

# The influence of group settings on music listening: a physiological and psychological perspective on emotion

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## 1. Background and Aims

Music has often been shown to induce pleasurable **emotional responses**, including ecstatic **chill** experiences (Sloboda, 1991; Panksepp, 1995). These reactions are often accompanied by measurable physiological reactions, such as changes in skin conductance, in heart and breathing rate (Grewe, Nagel, Kopiez & Altenmüller, 2007; Krumhansel, 1997). Generally, emotions are regarded as consequences of a cognitive appraisal process (Scherer, 2004), but **social influences** on this appraisal have seldom been investigated in connection with music.

Nevertheless there are many social factors related to music: e. g., peer groups determining preferences, collaboration processes of musicians or audiences **listening together as a group** to music performances (North & Hargreaves, 2008). The latter factor will be investigated in the study presented. Here the question will be, how the **mere presence of others**, similar to a concert setting, influences emotional experiences during music listening. Doing so, as a first pilot study, emotional responses will be recorded **in parallel from 14 participants**.

## 2. Method

The **14 participants** were members of an amateur orchestra to increase the level of group cohesiveness (7 male, 7 female; mean age 29 years, SD = 10.5 years, range 22-63 years). They came in for **two testing sessions**: once **alone**, and once as a **group**. Participants were randomly divided into two groups: one came in for the single session first, the other for the group session. In the group setting they were seated in a circle of armchairs (Fig. 1).

When a **chill** (defined as goose bumps or shivers down the spine) was experienced, subjects were instructed to **press a button** of the **GORDI** (Kopiez & Wolf, 2003) – a device recoding button presses from all 14 subjects in parallel.

For **physiology** a self developed **16-channel Skin Conductance Response (SCR) measuring device** was used: Electrodes were placed on the non-active hand. Stimuli were 10 musical excerpts previously shown to contain chill-inducing musical parameters (Grewe et al., 2007) each 60 sec long (see Table 1). For both listening conditions (alone/group) the presentation order of the pieces was the same.

Table 1: Music pieces used as stimuli.

Presentation No.	Composer	Piece
1.	Bedřich Smetana	"The Moldau"
2.	Ludwig v. Beethoven	Piano Concerto No. 5 (3. movement)
3.	Jean Sibelius	"Finlandia"
4.	Alan Silvestri	"Forrest Gump Suite"
5.	Wolfgang A. Mozart	Requiem d-minor: "Lacrimosa"
6.	Felix Mendelssohn	"Hebriden"
7.	Edward Elgar	"Nimrod" from the "Enigma Variations"
8.	Klaus Badelt	"The Medallion Calls"
9.	Richard Wagner	"Lohengrin" Overture
10.	Rolf Lovland	"Serenade to Spring"



Figure 1: Photograph of participants in the group listening setting.

## 3. Results

For every chill event to be taken into account, the corresponding button press had to be accompanied by a SCR peak. Averaged over all pieces, the **mean number of chills** per piece was 0.35 in the alone and 0.1 in the group setting (Fig.2). A Wilcoxon-Test showed, that there was a **not significant trend towards more chills in the alone setting** ( $p = .091$ ).

Looking only at the **SCR data during button presses** of chills revealed that the median SCR peak during the **alone** condition was **significantly higher** compared to the **group** setting (Fig. 3, Random-Permutation-Tests with 5000 permutations (Good, 1994)).

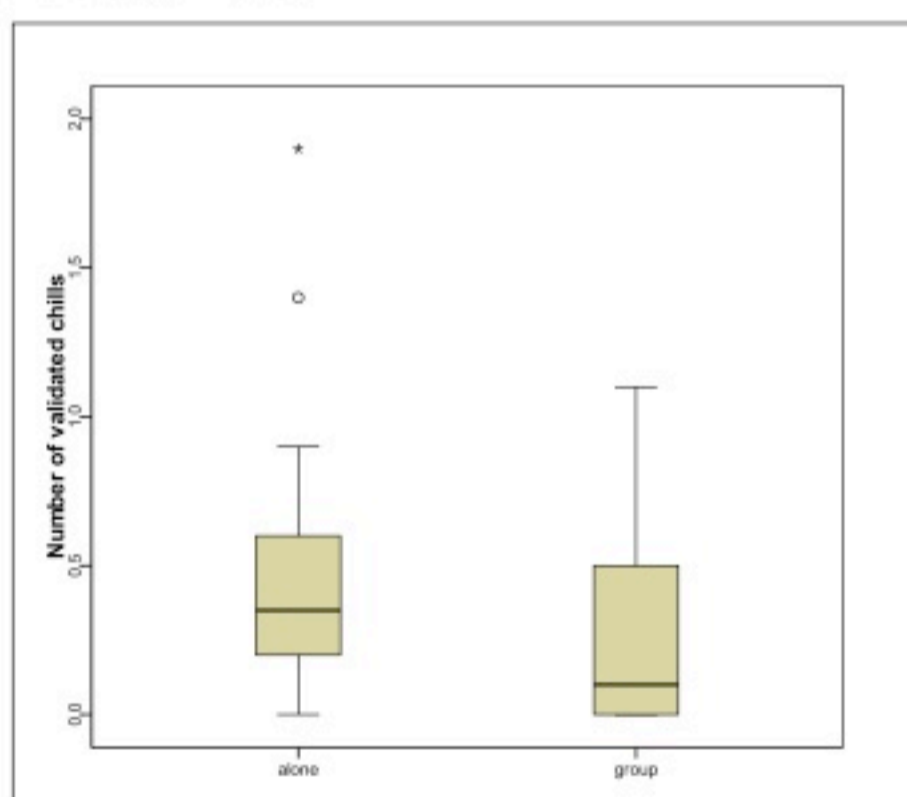


Fig. 2: Box plot of the averaged number of chills per piece and participant compared between the two conditions alone and group.

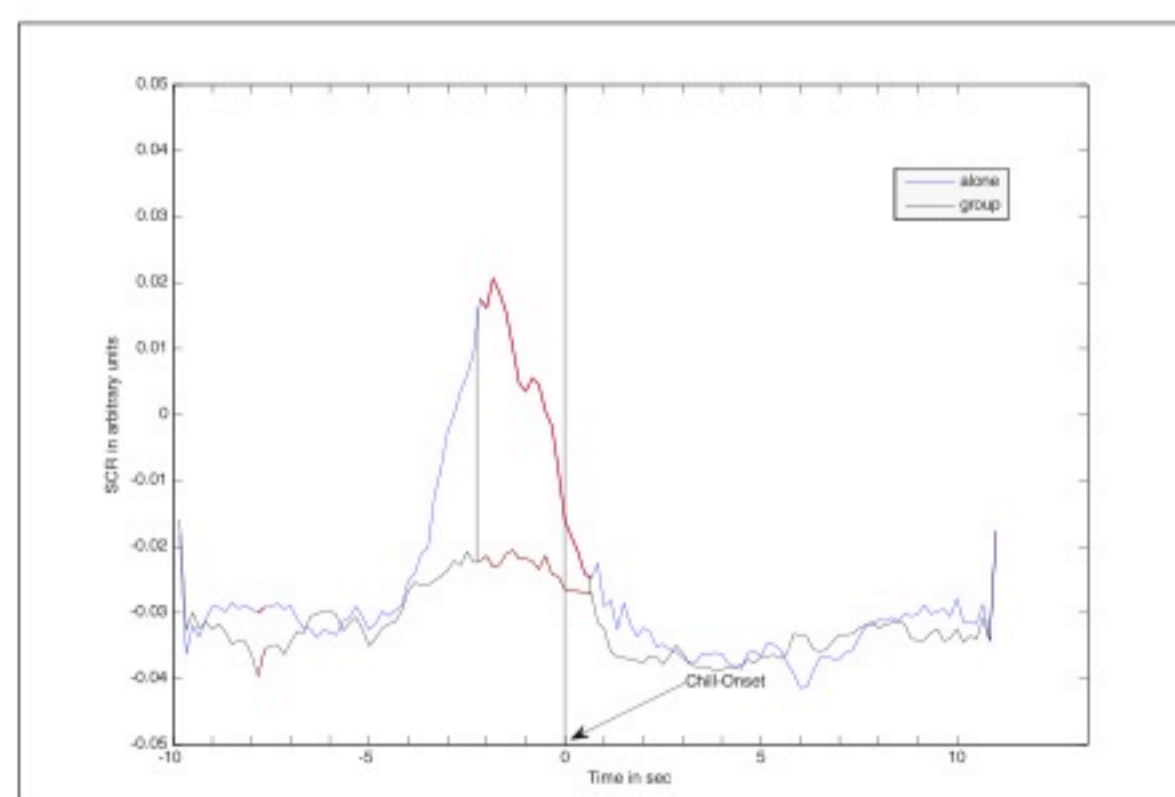


Fig. 3: Median of SCR during reported Chill-Onset separated by condition group (91 events) and alone (134 events). The blue line represents the median of the single setting, the dotted black line the median of group setting. Significant differences are highlighted in red.

## 4. Conclusions

Using this new explorative method, emotional measurements showed that listening to music **alone** was **more arousing** compared to the group setting: Although only a non-significant trend, subjects showed to have more chills alone. But as well, the SCR during chills was significant higher. So **sympathetic arousal** during chills was higher for single listening. Our results might be explained by the following aspects:

(a) Subjects received **not any explicit social feedback** from the fellow subjects. They did not know how the other subjects were feeling. So no direct emotional contagion could take place and social appraisal (Manstead & Fischer, 2001) was decreased.

(b) The fact that reports were given privately might also have had lead to an other well studied phenomenon: The so called **social loafing theory** predicts, that tasks carried out in a group lead to a lowered arousal when no direct control of each group member's output is observable.

(c) It might have been an unrealistic or artificial group context to listen to the music sitting in a circle connected to the SCR amplifier. So subjects might have been **not concentrating** enough on the music when listening to it in the group. Grewe et al. (2007) emphasized the importance of attention for genesis of emotion and chills.

### References

- Grewe, O., Nagel, F., Kopiez, R., & Altenmüller, E. (2007). Listening to music as a re-creative process – Physiological, psychological and psychoacoustical correlates of chills and strong emotions. *Music Perception*, 24(3), 297 - 314.
- Good, P. (1994). *Permutation Tests: A Practical Guide to Resampling Methods for Testing Hypothesis*. New York: Springer.
- Kopiez, R. & Wolf, C. (2003). The Group Online Response Digital Interface (GORDI) as a tool for online measurement of music perception. In R. Kopiez, A. Lehmann, I. Wölfler & C. Wolf (Eds.), *Proceedings of the 5th International Conference of the European Society for the Cognitive Sciences of Music (ESCOM)*, Hannover, 8-13. September 2003, p. 340 [CD-ROM].
- Krumhansel, C. L. (1997). An exploratory study of musical emotions and psychophysiology. *Canadian Journal of Experimental Psychology*, 51(4), 336-353.
- North, A. & Hargreaves, D. (2008). *The Social and Applied Psychology of Music*. Oxford: Oxford University Press.
- Panksepp, J. (1995). The emotional sources of "Chills" induced by music. *Music Perception*, 13(2), 171-207.
- Scherer, K. R. (2004). Which emotions can be induced by music? What are the underlying mechanisms? And how can we measure them? *Journal of New Music Research*, 33(3), 239-251.
- Sloboda, J. A. (1991). Music structure and emotional response: Some empirical findings. *Psychology of Music*, 19, 110-120.