The Influence of Ring-Back-Tone (RBT) Music
on Evaluation of the Phone-call Receiver's Personality

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Abstract: *The purpose of the study is to investigate the influence of Ring-Back-Tone (RBT) music on the evaluation of the phone-call receiver's personality in dimensions of Openness, Extroversion, and Neuroticism. In a preliminary test, the subjects listened to 17 RBT music stimuli in random order and assessed the personality associated with liking for each music (N=15). Among the 17 RBTs, three were selected to be used in Experiments I and II and they were distinguished from each other in terms of the three personality dimensions (p<0.001).In Experiment I, the subjects were divided into four groups and were asked to make a call to interview an unknown receiver (N=60). Different RBT music was installed depending on the group to which each subject belonged. It was found that different RBT influences the caller's evaluation of the receiver's personality, supporting Hypothesis 1 (p<0.001). Moreover, the ratings of the receiver's were highly correlated with those of the RBT music stimuli in terms of Openness (r=0.722, p<0.001) and Extroversion (r=0.753, p<0.001). In Experiment II, an identical experiment design was applied for a new group of subjects who were acquainted with the receiver (N=40). It was hypothesized that previous knowledge about a person would weaken the RBT effect. The results showed that RBT exerted no effect on the evaluation of the receiver's personality when the caller knew the receiver. It was also found that 12 personality traits, where each of the three personality dimensions is described by four traits, facilitated assessment of the character of the RBT music as well as the personality of the receiver.*

Key words: *Ring-Back-Tone, Personality, Openness, Extroversion, Conscientiousness, Music, Mobile Phone*

1. Introduction

As mobile phones see increasingly wider use, they have come to take on the status of a personal icon for their users. Subsequently, new business domains are targeting personalization of the mobile phone. The business domains include not only ornamental accessories, such as stickers, pendants, or bags, but also information services, such as ring-tones, screen images, games, etc. The Ring-Back-Tone (RBT hereafter) is an acoustic service that a caller hears until the receiver picks up the phone. While the receiver purchases the RBT, the caller is the actual user. In South Korea, RBT services have been branded by providers—for example, "Coloring" by SKT, "Ring-To-You" by KTF, and "Feeling" by LG Telecom. Currently, the most popular genre of RBT service is pop-music in the South Korean market.

Interestingly, once one installs the RBT, the callers hear the music unless the receiver actually calls their own phone. Thus, the RBT is purchased not necessarily for the buyer's entertainment. Instead, it is the first contact point between the callers and the receiver. In this context, it can be predicted that the mood generated by the RBT may influence the caller in forming impressions of the receiver, such as with regard to personality. Moreover, this effect could be intensified when the receiver is not known to the caller. The RBT industry is growing and thus an increasing number of mobile phone users including receivers and callers are exposed to this situation. To date, there has not been any relevant study that can clarify the influence of RBT in evaluating the phone's owner. In this study, empirical studies were carried out to provide evidence as to whether the RBT influences the cognitive behavior of the caller, focusing on evaluation of the receiver's personality. The results could be utilized not only by individual RBT users but also by the RBT providers for marketing purposes.

1.1 Goal and Hypothesis

The goal of this study is to investigate whether RBT music influences callers in their evaluation of the receiver's personality. The effect was tested in two different contexts: where the caller does not know the receiver and where the caller already knows the receiver well. In relation to this, the following two hypotheses

were formulated:

[H.1] The RBT influences the caller's evaluation of the phone call receiver's personality.

[H. 2] The effect of [H. 1] is stronger when the receiver is not known to the caller.

In this study, a preliminary test and two experiments were carried out, as explained in section 2.

1.2 Music and Personality

A wide body of studies on personality associated with liking for specific types of music and its application has been reported. Rentfrow and Gosling[5] showed that one's personality plays a decisive role with respect to preference of a specific genre of music. More specifically, Rawlings and Ciancarelli[4] found that music preference is related with two personality dimensions, extroversion and openness. Based on the previous findings, it could be expected that a caller might be able to evaluate the personality of the receiver by the phone owner's RBT music. On the other hand, it could also be predicted that the listener's mood is influenced by the RBT music. Eich, Ng, Macaulay, Percy, and Grebneva[2] demonstrated that music can manipulate the listener's mood. Their mood-modification technique, MCI, showed a high rate of return: About 81% of women and men alike developed either a very pleasant or a very unpleasant mood in under 20 minutes. Such mood change often motivates cognitive behavior. Kim[1] showed that the background music of commercial films can remind consumers to remind of a product and can increase the likelihood of a purchase accordingly. Therefore, previous studies support [H.1] and it thus can be predicted that the characteristics of RBT music will influence not only the assessment of the receiver's personality but also the caller's mood.

2. Outline of Experiment

The study consists of three major steps: First, a preliminary test was planned to collect RBT music as stimuli. Personality traits based on the five factor model (FFM)[2] were utilized to profile the characteristics of the RBT music. Second, in the first experiment, the subjects were grouped and different RBT music stimuli were arranged. The subjects were asked to dial and talk with the receiver (the experimenter). The subjects were then asked to evaluate the personality of the receiver, who was not known to the subjects. The personality assessments were expected to show whether different RBT music stimuli influenced the evaluation of the

receiver's personality (H. 1). Lastly, the same experimental design as the previous experiment was applied, but the subjects and the receiver were acquainted. Based on a comparison of the personality assessments between both experiments, [H. 2] could then be clarified.

2.1 Personality Measurement

Derived from Costa & McCrae[1]'s FFM, the following five dimensions of personality were used as a reference:

- Openness (vs. Non- openness)
- Conscientiousness (vs. Undirectedness)
- Extroversion (vs. Introversion)
- Agreeableness (vs. Antagonism)
- Neuroticism (vs. Sentimental Stability)

The FFM can identify individual differences within a broad framework. Among these five, three dimensions, "Extroversion", "Openness", and "Neuroticism", were taken into consideration, since the other two dimensions are thought to be less related with the characteristics of music in general[9]. In Table 1, four personality traits are listed under each dimension, and one trait of each dimension is marked with an asterisk(*). These marked traits are, say, "balance traits", and they are "conservative" in Openness, "cold-hearted" in Extroversion, and "stable" in Neuroticism. Each dimension can be characterized in a bipolar manner, and it was intended to employ the traits from both ends. In total, 12 personality traits were employed and each was assessed with a 5-scaled continuum ranging from 1 to 5 in the three empirical studies.

Table 1. 12 Personality Traits

Openness	Extroversion	Neuroticism
creative curious imaginative conservative*	optimistic active sociable cold-hearted*	apprehensive sentimental sensitive stable*

2.2 Conversation

In Experiments I and II, the subjects were asked to conduct an interview with the receiver (experimenter). The questionnaires were made up of 8 items related to demographic information, cultural interests, lifestyle, etc (see Table 2). In order to minimize the emotional bias caused by provocative answers, the receiver replied with

average values (values in the right column in Table 2), which were already noted in the questionnaire sheet.

Table 2. Interview Questionnaire

Questionnaires	Answered by the receiver (experimenter)
How often do you go to the movie theater in a month? (average: 1/month)	"Once a month."
How many books do you read in a month? (average: 1.3/month)	"1~2 books."
Do you play sports regularly?	"Quite often"
If so, how often do you play any kind of sport? (average: 2 times /week)	"On average…twice a week"
How long do you watch TV per day? (average: 3.2 hours/day)	"2~3 hours"
What do you watch usually?	"News, soap operas, comedy shows, sports, etc."
Where do you live?	Daejeon city
How old are you?	Mid-20s.

3. Preliminary Test

3.1 Goal

The purpose of the preliminary test was to select RBT music stimuli for Experiments I and II. The selected RBT music stimuli were assumed to be distinguished from the other in terms of three dimensions of personality—Openness, Extroversion, and Neuroticism. Thus, each stimuli might influence the subjects' judgmental process in different directions.

3.2 Method

Fifteen university students made up of 6 males and 9 females participated in the test (M age: 24.00; SD of age: 1.73). Based on a popular-RBT-chart in May 2007 published by one of the RBT providers in South Korea [13], 17 of the most popular RBT music stimuli were collected (see Table 3).

The subjects were asked to evaluate the personality associated with liking for each music stimulus. Subjects rated the 17 music stimuli using the 12 traits and the music stimuli were played in random order.

Table 3. The 17 RBT Music Stimuli

	Music Title (*English Translation*)	Singer/Group
1	Toc Toc Toc	Hyo−Ri Lee
2	Mi In (*a beautiful woman*)	Ki−Chan Lee
3	Fan	Epikhigh
4	Kieogi Mareumyeon (*If the memory were dry*)	MayBee
5	Must have love	SG Wanna Be & Brown Eyed Girls
6	Nareul Wechida (*Shouting out about me*)	Maya
7	Sarangeun (*Love is*)	the Name
8	Soricheo (*Shout out*)	Seung−Chul Lee
9	Ice cream	MC Mong
10	Yeah	Jung−Ah Park
11	Yocsimjaengi (*greedy*)	Dong−Ryul Kim & So−Eun Lee
12	Baby love	Humming Urban Stereo
13	Jangmi (*Rose*)	Hae−Chul Shin
14	Maria	Ah−Joong Kim
15	Napeun Saram (*Bad Person*)	Ji−Young Back
16	Rainbow Romance	Crying Nut
17	& Design	Keun−Young Moon

3.3 Results

Based on the personality ratings, Cronbach's alphas were calculated and yielded a satisfactory level of internal consistency (see Table 4). The results provide evidence that the characteristics of the popular music can be profiled in terms of the personality dimensions—Openness, Extroversion, and Neuroticism.

Table 4. Reliability Coefficients of Preliminary Test, N=15

	Openness	Extroversion	Neuroticism
The 17 RBT music stimuli	0.871	0.821	0.706
	0.868		

Among the 17 RBT music stimuli, three were selected, no.10, no.3, and no.15 in Table 3, and labeled as Music 1, Music 2, and Music 3, respectively. The personality of Music 1 was rated to be "imaginative", "optimistic", and "apprehensive". That of Music 2 was rated to be "creative", "active", and "sentimental". However, that of Music 3 was rated to be "*not* curious", "*not* active", and "*not* sensitive".

As mentioned in section 2.1 (see Table 1), the ratings on the balance traits, such as "conservative (Openness)", "cold-hearted (Extroversion)", and "stable

(Neuroticism)" should be revised. By subtracting the initial ratings from 6, we obtained revised ratings that describe how "not conservative", how "not cold-hearted", and how "not stable" the stimuli are. The averaged ratings of the three music stimuli on the personality traits are shown in Tables 5a, 5b, and 5c.

Table 5a. Ratings on Openness Traits (N=15)

Music	Traits			
	Creative	Curious	Imaginative	"Not" Conservative
	M (SD)	M (SD)	M (SD)	M (SD)
1	3.87(0.64)	3.47(0.83)	3.80(0.56)	4.27(0.59)
2	4.13(0.64)	3.87(0.83)	3.47(1.06)	3.80(1.26)
3	2.27(0.70)	1.87(0.74)	2.67(0.82)	2.20(0.68)

Table 5b. Ratings on Extroversion Traits (N=15)

Music	Traits			
	Optimistic	Active	Sociable	"Not" Cold-hearted
	M (SD)	M (SD)	M (SD)	M (SD)
1	4.60(0.51)	4.13(0.74)	3.87(0.74)	3.80(0.94)
2	2.80(0.68)	4.00(.65)	2.93(0.96)	3.33(0.72)
3	1.60(0.51)	1.93(0.59)	2.13(0.74)	3.73(1.39)

Table 5c. Ratings on Neuroticism Traits (N=15)

Music	Traits			
	Apprehensive	Sensitive	Sentimental	"Not" stable
	M (SD)	M (SD)	M (SD)	M (SD)
1	1.87(0.64)	1.80(0.68)	3.40(0.74)	2.53(0.99)
2	3.20(0.56)	3.67(0.72)	3.67(0.49)	3.93(0.80)
3	4.60(0.51)	4.20(0.77)	4.67(0.49)	4.20(0.77)

An averaged rating over the four traits of each music stimulus was then obtained per subject. Thus, each subject held three representative ratings, i.e., for openness, extroversion, and neuroticism (see Equation 1 for calculation of a representative rating for openness).

Equation 1. Representative Rating of a Music Stimulus per Subject (e.g. Openness)

Rating of Openness= (Rating on "creative" + Rating on "curious" + Rating on "imaginative" + Rating on "not conservative")/4

Based on the representative ratings of the subjects, the personalities of the three music stimuli are profiled as shown in Table 6 and Figure 1.

Table 6. Personality of the 3 RBT Music Stimuli, (N=15)

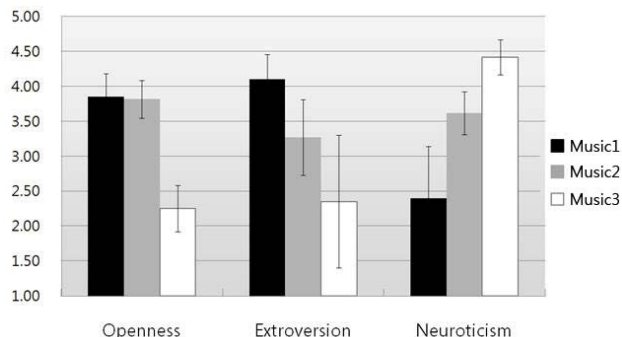| Music	Openness	Extroversion	Neuroticism
	M(SD)	M(SD)	M(SD)
1	3.85(0.71)	4.10(0.80)	2.40(0.99)
2	3.82(0.98)	3.27(0.88)	3.62(0.69)
3	2.25(0.77)	2.35(1.19)	4.42(0.67)

Fig.1 Personality of the 3 RBT Music Stimuli

In order to investigate whether the mean differences in each dimension are statistically significant, a repeated measurement One-Way ANOVA was run, yielding significant mean differences at an alpha level of 0.001 (see Table 7).

Table7. Results of Repeated Measurement One-Way ANOVA, Factor: Music Stimuli, ***p<0.001 (N=15)

Openness	Extroversion	Neuroticism
$F_{(2, 43)}=46.01$***	$F_{(2, 43)}=42.83$***	$F_{(2, 43)}=85.53$***

3.4 Discussion

In the preliminary test, it was demonstrated that the RBT music can be utilized as a stimuli to predict one's personality (Cronbach's alpha>0.8). Based on the ratings on the personality traits of Openness, Extroversion, and Neuroticism, three music stimuli were selected, the personality characteristics of which respectively differ in terms of personality dimensions (p<0.001).

The RBT music stimuli employed in this test were typical popular music samples respectively are a sum of complex acoustic information, lyrics, the singer's personality, and so on. Thus, given the high level of internal consistency obtained in the results, the utilization of popular music as stimuli in further research can be advocated.

The selected RBT music stimuli were used in Experiments I and II to find empirical evidence supporting or refuting hypothesis I.

4. Experiment I

Experiment I was designed to investigate whether RBT influences the evaluation of the call receiver's personality by the caller (H. 1).

4.1 Method

Sixty students comprised of 30 males and 30 females served as subjects, and they were divided into four groups. Subjects were provided with the mobile phone number of the receiver (experimenter) and were asked to call the numbers. Different RBTs were installed for each group of callers (Table 8).

Table 8. Subjects of Experiment I

	Group1	Group2	Group3	Group4
male	7	9	7	7
female	8	6	8	8
mean of age	24.40	25.87	22.87	23.67
RBT	Music1	Music2	Music3	Default

Prior to Experiment I, the subjects were told that they should evaluate the receiver's personality and were provided with questionnaires, as shown in Table 2. No information about the RBT was provided to the subjects. The subjects of Groups 1, 2, and 3 listened to the installed RBT music for approximately 25 seconds until the receiver answered the call. The subjects of Group 4 did not listen to any music, but listened to a plain ringing tone. The interview took a maximum of 2 minutes, and the subjects rated the personality of the receiver using the provided 12 personality traits.

4.2 Results

The ratings of each subject were averaged over four traits (per dimension) to obtain a representative rating of each dimension in the same manner that the ratings in the preliminary test were obtained (Equation 1). The values of mean and standard deviation of the personality evaluation on the three dimensions are presented in Table 9 and Figure 2.

Table 9. Personality Ratings of the Receiver, Experiment I

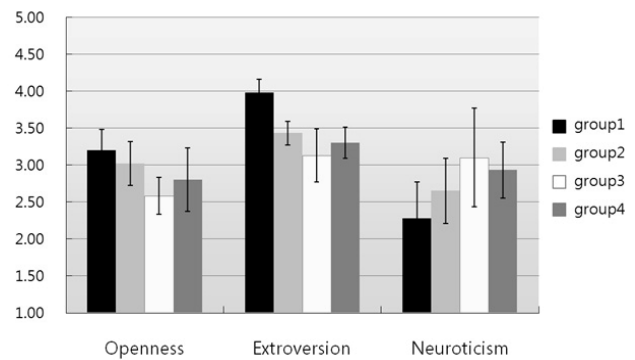| Subjects	RBT	Openness	Extroversion	Neuroticism
		M(SD)	M(SD)	M(SD)
Group 1 (N=15)	Music 1	3.20(0.90)	3.98(0.71)	2.28(0.94)
Group 2 (N=15)	Music 2	3.02(0.81)	3.43(1.01)	2.65(1.01)
Group 3 (N=15)	Music 3	2.58(0.77)	3.13(0.98)	3.10(1.24)
Group 4 (N=15)	none	2.80(0.80)	3.30(0.77)	2.93(0.88)

Fig.2 Personality Ratings of the Receiver, Experiment I

In order to examine whether the mean values vary at a significant level with regard to change of the RBT, a One-Way ANOVA was run. The analysis yielded a significant RBT effect ($p < .001$) in all three dimensions of personality, thus supporting [H. 1] (Table 10).

Table 10. Results of Repeated Measurement One-Way ANOVA, Factor: Group, ***$p<0.001$ (N=60)

Openness	Extroversion	Neuroticism
$F(3, 56)=6.359$***	$F(3, 56)=10.480$***	$F(3, 56)=7.273$***

Second, it was observed that the mean values of the groups varied in the same manner as the mean values of the evaluation of the RBT music stimuli, as shown in Figure 1. For example, the openness of Music 1 was assessed to be higher than that of Music 3 in the preliminary test. In Figure 2, the Openness of the receiver was rated higher by Group 1 than by Group 3, thus agreeing with the tendency observed in the preliminary test, i.e., the Openness of Music 1 was rated higher than Music 3. Based on this observation, it was assumed that there would be a positive correlation between the personality of the RBT music and the personality of the receiver as evaluated by the callers.

Therefore, the mean values of the 12 traits obtained from the preliminary test were compared with those from Experiment I, as illustrated in Figures 3a (Openness), 3b (Extroversion), and 3c (Neuroticism). A correlation analysis was run, yielding positive coefficients ($r=0.722$** in openness; $r=0.753$** in extroversion; $r=0.265$ in neuroticism, **$p<0.01$).

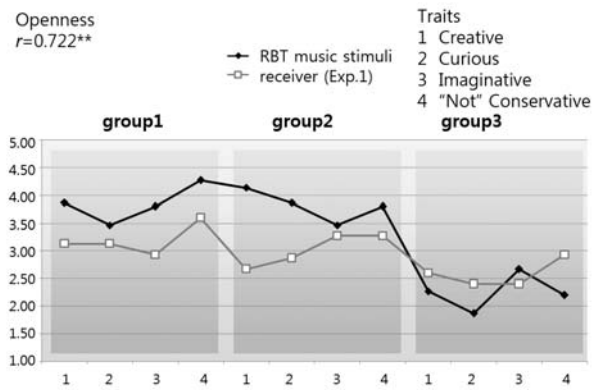**Fig.3a The mean values of the 12 personality traits: openness (**p<0.01)**

Fig.3b The mean values of the 12 personality traits: extroversion (p<0.01)**
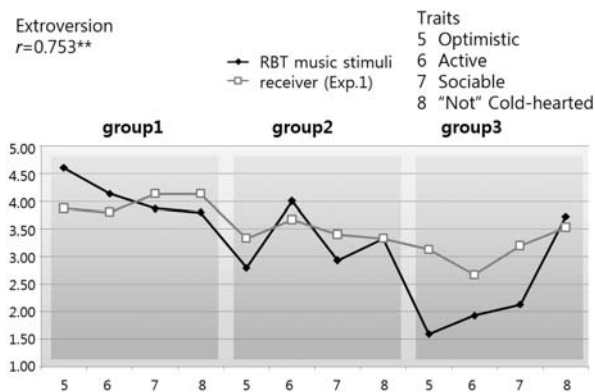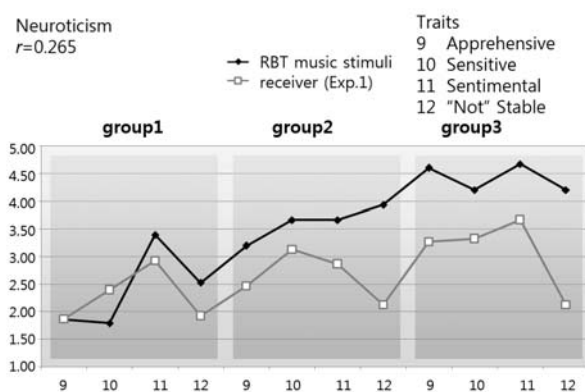

Fig.3c The mean values of the 12 personality traits: neuroticism (p<0.01)**

4.3 Discussion

The empirical results provided evidence that the caller's evaluation of the personality of the phone-call receiver is influenced by the RBT (H. 1). Moreover, the personality evaluation varies with regard to the personality of the RBT music, particularly in Openness

($r=0.722**$, $p<0.01$) and Extroversion ($r=0.753**$, $p<0.001$). However, the subjects in Experiment I did not know the receiver, and thus it can be predicted that the RBT music influenced the subject's first impression of the receiver either consciously or unconsciously. In Experiment II, an identical experiment design was applied for a new group of subjects who already knew the receiver. In this case, it was hypothesized that the influence of the RBT music would be less pronounced (H. 2).

5. Experiment II

Although the empirical results supported [H. 1], it could not yet be concluded that RBT is influential in the evaluation of the receiver's personality. The subjects in Experiment II were recruited among friends or acquaintances of the receiver, who served as the experimenter of this study. Hence, the personality evaluation admits previous knowledge of the subjects about the receiver's personality. Consequently, it was hypothesized that the influence of the RBT on the evaluation of the receiver's personality would appear in a weaker pattern (H. 2).

5.1 Method

Forty people comprised of 15 males and 25 females served as subjects and they were divided into four groups (Table 11). The subjects were asked to call the receiver to complete the questionnaire and were told that they were going to assess the personality of the receiver.

Table 11. Subjects of Experiment II

	Group1	Group2	Group3	Group4
male	3	5	2	5
female	7	5	8	5
mean age	23.90	26.30	22.60	24.80
RBT	Music1	Music2	Music3	Default

5.2 Results

The averaged ratings over every four trait (per dimension) were obtained for each subject. Based on these representative ratings, the mean values of the personality dimension of the receiver were calculated as presented in Table 12 and Figure 4.

Table 12. Personality Ratings of the Receiver, Experiment II

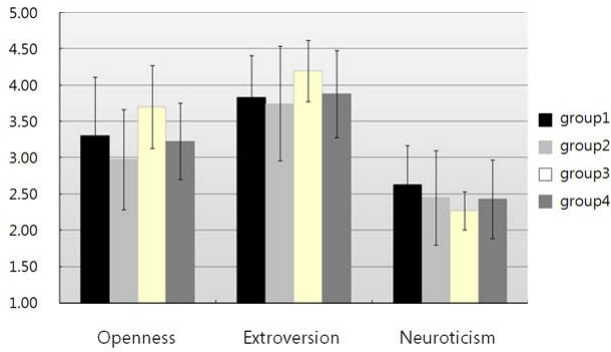| Subjects	RBT	Openness M(SD)	Extroversion M(SD)	Neuroticism M(SD)
Group 1 (N=10)	Music 1	3.30(0.81)	3.83(0.58)	2.63(0.54)
Group 2 (N=10)	Music 2	2.98(0.69)	3.75(0.79)	2.45(0.65)
Group 3 (N=10)	Music 3	3.70(0.57)	4.20(0.42)	2.70(0.26)
Group 4 (N=10)	none	3.23(0.53)	3.88(0.60)	2.43(0.54)

Fig. Personality Ratings of the Receiver, Experiment II

Subsequently, a One-Way ANOVA was run to analyze whether the mean values of the groups differed significantly. As shown in Table 13, no effect was found in any of the dimensions (p>0.05). Therefore, it was determined that the subjects in Experiment II evaluated the receiver's personality independently of the RBT.

Table 13. Results of One-Way ANOVA, Factor: Group

Openness	Extroversion	Neuroticism
$F_{(3, 36)}=2.075$ p=0.121	$F_{(3, 36)}=1.049$ p=0.383	$F_{(3, 36)}=0.662$ p=0.581

5.3 Discussion

In Experiment II, an identical experiment design with Experiment I was applied for a different group of people. The aim of this experiment was to determine whether [H. 1] would appear in a weaker pattern, since the subjects already knew the call receiver. The results showed that the RBT had no effect on the subjects in their evaluation of the receiver (p>0.05).

Moreover, the assessments of the personality did not appear to reflect any influence of the RBT. In Experiment I, the mean values are positively correlated with those of the RBT music. However, the varying pattern of mean values within each dimension does not appear to follow the personality of the music.

6. General Discussion

Since mobile phones have become personalized, an increasing number of service providers have developed tangible as well as intangible products. This study focused on RBT service, which is sound, in most cases various genres of music, that is used to replace the traditional ring tone. The interesting facet of RBT is that the caller listens to the music while waiting for the mobile phone to be answered. In other words, the user of the RBT is not the owner of the phone but rather the caller. Thus, RBT can provide a first impression of the phone owner to the caller and may influence the mood and cognitive behavior of the caller, especially when the caller does not know the receiver. In this context, it was hypothesized that the caller's evaluation of the personality of the receiver would be influenced by the RBT (H. 1). Second, it was assumed that the effect would appear in a stronger pattern when the personality of the receiver is not known to the caller (H. 2). Therefore, an identical experiment design was carried out in two different contexts: In one experiment, the subjects did not know the receiver. In the other experiment, the subjects and the receiver already knew each other well (e.g. receiver's friends or school colleagues).

Before the experiments, a preliminary test was conducted and three kinds of RBTs were selected from 17 RBT music stimuli, and were employed in both experiments. In measuring the personality, three dimensions of personality—Openness, Extroversion, and Neuroticism—were taken into account. Derived from the FFM, 12 personality traits—four for each dimension—were facilitated to assess the personality of the RBT music stimuli as well as that of the receiver. For example, the characteristics of the three RBTs were found to be distinguished in terms of the three personality dimensions (p<.05).

The empirical results of Experiment I provided evidence that the RBT influences the caller's personality evaluation of the receiver, supporting [H. 1] (p<0.001). Furthermore, the averaged ratings of each trait obtained in Experiment I were compared with those in the preliminary test, and positive correlations were found: r=0.722** (p<0.001) in Openness and r=0.753** (p<0.001) in Extroversion. Therefore, it was found that the personality of the RBT music was associated with the personality of the receiver when the receiver was not known to the caller.

On the contrary, no RBT influence was found in Experiment II (p>0.05). The subjects already knew the personality of the receiver and were not influenced by

the RBT in evaluating the personality of the receiver. The results could support [H. 2] in that previous knowledge about the receiver's personality is dominant and thus the caller is not influenced by the personality of the RBT.

The study focused on RBT in the context of mobile phones. In a larger extent, the results could be considered in assessing whether music applied as a background acoustic interface or as secondary stimuli influences cognitive behavior.

7. Acknowledgment

8. References

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