach or avoided and the

strength level. The orientation of approach or avoided is to ask subjects “what orientation the activity you do”. If it shows approach orientation is marked “+”, on the contrary, it shows avoided orientation is marked “-”. The strength level of motivation is measured by asking “how strength the motivation you feel” from 7-point scales (1 = not at all, 7= strongly). Thus, the motivation value is $\sum_{l=1}^r (\text{approach orientation})_l (\text{strength})_l$. r is the numbers of media multitasking which includes the primary work.

Parameters Estimation

It uses the maximum likelihood estimation (MLE) to calculate the parameters. Let L denotes the total likelihood and n is the number of calculation sample size.

$$L(\sigma, \theta, \varepsilon) = \prod_{k=1}^n L_k(\sigma, \theta, \varepsilon) = \left(\frac{1}{2\pi\sigma\varepsilon}\right)^n \int_{\alpha_h}^{\alpha_k} \int_0^\delta \exp\left\{-n\left[\frac{(x-\mu)^2}{2\sigma^2} + \frac{(\mu-\theta)^2}{2\varepsilon^2}\right]\right\} d\mu dx$$

Then, to differentiate $L(\sigma, \theta, \varepsilon)$, respectively, regarding $\sigma, \theta, \varepsilon$, and set them equal to zero.

Results

The mean of primary working efficiency is 75.23 minutes and the mean of numbers of media multitasking is 3.23.

θ is demonstrated the mean of motivation conflict which is closed to δ . In this article, it shows the approach-avoidance conflict situation. The motivation is measured both

with the orientation and its level of strength. Thus, the threshold level (δ) shows the sum of approach (+) and avoidance (-) is positive and negative cancel each other and near to 0. α_h is 2.019 which shows the optimal volume of media multitasking to achieve the highest working efficiency. α_k is 3.988 which represents about four media multitasking numbers that can achieve emotional gratification and a certain degree of work efficiency (Table 1).

Table 1. mean of primary working efficiency

σ	θ	ε	δ	α_h	α_k
2.256	0.012	3.212	0.018	2.019	3.988

Conclusion

The contribution of this research is to propose a stochastic model for prediction and estimation of the optimal volumes of media in

multitasking phoneme when concerning the working efficiency and individual emotional gratification. The results show that there is two media multitasking numbers to achieve optimal working efficiency. It means that in

addition to the primary work, there is only one medium for satisfying emotional gratification.

On the other hand, from the viewpoint of achieving more emotional gratification, there are three mediums (excludes primary work) that can meet certain degree of work efficiency.

This results can be explained by previous researches that suggest too many volumes of media multitasking will increase cognition loading and cause inefficiency. However, suitable media multitasking behavior can disperse and reduce the negative emotions of not completing the primary task, and promote task achievement.

In the future, other types of probability density model can be considered to portray both work efficiency and emotional gratification situation to find more impact indexes of media multitasking behavior. Different sources or measurements of individual media multitasking can be used to make model calibration and demonstrate real media usage environment.

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