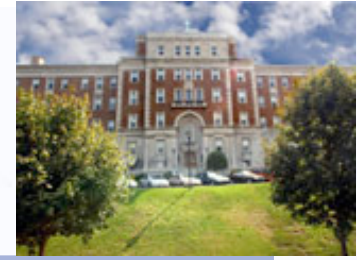




Hochschule
für Musik und Theater
Hannover

Workshop: Music and Pain

BRAMS -- Montreal



Music, Pain and Emotions – Neurobiological
Mechanisms and Applications.

Eckart Altenmüller,

Institute of Music Physiology and Musicians' Medicine (IMMM)
Hannover University of Music and Drama

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www.immm.hmt-hannover.de





Structure

- Some remarks on chronic pain
- Some remarks on music therapy
- Neurobiology of „psychodynamic“ music therapy
- Chill, Trance, Creativity
- Pain in musicians
- Summary and outlook



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Some remarks on chronic pain

- Chronic pain is pain lasting longer than 3 months

From Herta Flor,
EMBO Reports 2002



Some remarks on chronic pain

- Chronic pain is pain lasting longer than 3 months
- It may begin with acute pain

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- However, is not self-limiting and does not signal a specific nociceptive event

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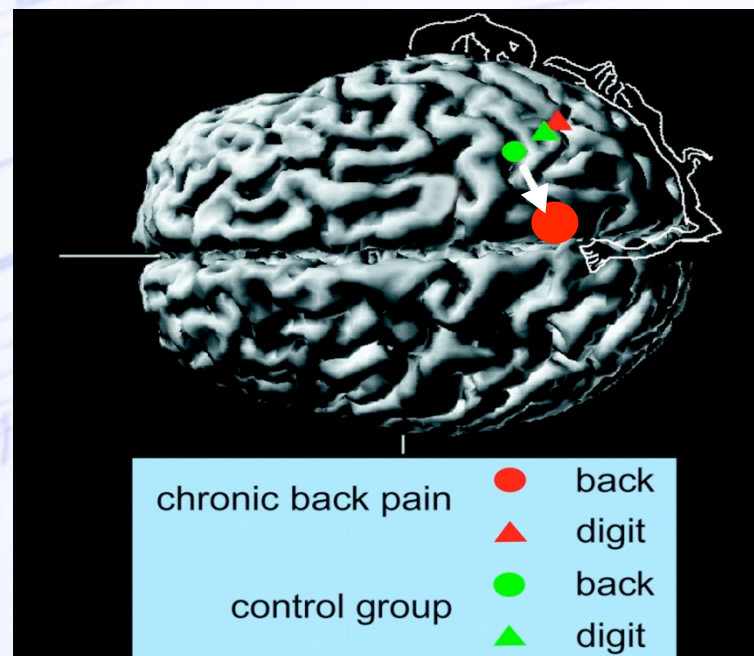


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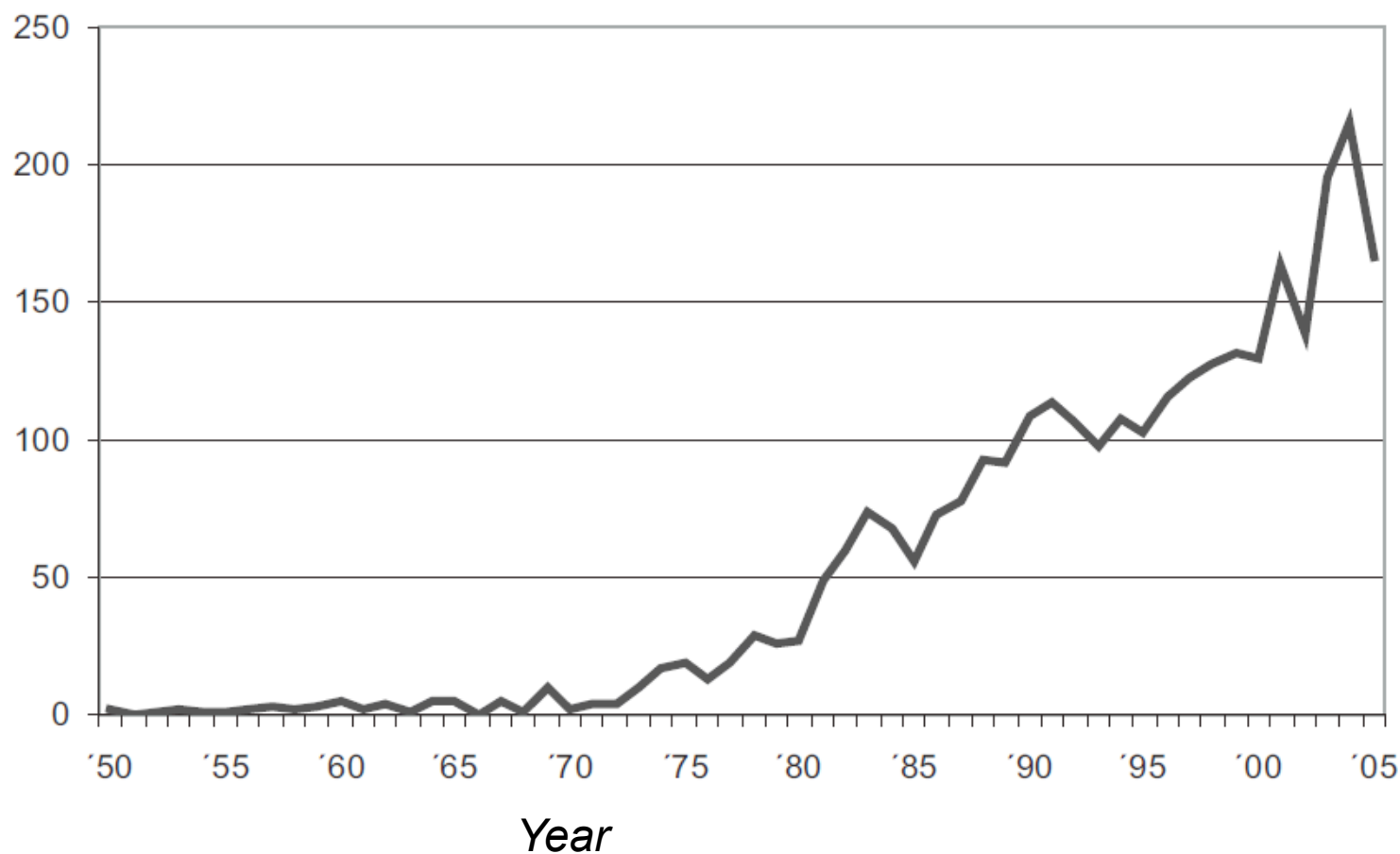


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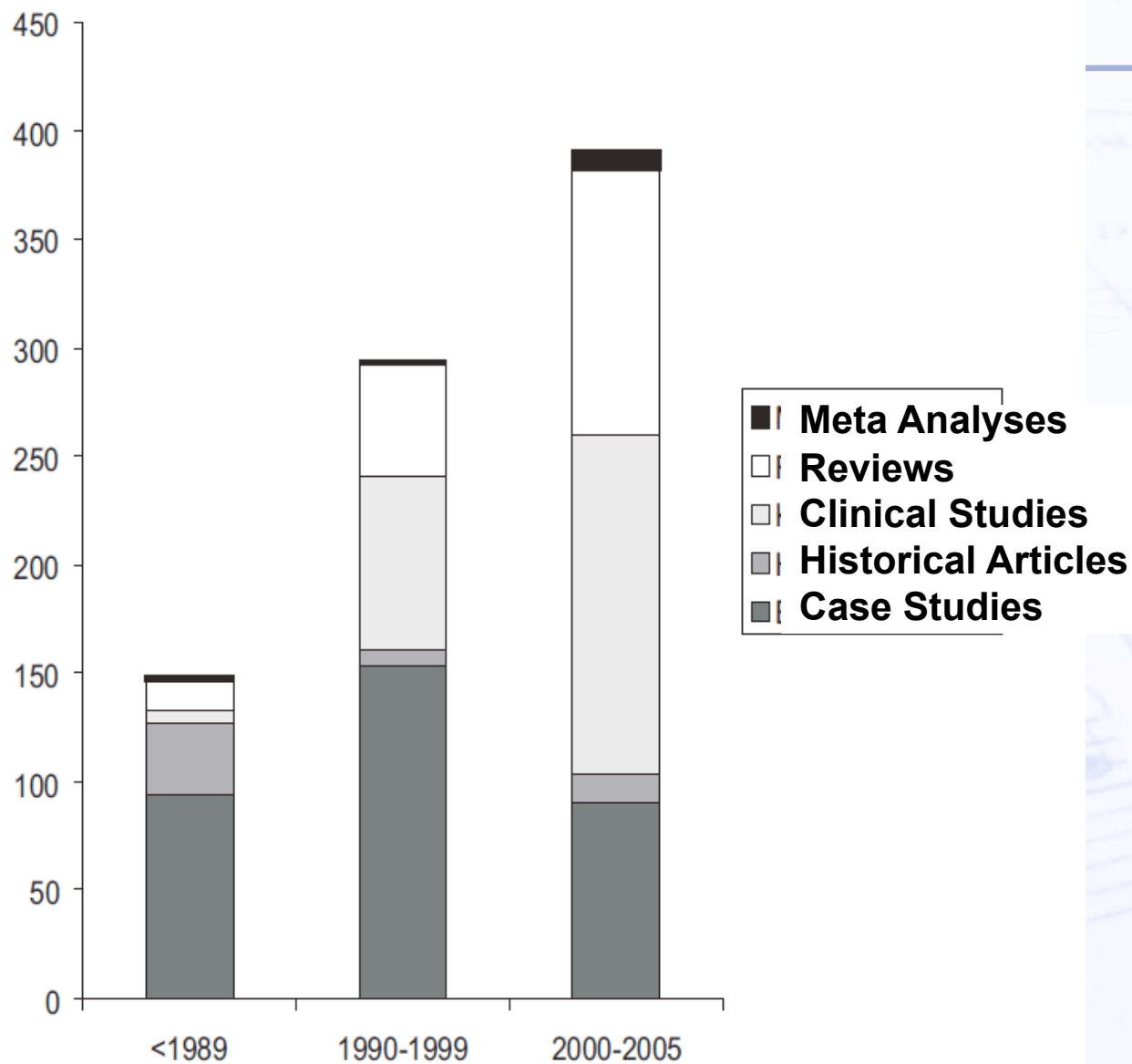
Number of Publications on Music Therapy



Sources: *Psycindex, PsychInfo, PubMed, Medline*



Type of Publication (1900-2005)





Receptive Music Therapy for pain relief

The „Cochrane verdict“

Music should not be considered a first line treatment for pain relief as the magnitude of its benefits is small. Listening to music for treatment of pain offers potential advantages of low cost, ease of provision, and safety.

Receptive Music Therapy for pain relief

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Music should not be considered a first line treatment for pain relief as the magnitude of its benefits is small. Listening to music for treatment of pain offers potential advantages of low cost, ease of provision, and safety.

This systematic review included 51 studies involving 3663 subjects.

The review authors found that music reduced pain, increased the number of patients who reported at least 50% pain relief, and reduced requirements for morphine-like analgesics.

However, as the magnitude of these positive effects is small, the clinical relevance of music for pain relief in clinical practice is unclear

Cepeda et al. 2006: Cochrane Review

PubMed-Search (2/2009):

Key-words:

Music therapy, chronic pain, prospective study

overall only 3 articles!

only one applying active music therapy:

Müller-Busch HC et al. Schmerz. (1997)

Hypothetical Design: A Prospective randomized clinical trial

1.) Recruiement of patients

(large number, homogenous with respect to diagnostic, social, educational background)

2.) Meaningful „pre-“ diagnostic measures (objective?)

3.) Randomized assignments to groups

Group 1
Intervention 1

Standard-
therapies

Group 2
Intervention 2

Standard-
therapies

Group 3
Empty controls

Standard-
therapies

4. Meaningful „post“ diagnostic measures (blinded evaluators)
(Life Quality, Pain-Questionnaires etc.). Objective Measures

5.) Long-term outcome and sustainability

Multiple Long-Term Measures



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„Mental Models“ or „Conceptions“ of Active Music Therapy in Pain: How does it work?

Mahns 1996	Bolay et al.1999	Thaut et al. 2009
„Medical Model“	„Depth-psychology model“	Neurologic Music Therapy (NMT)
„Psychodynamic Model“	„Cognitive-behavioral therapy“	
„Social Learning Model“	„Gestalt-Therapy“	
„Humanistic Existentialist Model“	„Emotional activating Therapy“	

„Psychodynamic“ Model of Music Therapy in chronic pain (after Müller-Busch)

Suggestive effects

Aesthetic Experience

CNS:
Perception
Sensorimotor
Modulation
Autonomic
responses

Behaviour:
Social Interactions
Social Competence

Imaginations

Creative Activity

Emotional Stimulation

Consciousness:
Feelings
Pain evaluation
Attention focus

Communication and Interaction

Awareness of hidden
conflicts



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Chill Theories

Chills related to
FIGHT reaction

e.g., David Huron

Chills related to
SEPARATION CALL

e.g., Panksepp

Chills related to
AESTHETIC AWE

e.g., Konečni





Examples for Chill-Music





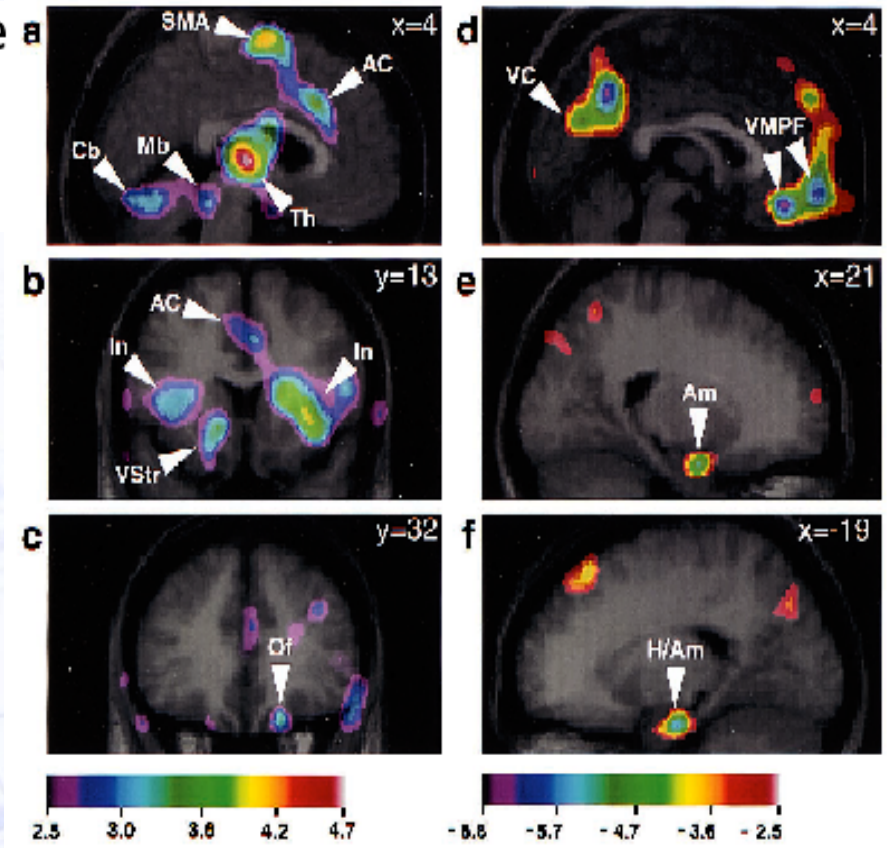
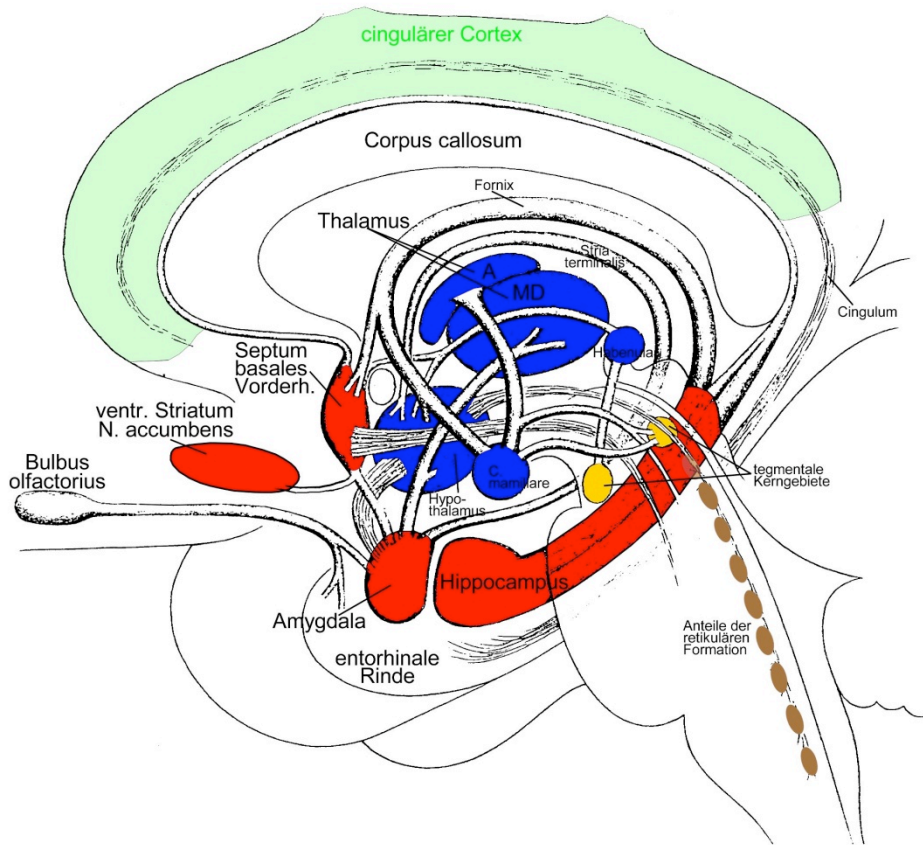
Examples for Chill-Music



Intensely pleasurable responses to music correlate with activity in brain regions implicated in reward and emotion

Anne J. Blood* and Robert J. Zatorre

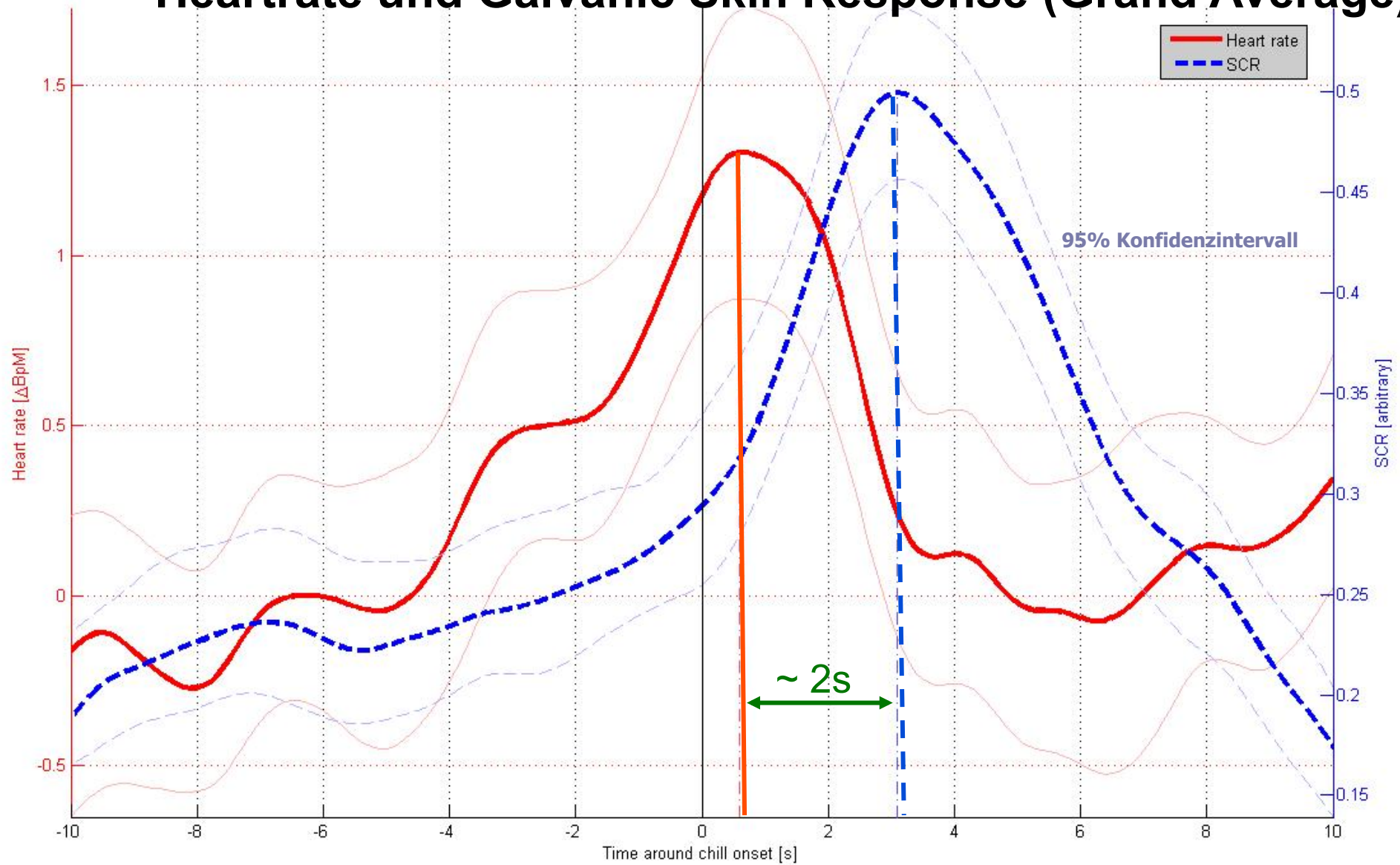
PNAS | September 25, 2001 | vol. 98 | no. 20 | 11819



Positive correlation Negative correlat.
with chill intensity

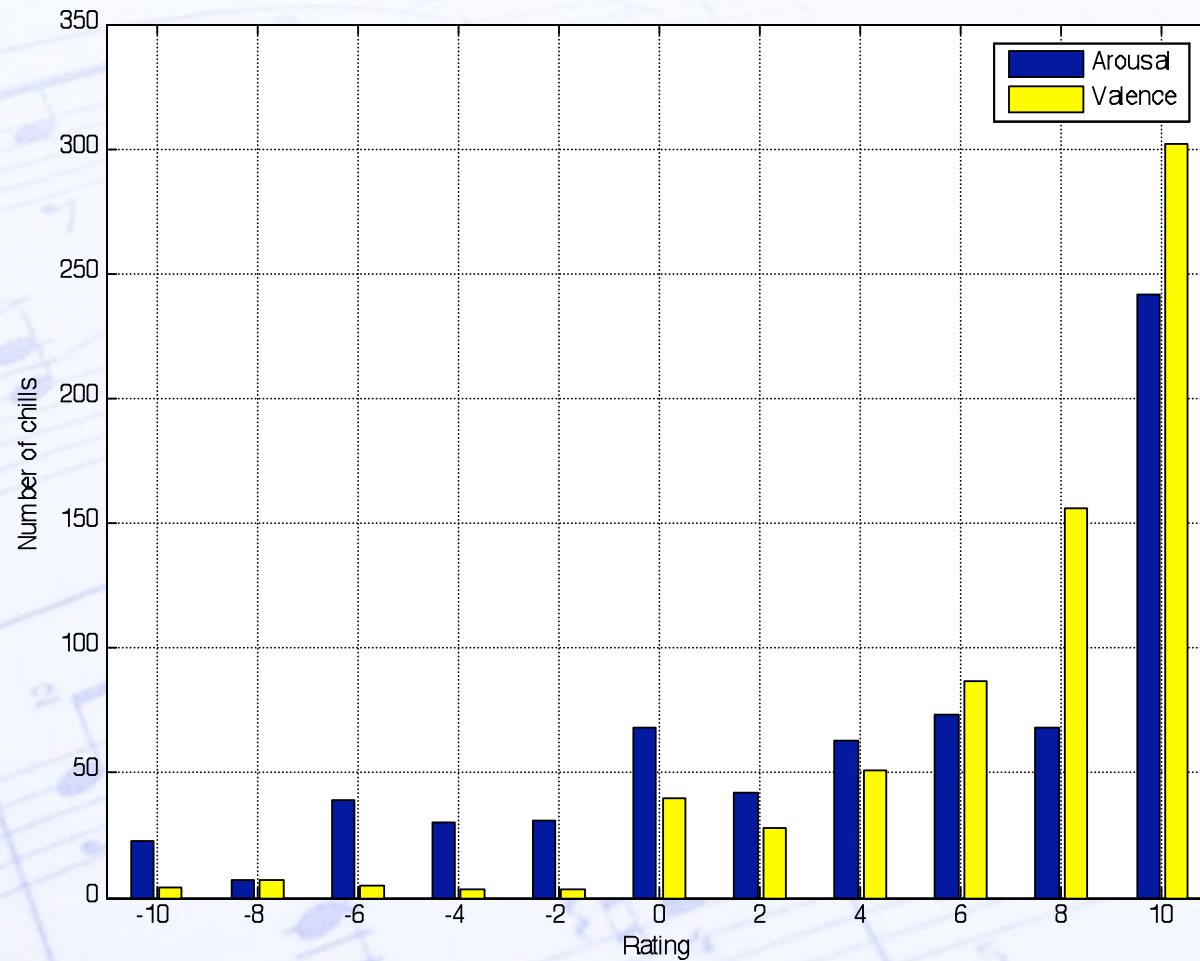
= Regions related to opioid-mediated reward, to dopamin-mediated motivation

Psychophysiological correlates to Chill-Reactions: Heart rate und Galvanic Skin Response (Grand Average)





Mean Arousal und Valence in self reports: A 20 seconds window around the „chill response“





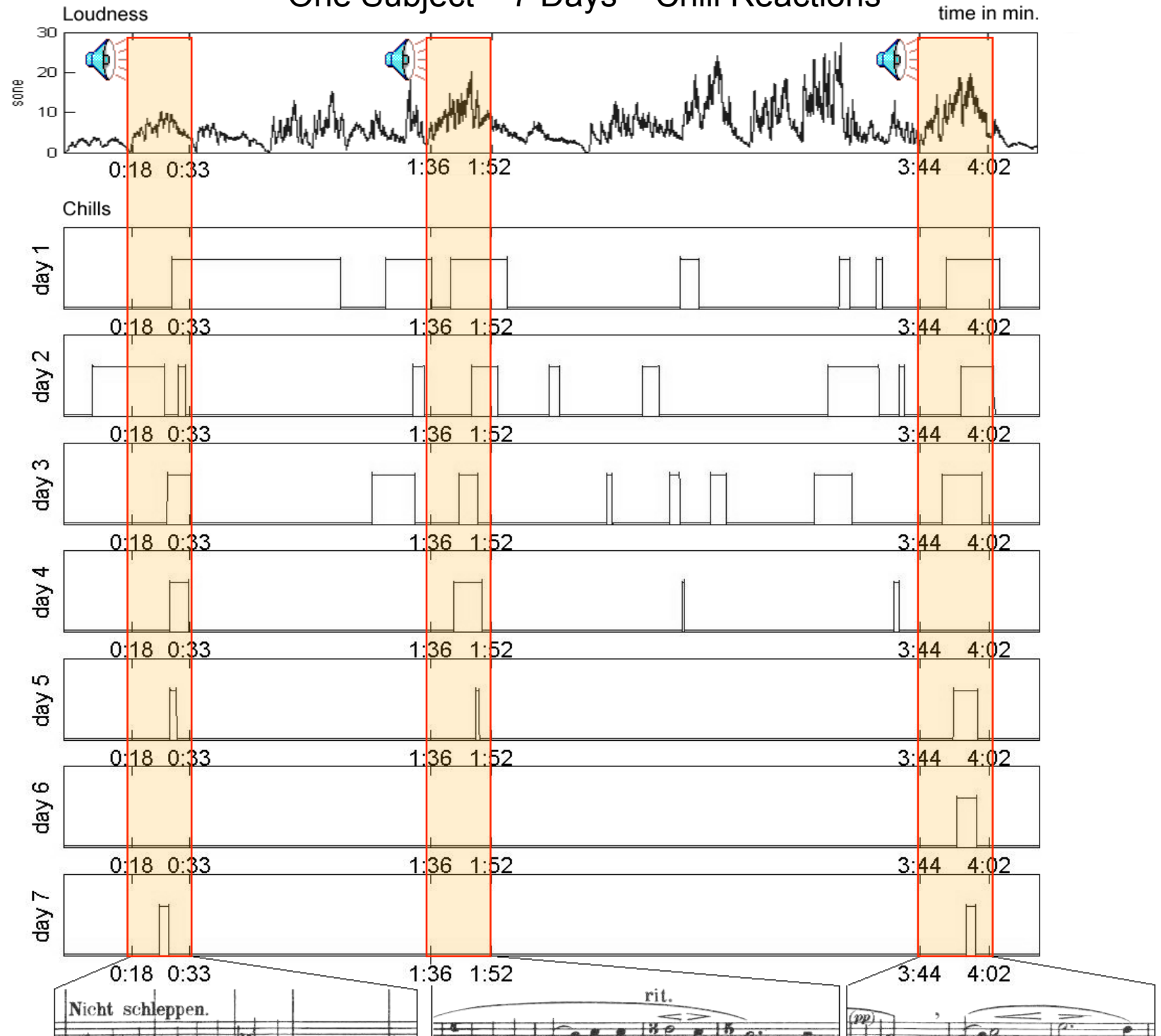
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Mahler

Symphony No.2
4th movement

“Urlicht –
Oh Röslein rot”

One Subject – 7 Days – Chill Reactions



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Satie's Vexations: to be played 840 times

Theme



Variation 1



Variation 2



28 Hours





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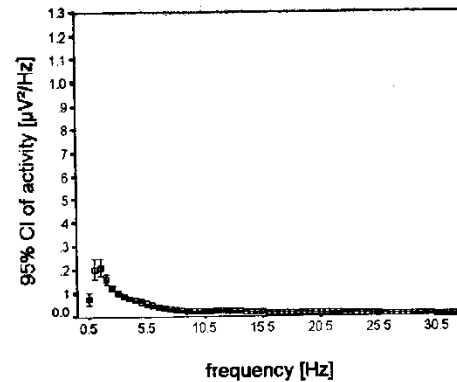
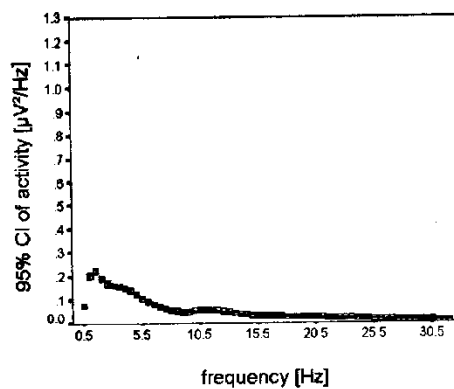
Armin Fuchs – the Pianist



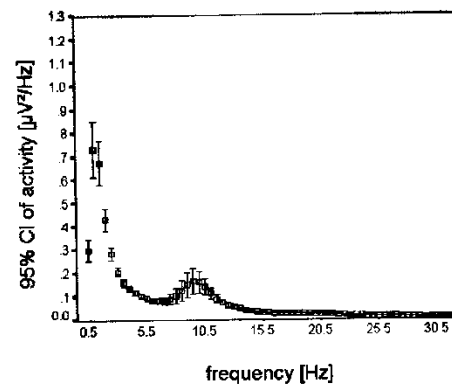
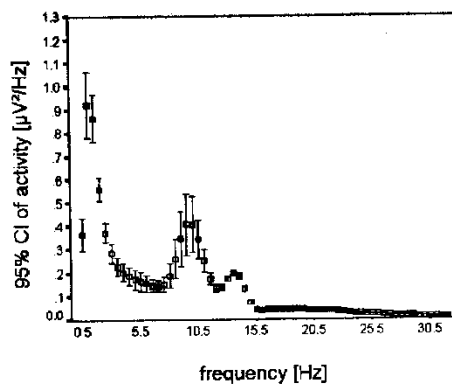
Left parietal region

Right parietal region

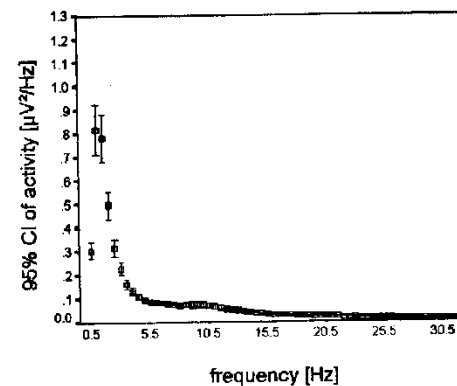
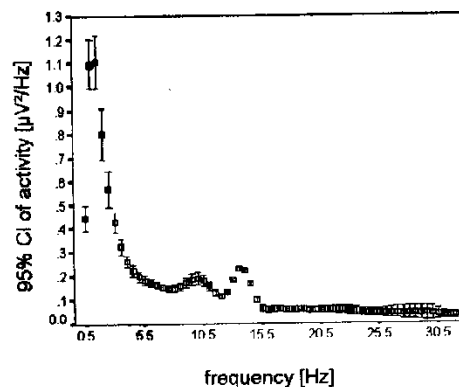
Wakefulness



Trance



Fatigue



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Alexander Nicolayevitch Scriabin



At age 15 (1887)



At age 37 (1909)

Alexander Scriabin

6. 2. 1872

born in Moscow

Early signs of musical giftedness

Summer 1891

Tries to improve sonority by “deep touch”. Practices Liszt Don Juan-Fantasy - Consequence: severe pain in the right arm
Stops playing with the right hand, develops left hand.
Right hand feels stiff, whenever he takes up piano playing

1891-1894

Concert travels have to be postponed
Tries several cures in Russia (cumiss cure in Samara: bored)

1894

Composes Prelude (and other works) for the left hand

1895

Triumphant concerts with both hands, but hesitant with longer practice times

16. 5. 1896

Visiting Dr. Erb in Heidelberg: prescribes hydrotherapy
(In Switzerland, Scriabin is extremely bored!)

From then: Uses pain as excuse for concert cancellations



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PRÉLUDE Alexander Scriabin (1872-1915)
op. 9 Nr. 1
Herausgegeben von Wladimir Pohl

Andante

linke Hand

p

* Ped. * Ped. * Ped. * Ped.

cresc.

f *dim.* *p*

cresc. *cresc.*

M. P. Belaieff Nr. 148 1200

© 1940 by M. P. Belaieff
© renewed 1968 by M. P. Belaieff



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Financial
Times,

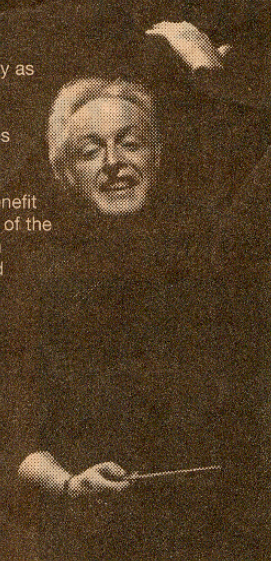
27 Juli 1994

FINANCIAL TIMES MONDAY JUNE 27 1994

OPENINGS

BERLIN

Regarded by many as the greatest living conductor, Carlos Kleiber joins forces with the Berlin Philharmonic tomorrow for a benefit concert in honour of the departing German president, Richard von Weizsaecker, at the orchestra's home in Berlin. The reclusive Kleiber, 63, sets such rigorous artistic demands that his appearances have become increasingly rare.



CHELTENHAM

For 50 years this spa town has offered a genteel ambience for a festival celebrating the work of living composers, mostly British. The highlights of this year's golden jubilee of the Cheltenham International Festival of Music include premieres from Judith Weir and Thea Musgrave. Visiting celebrities include Alfred Brendel and the Amsterdam Baroque Orchestra. A cycle of the Beethoven quartets and some touring opera and ballet vary the festival programme, which opens on Friday.



the diverse sounds of Bob Dylan (above left), Wynton Marsalis, the Attalla Superchoir and the opera orchestra of Marseille. A major highlight this year is the 50th anniversary celebrations of the Verve Label and the appearance of its entire roster on one bill across two nights.

ARTS

MONTREUX

The jazz glitterati meet the elder statesman of rock at the Montreux Jazz Festival, which starts on Friday. The lakeside Stravinski Hall

AMBASSADOR

Although 'Ole broadside on ended its exte David Mamet London stage Ross' recently Donmar Ware play, 'The Cry family betraya Wednesday a Theatre, starri (below left) an comedian Ed



Warning: music can damage your health

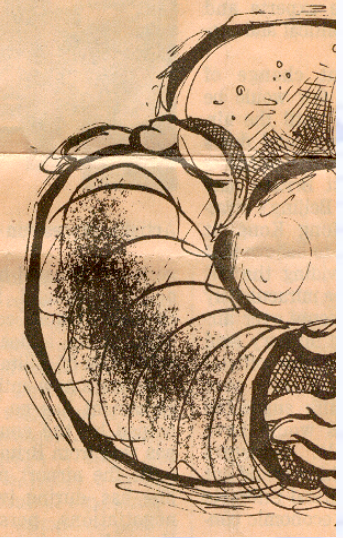
Muscle strain, alcoholism and stress-related illnesses are afflicting British orchestras, reports **Garry Booth**

Music hath charms to soothe a savage breast, to soften rocks, or bend a knotted oak, said Congreve. But it can have the opposite effect on the player. The mus-

the Royal Free Hospital in North London, runs the performing arts clinic there. He holds one session a month, which is consistently over-booked and currently has a three month waiting list. Most of the cases he sees, if not directly related

for string players) or the working environment.

Pit orchestras, such as the English National Opera, have special problems, elbow room being in short supply. Surprisingly, Dr James does not prescribe rest and



Medical Problems among Musicians

ICSOM-Study, 1987

(ICSOM: International Conference of Symphony- and Opera-Musicians)

- Musicians from 48 orchestras (USA)
- 2212 completed questionnaires were received and analyzed

76% of musicians reported at least one medical problem that was severe in terms of its effect on performance.

(Fishbein M, Middlestadt SE. Medical Problems among ICSOM musicians: overview of a national survey. Med Probl Perform Art 1988; 3: 1-8)

„Psychodynamic“ Model of Music Therapy in chronic pain (after Müller-Busch)

Suggestive effects

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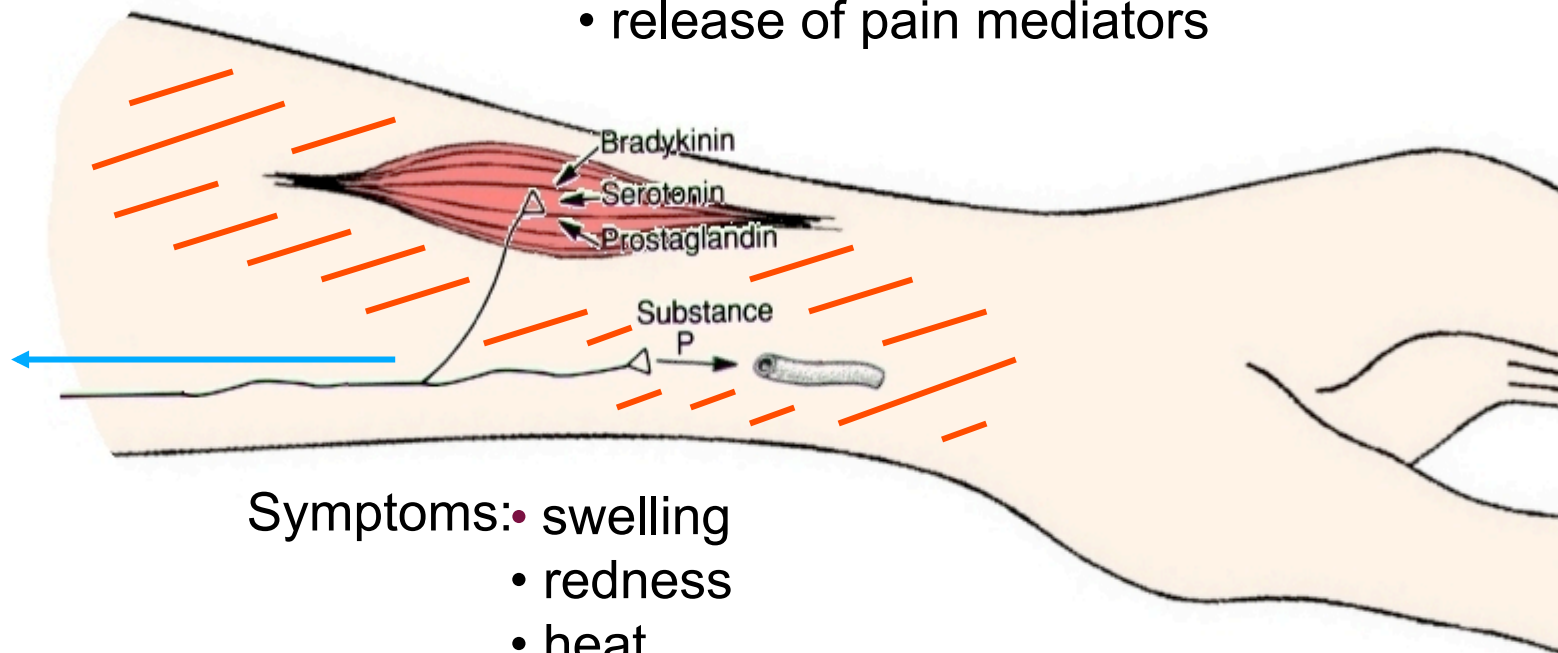
Awareness of hidden
conflicts



Pain-Mechanisms in the „Overuse-Syndrom“

Overuse of the musculoskeletal system causes

- local inflammation including
- release of pain mediators



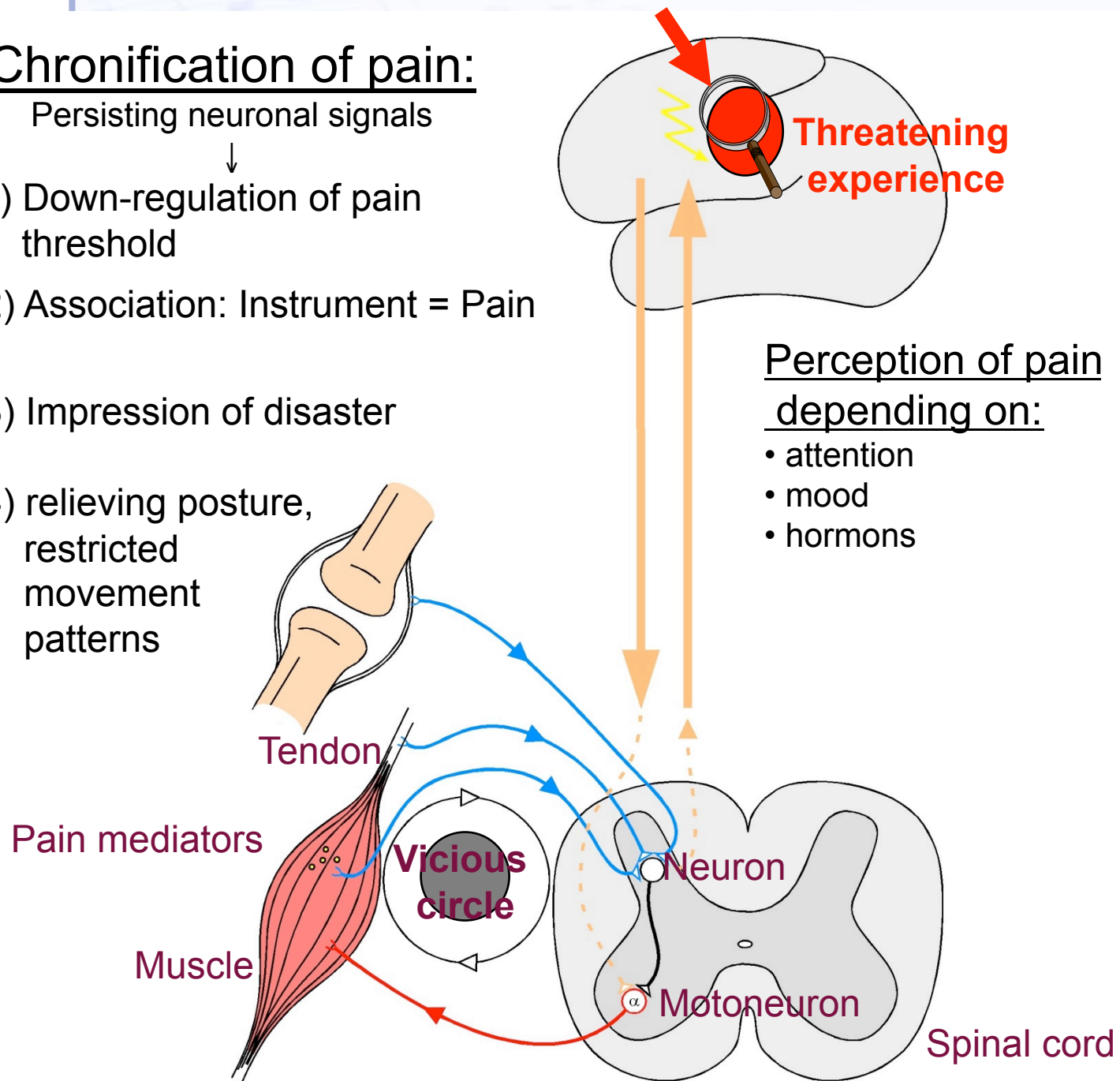
- Symptoms:
- swelling
 - redness
 - heat
 - impaired function
 - pain

Chronification of pain:

Persisting neuronal signals



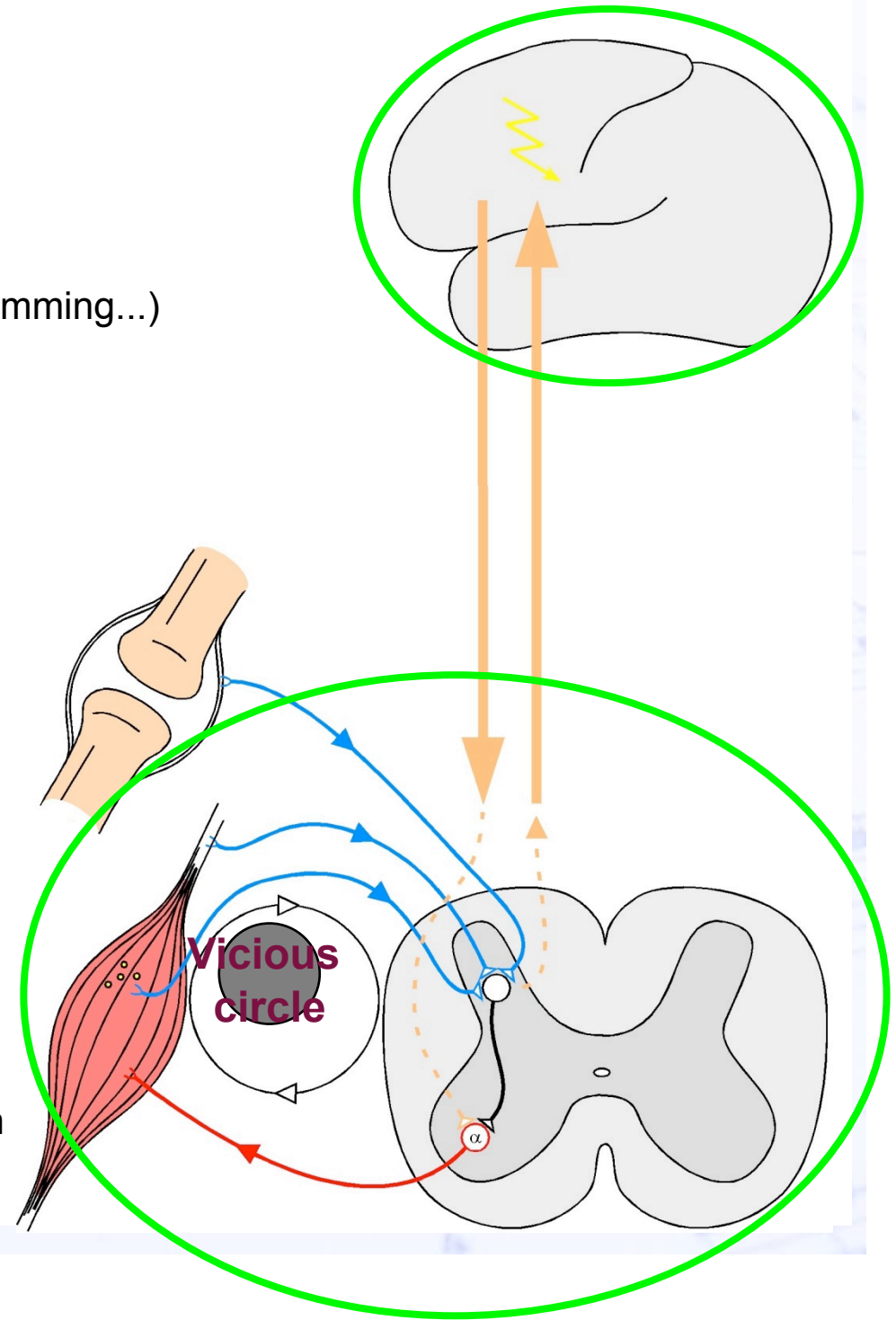
- 1) Down-regulation of pain threshold
- 2) Association: Instrument = Pain
- 3) Impression of disaster
- 4) relieving posture, restricted movement patterns





Recovery:

- 1) Understand the mechanism
- 2) Up-regulation of pain threshold (swimming...)
- 3) Learn to play music without pain
- 4) Practice Strategies - pedagogical intervention
- 5) physical therapy
- 6) physiotherapy, body awareness
- 7) medication
- 8) detect and avoid external triggers
 - problems with the instrument
 - manual strain in everyday life
 - schedule overload
 - psychological strains, social situation

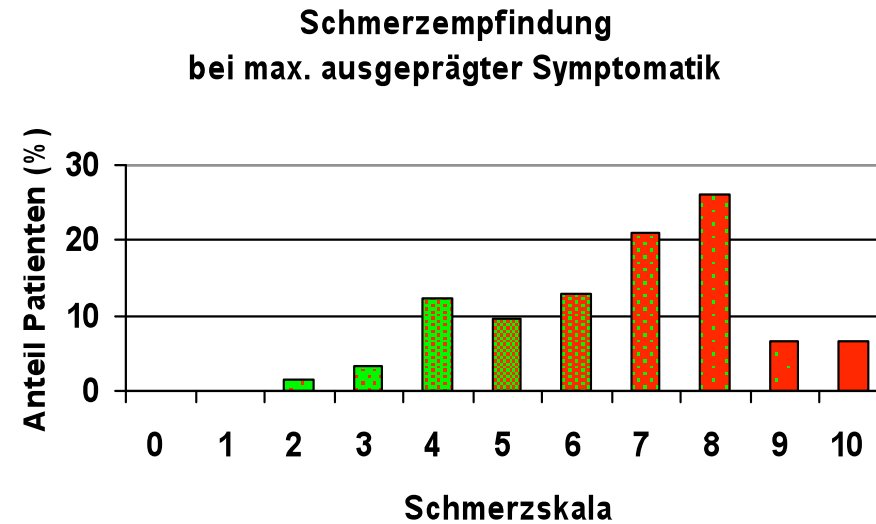




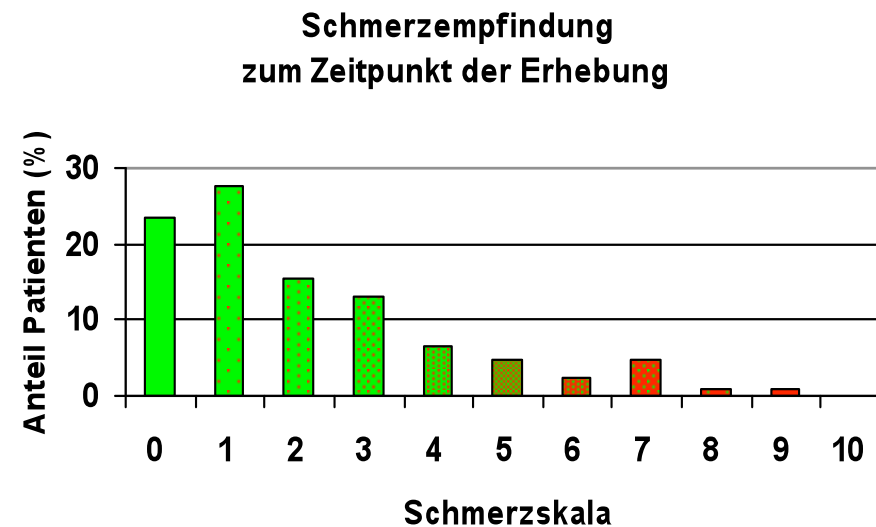
Pain sensation before and after follow up

Average 4,2 years, 128 musicians patients

Before



After



Wilcoxon Test:
 $p < 0.001$



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Summary and outlook

- Sufficient and reliable research data on active music therapy in pain treatment are still missing
- Generally, music therapy is now more in the state of a „Pre-Science“ according to Thomas Kuhn – scientific revolutions have to follow
- Multimodal active music therapy may act on well founded neurobiological mechanisms
- Musicians' pain demonstrates a specific example for pain management
- But it also shows that pain is a societal challenge!



Giacomo Balla, „Ritmi dell'archetto”, 1912