

# Discovery of Comfortable Music from Brain Waves

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## Purpose

- We expected that there is a rule in comfortable music such as background music (BGM) at hospital.
- We want to write music which has a relaxing effect by using the rule.
- $1/f$  noise has already been used. In addition,  $1/f$  noise can measure only "song unit". So we chose using brain waves.
- First, we started trying to specify the most effective chord (by using the index of brain waves.)

## Result

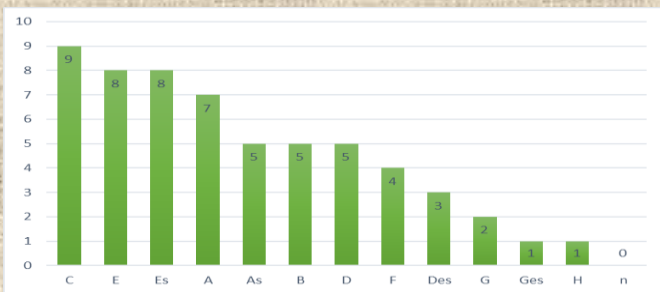


Figure1 : questionnaire

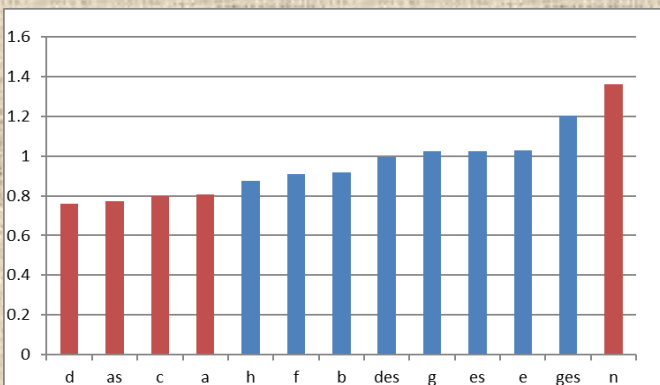


Figure2 : X of  $\beta_1$

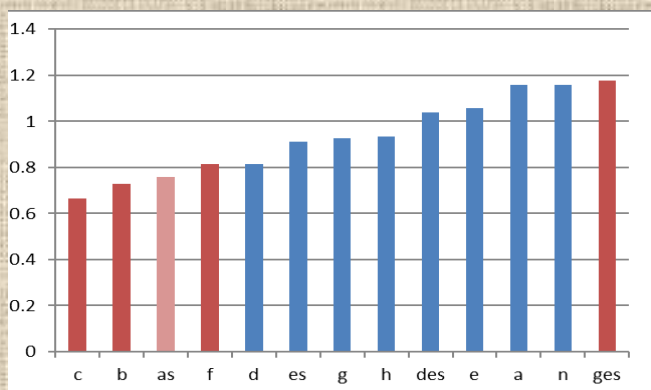


Figure3 : X of  $\beta_2$

## Method

- ① Subjects undo puzzle rings for 20 second.
- ② They listen to cadenzas (successive chords with sound which is the center of the scale).
- ③ They answer the questionnaire.  
Repeat ①~③ 4 times.  
<During ①②, we measured subjects' brain waves ( $\alpha_1, \alpha_2, \beta_1, \beta_2$  wave).>
- ④ The proportion of the value undoing puzzle ring to the value listening to cadenza is 1 to X. We compare each X.

## Consideration

<Cadenzas and a relaxing effect>

- Subjects felt comfortable when they listened to a cadenza but not during silence.(Figure1)
- Silence doesn't reduce stress as well as cadenzas.(Figure2)

⇒ **Cadenzas have a relaxing effect.**

<The most effective cadenza>

- On the bases of  $\beta$  relative value, there are significant differences among cadenzas by doing T.TEST.  
→ **Either C or As is the most effective cadenzas.**
- On the bases of questionnaire, C is better than As.  
⇒ **C is the most effective cadenzas.**

## Perspective

In this experiment, we can't use  $\alpha$  wave because subjects concentrate on the puzzle ring. By changing the process, we may be able to use  $\alpha$  wave.

With more trial, we may be able to get more data to conclude this study precisely.

## References

「 $1/f$  ゆらぎと生物に関する数理的研究」

<http://www.nagano-c.ed.jp/seiho/risuka/2008/2008-08.pdf>