

A Study on Promoting Appetite in Sound Signal Processing

Ik-Soo Ahn*, Myung-Jin Bae* and Seong-Geon Bae

* Information and Telecommunication Department, Soongsil University,
1-1 Sangdo 5 dong DongJAK-Ku, Seoul, 156-743, Republic of Korea

Department broadcasting Sound & Visual, Daelim University College
29, Imgok-rd, Dongan-gu, Anyang-Si, Gyeonggi-Do, 431-715, Korea

Abstract: This thesis seeks to research the sound of appetite improvement, suggest ways for practical use, and lay the ground for sustainable research. This study bases on the principle of conditional reflex to examine the waveform of appetite-improving sound and traces the hormonal function of digestive organs. For any research on appetite-stimulating sound, important aspect is to select effective appetite-improving sounds and pick them up and examine. Also it is essential to analyze and prove the process that such a sound stimulates the brain association part to recall memories accumulated inside whether directly or indirectly related and promote appetite. Accordingly, in this thesis, we adopted the principle of conditional reflex as the main research methodology and examined waveform to elevate research confidentiality and showed in diagrams and flow charts how the selected appetite-stimulating sounds are picked up and function inside the body. This research on appetite-stimulating sounds is significant in that it traced some sound potentially bringing about human body and mental responses to stimulate appetite and that it drew some more practical ways to use the research findings herein.

Keywords: appetite stimulation, conditional reflex, hormone, association process, memories associated with sound

1. Introduction

As the modern society has grown mature, today's people are living in a more complicated and convenient lives. However, in proportion to this, people are facing numerous new problems emerging daily. In the same context, different kinds of problems are being caused in people's food, lodge and clothe. Of them, problems related to our food life, one of the very basic means of people to extend life span, have long emerged as a social issue. Obesity cause by fast food, abuse of synthetic seasoning, drug abuse for losing weight, and many others have heavily stressed modern-day people's dietary habit. Such problems have also generated serious side effects such as anorexia, a disease to refuse food; and bulimia, a disease to try to overeat; while patients with diabetes and nutrition disorder are being round among younger ages. This thesis seeks to address anorexic cases caused by excessive diet, in appetence cases due to diseases, senile under nutrition cases to present ways of treatment by utilizing sound as an appetite-stimulator with a view, also, to improving research efforts in this area. The study on appetite-stimulating sounds picks up the (DOI: [dx.doi.org/14.9831/1444-8939.2014/2-5/MAGNT.14](https://doi.org/10.9831/1444-8939.2014/2-5/MAGNT.14))

food-related sounds and links it with the brain's association part. This mechanism is to improve appetite through auditory sense by recalling some memories experienced in relation to a specific sound to generate appetite-stimulating response. The basic principle of this research is the findings of the famous Pavlovian conditioning (a theory that a specific condition triggers a trained response) canine experiment. In parallel, in this research, we also examined sounds' waveforms (component analysis) and conducted the human response process in connection to an appetite-stimulating sound for the perfection of the research findings.

Chapter II of this thesis classifies food-related sounds into cooking sound, eating sound and food name speaking sound and explained reasons for such classification to prove its appropriateness. Then, we, for the research, studied the waveforms of 2 sample sounds of cooking and 2 sample sounds of eating and drew common spectrum. Chapter II shows how those appetite-stimulating sounds work inside the body and what kind of results are seen in figures and flow charts. Chapter III. Investigation & Review states

four ways of utilizing the findings of Chapter II for putting into practice appetite stimulation how to be gained theoretically in the research. Chapter IV presents the research conclusion that auditory sense, one of the five basic human senses, is deeply engaged in humane appetite stimulation with huge potential for practical use worth of continued research efforts.

2. Main Point

A research on appetite stimulation through auditory sense is performed by awakening human's sense center in connection with food experience to trigger its association process by the mediation of hearing sense. This thesis adopted the basic principle of conditional reflex as a corresponding research. In addition, we, in this research, examined appetite-stimulating sounds' waveforms to find out their characteristics and the roles of Ghrelin (an appetite-stimulating hormone secreted by stomach and pancreas), an endocrine hormone reacting to an appetite-stimulating sound in order to prove research validity and present ways of practical use. In this study, Pavlovian (Ivan Petrovich Pavlov: Russian physiologist) canine experiment was adopted where conditional response generated not by unconditional instinct but by associating previous learning experiences directly or indirectly related to a sound. Sound waveforms were also examined to find the commonalities among appetite-stimulating sound samples and suggest the possibility of sounds to improve human's appetite with stronger persuasion. Lastly, we studied Ghrelin hormone, an appetite-promoting hormone secreted internally when appetite-stimulating sounds are sensed mentally through the brain, in order to improve the research confidentiality. Moreover, a prerequisite study of this research was to identify appetite-stimulating sounds first. The process of finding out appetite-stimulating sounds was based on common sense and generally acceptable theories. Since food is directly linked to appetite, appetite-boosting sounds should be found in relation to food sound. Such food-related sounds are classified into three groups. First, cooking sound; second, eating sound; and third, food name speaking sound that one has an experience of eating with relish. The sound of cooking triggers association about the process of mixing food ingredients to make a final dish. Such sounds could improve appetite by associating the atmosphere of a cooking room along with the cooking process by using diverse cookware for

vegetables, meat, and oil, sauce and other seasonings. These sounds may even call in the taste and smell of the specific dish to trigger the secretion of Ghrelin and saliva from the salivary gland, the results of bodily change that improves appetite. The sound of eating is the most effective sound of appetite stimulation. As the sound associates an image of putting food into the mouth, it strongly stimulates auditory sense and maximizes imagination. The moment of hearing the sound of chewing food, people can image the shape of the dish, its taste and even texture. In this way eating sound excellently stimulates appetite. The sound of speaking food name may be lowest in its efficiency among the three sounds, in general. However, that may not be the case if a food name is strongly recognized by special previous experience. Good example of lemon. The moment we speak lemon, we experience salivation and the moment we say sherbet, we feel our entire body cooler and thirsty out of craving to eat. In this mechanism, speaking of the name of the food one likes could trigger the association process and stimulate salivary gland. There are numbers of food names - dish names, natural products of fruit or vegetable names, artificially made commercial product names, etc. For foreigners, as well, who have tasted Korea's traditional food could trigger their association about Korea. Prior to applying the selected sounds to bodily reaction research, we analyzed the waveforms of appetite-stimulating sounds in order to find out their common aspects for enhanced research confidentiality and perfection. For the waveform analysis, we studied cooking sounds and eating sounds. Food name speaking sounds were excluded as they are nouns referring to product names. We selected 2 sound samples of cooking and eating, respectively for analysis and to find out common aspects and their significance. For cooking sounds, we chose a stew boiling sound and cutting board sound and for eating sounds, we selected a snacking sound and apple eating sound.

Figure 1 is a diagram comparing the spectrums of two cooking sounds of cutting board sound and stew boiling sound. Figure 2 compares the spectrums of two eating sounds of snacking and apple eating sounds. The results, as shown in the spectrum above, are repeated and small but regular in common.

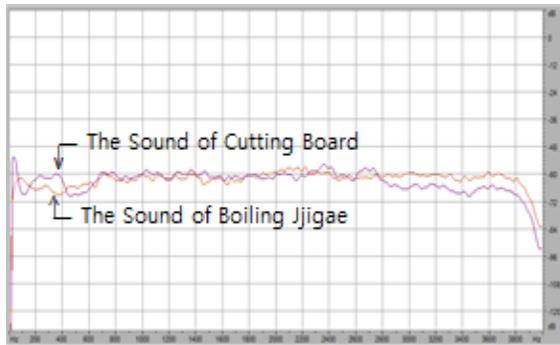


Fig 1. Waveform comparison of two cooking sounds

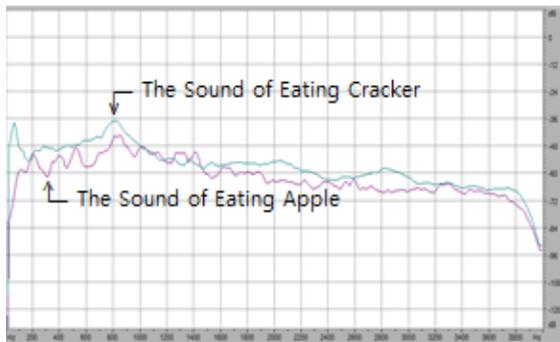


Fig 2. Waveform comparison of two eating sounds

From these results, it was found that the regular and repeated sounds arising from the process of cooking or eating can help people have the sense of comfort and stability on a continued basis. And it was also found that people tended to link their previous information on the food gained through five senses (senses of taste, sight, hearing, touch and smell) to sustain the association process for longer enjoyment. Such a regular sound repetition and easy and comfort sound is expected to bring about some hypnosis effect to stimulate appetite.

The following figure shows the process that the selected appetite-stimulating sound samples are delivered to the brain through ears to reach the secretion of Ghrelin, an appetite-stimulating endocrine hormone, and amylase enzyme from salivary gland and the return of such processes to the cerebrum to prepare for food intake. An appetite-stimulating sound (sound source) reaches the brain part that controls hearing through B process and is controlled and read by the mid-brain through the auditory nerve in b process. The analyzed appetite-stimulating sound recalls memories and experiences through cerebrum memory part in the process c during delivered to the cerebrum and stimulates (DOI: dx.doi.org/14.9831/1444-8939.2014/2-5/MAGNT.14)

stomach and pancreas in the process d by generating conditional reflex.

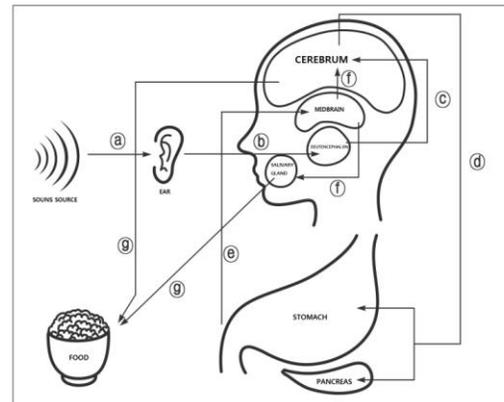


Fig 3. Human body response to appetite-stimulating sounds

The stimulated pancreas secretes Ghrelin and it is read by the appetite-controlling part of the deutencephalon through the process e and delivered to the process f to stimulate cerebrum motor center and salivary gland. Salivary gland releases amylase to prepare for digestion and the stimulated cerebral motor center orders sense organs to pursue an action to satisfy appetite.

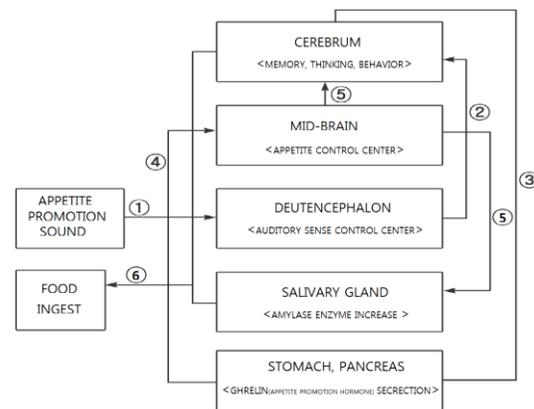


Fig 4. Flow chart on human body response to appetite-stimulating sound

Following the order of the numbers, an appetite-stimulating sound is sensed by the midbrain through ears. The hearing center of the brain reads the sound and delivers to the cerebrum. The cerebrum recalls the sound memories and triggers conditional reflex. Through the conditional reflex, stomach and pancreas generate Ghrelin. Ghrelin stimulates appetite center of

the deutencephalon and activates cerebrum and salivary gland the need to eat food. Cerebrum activates its motor center to eat food and salivary gland secretes amylase for digestion in advance.

3. Investigation & Review

As a result of our investigation and review for validity of the study on the selected appetite-stimulating sound waveform analysis and human body response, we could present some ways of using the research findings into practical use. The suggestions are grouped into four large categories – appetite stimulation for patients, national health improvement, good or restaurant advertisement effect and inverse thought provocation for effective diet. First of all, for patients' appetite improvement, we can discuss appetite treatment for patients who lost their appetite due to diseases to the extent of nutrition disorder, anorexia patients (who have anorexia nervosa that makes them extremely refuse food until they lose at least 15% from their normal weight) senile and other nutrition disorder patients. In case of anorexia patient, in particular, as their reasons and ways of refusing food could vary and their sound-based appetite promotion effects could also different, continued and diversified appetite-stimulating sounds should be developed for their effective conditional reflex. Second is national health promotion effect. South Korea is surveyed and found as a country with longest working hours among the OECD members. And the country was also found to have the shortest dining time, the largest number of office employees who skip breakfast and lots of poorly-fed children. There could be some who skip their breakfast for financial reasons but more are skipping for time pressure for work or school. But a more serious problem is there are still a lot of people who skip meals for weak appetite due to work or study stresses. If it is a financial problem, one can always borrow money to eat or if it is a time problem, one can always have some food whenever they find some time. But appetite loss due to overstress from work or study, depression and sense of loss from the fall of national happiness is a huge social loss. That is, it could result in national productivity fall and international competition drop. To address such a problem, more researches on appetite-stimulating sounds need to continue and put their results into

practice will help improve nationwide appetite for better health and brighten the future of the country by strengthening up our next generational physical health. Third, food or restaurant advertising effect can be gained through mass media or on the spot through simple speaker system. Sound in any food advertisement plays an absolute important role. The sound of sparkling along with the coke bottle opening sound provokes the craving to drink right now to resolve thirst. The sound of slurping up instant noodles may drive people feeling hungry slightly at night to the limit of their patience. Such sounds are frequently found in many advertisements. These effects could also be enjoyed outside mass media commercials, such as offline restaurants in neighboring areas. Install speakers outside a restaurant and deliver the cooking sound of the kitchen in real time. Then passers-by can stop. Finally, there is diet effect via inverse thought provocation. This is a way of thinking sound-based appetite provocation in an inverse way. We can enjoy diet effect by using appetite-discouraging sounds. At the point of Ghrelin secretion increase in the body metabolic cycle, we can use appetite-killing sounds to decrease Ghrelin and increase Leptin, an appetite-controlling hormone. As such researches on appetite-stimulating sounds have large potential of commercial application to diverse areas, thus, there studies need continued research and development efforts and promotion. Such sounds can also be developed as a smart phone application.

5. Conclusion

This study is performed to develop appetite-stimulating ways for patients with anorexia or other diseases caused by inappropriate diet, or patients with senile or other nutrition disorders. The waveforms of appetite-stimulating sounds were analyzed and found that calm, regular and repeated sounds accompanied the senses of stability, comfort and rhythm. Such kinds of sound helps provoke continued association process and hypnosis effect of appetite stimulation. The human body response to an appetite-stimulating sound was studied based on the principle of Pavlovian canine conditioning experiment. As a result, an appetite-stimulating sound is picked up by the brain's auditory center and linked to association process to recall food-related previous experiences

and memories until stimulate appetite. We, also, in this research, found that these study findings can be put into practical use with a view to treating many modern-day dietary problems and side effects. First of all, we suggested the possibility of treating anorexia patients or those with lack of appetite or nutrition disorder, etc. and second, we pointed out the national health improvement effect. And third, from an economic point of view, we mentioned food or restaurant advertisement effect. Finally, by inverting the appetite-stimulating effect, we can use appetite-dropping sound for effective weight loss efforts. By linking the food-related sounds with the brain's association process, researches on appetite-stimulating sounds need to be regarded as a way of promoting appetite and continued for practical use for national health improvement and economic development.

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