



## Comparing and Localizing the Effect of Musical Stimuli on the Brain

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## Introduction

- What is known:
  - Musical perception seem to be a exclusively human cognitive skill
  - Musically sophisticated people (S) prefer complex (e. G. Classical or Jazz music), while musically non-sophisticated people (NS) prefer highly repetitive rhythmic music.
  - Assumed that sexual hormones have influence on sophistication (increased testosterone in females, decreased in males)
  - Musical perception differs stongly between subjects

## Introduction

- What is unknown:
  - Exact location of musical abilities in the brain
  - Distribution and intensity of brain activity of S and NS when stimulated with complex and "rhythmic" music

## Objectives

- Get further insight on the location of brain activity while exposed to different kinds of music
- Measure difference of intensity of musica stimuli in subjects when exposed to their favored vs. their unfavored type of music.

## Hypothesis

- Exposure to complex music:
  - S: **increase** of brain activity
  - NS: **decrease** of brain activity
- Exposure to rhythmic music:
  - S: **decrease** of brain activity
  - NS: **increase** of brain activity
- Distribution of brain activity is wider in S when exposed to complex than that of NS when exposed to rhythmic music

## Materials & Methods: Subjects

- 100 subjects with musical sophistication
  - Composers
  - Highly talented adolescents
  - Conductors
- 100 subjects without a special sophistication
  - Desirably with affections to different kinds of rhythmic music

## Materials & Methods: Paradigm

- 4 sessions per subject á 10 minutes
- 1<sup>st</sup> and 3<sup>rd</sup> session: rhythmic music
- 2<sup>nd</sup> and 4<sup>th</sup> session: complex music
- Brain activity measured by fMRI
- Subject get hears music using headphones
- Audio quality has to be excellent to maximize impact

## Problems

- fMRI environment is not the optimal environment to enjoy music, effect might be impaired
- Even between subjects of similar musical taste the internal observable perception is expected to differ vastly.

## References

- *Perception of Music and Dimensional Complexity of Brain Activity*  
N. Birbaumer et al.
- *Mapping the musician brain*, Human Brain Mapping, 1, 20-39  
Sergent, S. [1993]