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*Soundscapes in public places: Profile and synopsis of an interdisciplinary research project on the impact of loud music.*

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**CONTENT**

Abstract

- 1 Soundscapes in public places: Qualities and impacts
  - 2 Project SPP: Sounds and behaviors in bistros, pubs, gyms
    - 2.1 Research issues
    - 2.2 Sub-studies
    - 2.3 Methodology
    - 2.4 Selected results
    - 2.5 Validity considerations
    - 2.6 Interpretation of findings
  - 3 Outlook: Issues for further research
- References



This report summarizes the design and essential results of the Project "SPP" ~ "Soundscapes in Public Places", which was running for a dozen years, from 1999 to 2010, based on a crosscultural and international perspective. Impacts of loud music venues on human communication were the core interest.

At the end, some metaphorical thoughts about the interpretation of the findings and an outlook are presented.

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## ABSTRACT

### Soundscapes in public places: Profile and synopsis of an interdisciplinary research project on the impact of loud music

**Ecological issue:** Public places - such as markets, pubs and restaurants, cinemas, theatres, teaching venues, shopping centres, sport venues, transportation facilities - have a particular 'soundscape' which affects visitors' perceptions and behaviors. For example, people in a restaurant encounter several kinds of soundscapes: sounds resulting from running the place, sounds created by customers, sounds from outside, and the sounds provided by the music systems which are run in most public places; none of these soundscapes are under the control of the visitors. Thus the question arises, what do they actually desire, and do they like what they experience in this kind of environment? Almost all people going to a shop or restaurant or gym do so for a practical reason, e.g., eating, buying something, exercising; hearing music is not their primary aim. The music imparted there may entertain or disturb.

**Conducted research:** In a series of 16 socio-psychological field studies, demands and appraisals of supplied music were explored, surveying what sound levels do occur, whether customers want music to be present or absent; the desired content and level of music; their perceptions and evaluations of the actual music situation, and how the soundscapes impact on communication. In the first study, "*Influence of music in cafes & restaurants*" <MCR>, 6 cafes and restaurants were looked at, with personal interviews of customers (N=72). The study "*Sound levels and social interactions in music venues*" <SIM>, dealt with 3 venue types: pubs, restaurants and gyms (3x3); including N=32 qualitative interviews. In a further study, "*Music levels in Melbourne University eateries*" <MLU>, 17 venues were inspected. In all studies sound measurements ( $L_{eq}$ , L-peak) were carried out. Using a different approach, in "*Sound levels and social interactions in eateries*" <SIE>, N=79 customers of cafes and bistros were observed. Furthermore, "*Social interactions in eateries with music: Staff and management attitudes*" <SSM> were explored in 8 venues. Finally, a "*Psychometric approach for scaling music loudness*" <LMP> was tested, N=12. The data collection ended with a tally, checking how many of 167 locations in a main street were "*Venues with regular music*" <MVM>. Many of these studies were repeated in Austria, Germany and Netherlands.

**Findings and interpretation:** Results from study <MCR> indicate that customers have specific preferences, and that satisfaction with a restaurant visit is influenced by their evaluation of the music soundscape they encounter. Although the measured sound levels were substantial ( $L_{eq}$ 's up to 85 dB[A], with peaks well above 100), most customers accept these levels. In study <SIM>, the sound exposure was similar; the interview data suggest that communication behavior changes in loud environments, for example, the use of words decreases while facial expressions become more essential. This was also observed in study <SIE>. Yet the tolerance for 'noisy' settings appeared to be considerable, and quiet situations not much searched for. Study <MLU> confirms the current trend of rather loud soundscapes in public environments. And study <MVM> substantiates that a wide variety of venues present music more or less permanently. Finally, the results from <SSM> signal that those running a venue rather than customers steer what's happening. Crosscultural comparisons yielded by and large similar insights.

**Practical implications:** These findings can be interpreted as part of a wider context: Quiet localities have become rare, and a need for music in about every kind of public place seems to be postulated. Yet there is a price: It seems that the quality of human interactive communication in music-dominated environments is impaired. Nevertheless, given the surprising acceptance of strident soundscapes - are they a principal feature of the contemporary culture? This thought leads to further questions: Do people who live in large-scale urban environments know and need 'quiet' soundscapes at all? What kind of soundscapes do humans 'really' desire? On-going research needs to explicate these facets. Understanding the meaning and implications of loud music soundscapes is as much a philosophical as a psychological and sociological issue.

## <1> SOUNDSCAPES IN PUBLIC PLACES: QUALITIES AND IMPACTS

The human issue dealt with in this project has a long history ... People spend a considerable amount of their time in public places - such as markets, pubs and restaurants, music venues, cinemas, theatres, teaching venues, shopping centres, sport venues, transportation facilities. All have a particular 'soundscape' (Schafer 1994, Tixier 2002, Berglund et al. 2001, Bohme 2000) which affects visitors' perceptions -- how they see and interpret the environment -- and behaviors, that is, how they spent time there, how they communicate with others, how they realize their intentions.

Taking restaurants as an example - guests encounter three kinds of soundscapes: The sounds created by other customers and the venue's staff; the sounds from outside (the street), including noise from car traffic; and the sounds of music, either records played via loudspeakers (as done in most public places) or occasionally live performances. People in bistros or cafes with an outdoor area may also experience natural sounds, such as wind, rain, birds. None of these soundscapes are under the control of the visitors.

Thus the question arises, what do they actually desire, and do they like what they experience in this kind of environment?

## <2> PROJECT SPP: SOUNDS AND BEHAVIORS IN BISTROS, PUBS, GYMS

### 2.1 Research issues

The author's project "Soundscapes in Public Places" <SPP> (cf. Rohrmann 2009) deals with the following research questions:

- o How common is it to provide music via sound systems in public places?
- o What sound levels do occur in eating places, pubs and sport venues?
- o Do customers in principal want music to be present or absent?
- o *If music wanted:* Desired content and level of music presentations?
- o How are soundscapes in public venues perceived and evaluated?
- o To which degree is loud music sensed as noise?
- o Is exposure to music interfering with human interactions?
- o What factors influence the appreciation or disliking of loud music soundscapes?

The findings will be utilized to understand the acceptance of music exposure (Hargreaves & North 1997), to elucidate the factor noise (Berglund & Lindvall 1995, Guski 2001, Job & Hatfield 2001, Schick 2000, Schulte-Fortkamp 2002), and to explore its role within the current social culture (Duffy 2000). The areas of environmental psychology (Bechtel & Churchman 2002, Gifford 2007), music psychology (Deutsch 2007, North & Hargreaves 2008) and social psychology (Brewer & Hewstone 2003, Oskamp & Schultz 1998) provide essential frameworks.

### 2.2 Sub-studies

The project is exploratory in nature. In order to clarify the raised questions, altogether 16 sub-studies were designed and conducted (cf. **Box 1** below); some are not yet finalized. For more information about these studies, cf. Rohrmann 2009; for some, earlier publications are available (Rohrmann 2003, Rohrmann 2006).

### 2.3 Methodology

#### Research plan

In most of these studies, five steps were carried out:

- (1) Choice of venues in which customers are exposed to music,
- (2) Measurement of sound levels,

- (3) Quasi-experimental surveys with venue customers,
- (4) Interviews of venue managers & staff,
- (5) Exploration of conversation behaviour in loud venues.

**Box 1****Sub-studies of Project SPP - Australian investigations and extension in Europe**

<i>Title</i>	<i>Acronym</i>	<i>Year</i>	<i>Venues</i>	<i>Survey</i>	<i>Studies in Europe</i>
"Influence of music in cafes and restaurants"	<MCR>	1999 2006	m=6	N=72	-/- {see SIM though}
"Sound levels in common-place situations"	<SLC>	2001 2009	(many; 24-hours diary) (dito)		-/-
"Sound levels & social interactions in music-presenting venues"	<SIM>	2004 2005	m=3x3	N=36	Germany: <SIH> 2007-8 Austria: <SII> 2008-9
"Impacts of music exposure and the influence of cultural factors"	<IMC>	2007	m=4	N=48	-/-
"Music levels in Melbourne University eateries"	<MLU>	2006	m=17	-/-	Germany: <MLH> 2007 Netherlands: <MLU> # Germany: <MLB> 2009
"Sound levels & social interactions in eateries with music: Observations"	<SIE>	2007	m=12	N=79	-/-
"Sound levels & social interactions in eateries with music: Staff attitudes"	<SSM>	2008	m=8	N=8	Germany: <SSH> 2009
"Venues with regular music in Melbourne-Carlton: Tally"	<MVM>	2009	m=167	-/-	
"Loudness of music: psychometric experiment - pretests"	<LMP>	2009	(home)	N=6	Germany: <LMX> 2009

*Note:*  
Further information about all these studies available from the author; cite the acronym in queries.

**Data collection: Venues, locations, countries**

The types of venues looked at include: cafes, bistros, restaurants, pubs, gyms, sport centers. They were chosen either in a university area or in city quarters outside universities.

Cross-cultural extension: In order to facilitate the interpretation of findings and widen the validity of the project, most studies were repeated in Austria, Germany and Netherlands, in a design as similar as feasible.

**Sound measurements**

For each venue listed in Box 1, a set of L-eq and peak levels (1 or 3 min's) was recorded, using a hand-held sound level meter (either a *Bruel&Kjaer* or a *MetraVib* instrument). Additionally, in several study areas it was checked for all venues whether they provide music via sound systems or not.

**Surveys: Type of questionnaires & observations**

For personal interviews, several survey instruments were developed, first pre-tested and

then consistently employed:

- o standardized questionnaires with quantitative rating scales; *or*
- o interview guideline based on a qualitative questionnaire.

Furthermore, observations were conducted in all venues. This included to take notes about relevant features of a venue, and to observe how people talk to each other under conditions of loud music.

## 2.4 Selected results

### Extent of music provision

For three of the SPP studies, two in Australia and one in Germany, it was checked how many of the venues in the pertinent area provide music for their customers; see **Box 2** for these data.

<b>Box 2</b>			
<b>Extent to which public venues provide music: data from 3 SPP sub-studies</b>			
<i>Study</i>	<i>location</i>	<i>venues</i>	<i>music provided regularly</i>
MLU	University of Melbourne	17 cafes or bistros on campus	100%
MLH	Hamburg University	13 cafes or bistros on campus	31%
MLH	streets around Uni	23 cafes, bistros, restaurants, pubs	52%
MVM	main street in Carlton	80 cafes, bistros, restaurants, pubs	94%
MVM	main street in Carlton	87 shops (fashion, office stuff, pharmacy, food)	76%

*Music supply mode: Note:* Multiple speaker systems (up to 8 speakers) at the walls of the room; plus outside speakers. The music played comes either from CD's or (mostly) via an iPod setting. Some venues use radio music, usually commercial radio stations.

The results vary between 1/3 and all venues; altogether both within campus and in main urban areas music provision dominates. This is increasingly common since about 2000.

### Sound levels

The following two boxes (**Box 3**, **Box 4**) present the sound levels observed in Study SIM (Sound levels and social interactions in music-presenting venues) and Study MLU (Music levels in Melbourne University eateries).

These data (even though they are mostly casual recordings and not representative professional measurements) clearly indicate that the sound levels in the visited pubs, bistros and gyms are quite substantial:  $L_{eq}$ 's up to 85 dB[A], with peaks well above 100. In comparison -  $L_{eq}$  sound levels in a quiet residential area are 50-55 dB[A]; 65-75 will be experienced on busy roads or highways; a heavy truck may create about 90 when passing by; 100-110 is a typical level for a jackhammer and 110-120 for a disco. Noise regulations contain limits between 50 and 70, depending on the environment. For example, the "Australian Standards for Ambient Sound Levels" (Australian Standards 1987) suggests that sound levels in restaurants and cafeterias should be below 55.

Noise researchers and psychologists would consider most of the observed soundscapes as unhealthy environments because sentence intelligibility falls under 100% and raised voice is increasingly necessary (Guski 2001).

**Box 3** Sound levels in a set of public places Study SIM (Melbourne)

	Mean L-eq	Typical peak levels	Evaluation
50			Sound level marked in yellow are considered as low to medium noise
51			
↓			
63			
64			
65			
66	Gym		
67			
68	Gym		
69			
70			
71			
72			
73			
74	Pub Bistro		
75	Bistro Gym		
76			
77			
78			
79	Pub	Bistro	
80		Bistro	
81			
82		Pub	
83	Pub	Gym	
84	Bistro		
85			
86			
87		Pub	
88		Gym	
89			
90			
91			
92		Gym	
93			
94		Pub Bistro	
95			
			Sound level marked in lilac are considered as high to very high

All principal sources - behaviour of customers and staff, street noise, and the music played (record replay, no live bands) - contributed to the observed sound levels.

Examples for high peaks in a restaurant include: coffee machine, pulling table over stone floor, 'sharp' music from speakers, very loud customer, open kitchen with clattering pans and pots.

### Appraisal of customers

In all studies conducted so far, a high percentage of customers want music to be played in a venue; in gyms, this is close to 100%. **Box 5** summarizes results from Study SIM.

Most are tolerant regarding the type and style of the presented music. Their preferences regarding sound intensity vary, but three quarters of the customers accepted the venue's actual sound levels.

**Box 4** Distribution of sound levels in 'eateries' at Melbourne University [Study MLU]

	L-eq	L-peak		L-eq	L-peak
	◆ = inside ◇ = outside	◆ = inside ◇ = outside		◆ = inside ◇ = outside	◆ = inside ◇ = outside
50			80		◆
51			81		◆ ◆ ◆
52			82		
53			83		
54	◆		84		◆ ◆
55			85		◆
56			86		
57	◆		87		◆
58	◆		88		◆
59			89		
60			90		
61			91		◆ ◆ ◆ ◇
62	◆		92		◆ ◆ ◆
63			93		
64			94		
65			95		
66			96		◆
67			97		
68	◆ ◆ ◆		98		◇
69	◆ ◆ ◆		99		
70	◆ ◆ ◆ ◆		100		
71	◆ ◆ ◆		101		◆
72	◆ ◆ ◆	◆ ◆	102		◇ ◇ ◇
73	◆		103		◆
74	◆ ◆ ◆ ◆		104		◇ ◇
75		◆	105		◆
76	◆		106		
77		◆ ◆ ◆	107		◇ ◇
78		◆			
79		◆ ◆			◇

**Box 5** Customer evaluation of experienced soundscapes [Study SIM]

Wanting music in pubs or bistros/restaurants or gyms	~ 80-90 %
Expecting and preferring a particular music type/style	~ 10-30 %
Actually occurring sound levels accepted	~ 70-80 %

**Impact on human communication**

Most visitors of a pub, café, bistro, restaurant and the like go there together with others, and consequently they have in mind to talk with them. **Box 6** shows pertinent data from Study MCR; only 2% said they don't intent to communicate.

Of those interviewed in pubs, the majority stated that the existing sound level inhibited communication with others. This was also reported for being in a restaurants, but less frequently.

**Box 6** Company and conversation in café/restaurant visits [Study MCR]

	%		%
<i>Being with company</i> (none: 3%)		<i>Conversation intentions</i> (none: 2%)	
with friends	50%	Chatting, light conversation	57%
with family	18%	Discuss issues, resolve a problem	30%
with partner or date	29%	Get to know someone	11%

In **Box 7**, two essential perceptions are summarized for a study which was conducted in Australia, Germany and Austria. On average, only a quarter noticed impacts on social interactions, and only a third thought that communication needs to be reduced.

**Box 7** Socio-psychological impacts in loud venues [Studies SIM, SIH, SII]

	<i>Study:</i>	SIM	SIH	SII
Degree to which social interaction reduced because of the sound situation in this place: medium or high degree		32%	13%	37%
Degree to which the extent of communication is changed by the venue's music level: medium or high degree		42%	23%	41%

*Note:* The original judgements were given on 0-to-10 or 1-to-5 rating scales.

People use different means for dealing with communication difficulties; this refers to both the communication style and physical attempts to reduce the problem. In **Box 8**, a set of responses of those who indicated communication trouble is recapitulated. About half of these people decided to talk louder, and about 10% stopped talking.

Those in gyms gave different responses - communication with others is there less often intended, and most customers want intensive music during their exercises. Thus they don't worry that much about communicating getting difficult.

**Box 8** Behaviours to deal with communication difficulties [Study SIM]

# of cases (out of 24 customers interviewed in restaurants or pubs)			
Talking louder	10	Talking less often, wait till leave	3
Talking about less intense subjects	2	Talking not at all	2
Make use of body language and signs	3	Avoid loudest area in the venue	2
Approach the other person more closely	2		

Finally, it was explored, through observations and informal interviews, who determines the soundscape in public venues; a brief summary is given in **Box 9**. It appears that staff dominates which kind of music is played via the venue's sound system, and how loud, and that customers have only limited influence.

**Box 9 Responses of managers & staff: Summary** [Studies MCR, SSM, SSH]

- o Management makes general decisions about the intended soundscape in the venue
- o Staff decides on a daily basis (depending on staff at duty on that day)
- o Content & level of the music played based on staff rather than customer preferences

In sum, it seems that the culture of restaurant environments has changed - rather loud soundscapes are liked or at least tolerated, and quiet situations not much searched for.

**How judgements about loud soundscapes are anchored**

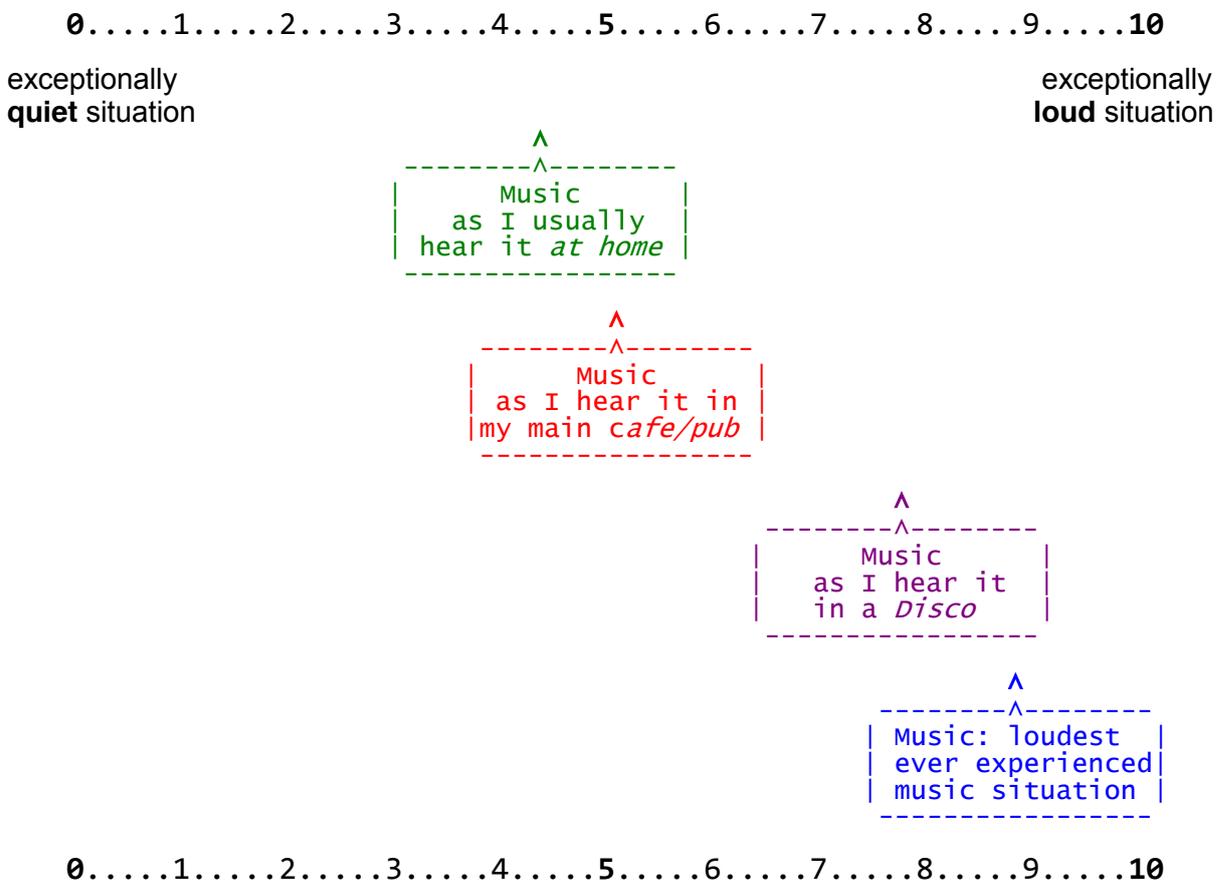
When people hear music and perceive it as more or less "loud", this depends considerably on their experiences and memories - regarding music events as well as other soundscapes. Judgements are always anchored within a person's range of her/his own experiences.

This concept was used in a complex psychometric approach. In an experiment, each participant was asked to give examples of "exceptionally *quiet*" and "exceptionally *loud*" situations and to describe their features.

**Box 10**

**Rated loudness of music - A psychometric experiment (2009)**

Study 



Means from ratings of 12 test participants in Melbourne and Hamburg, who were interviewed and made judgements after being in their usual café (afternoon) or pub (evening).

These situations were established as "0" and "10" on a quietness~loudness rating scale. The participant then had to place 4 types of music events on this scale. So far, 12 pretests have been conducted.

The results (means scores) are shown in **Box 10** (above). The loudness of "Music as I hear it in my main cafe/pub" was rated slightly higher than "Music as I usually hear it at home" - yet not as high as the measured sound levels would indicate. It seems that experiences from extreme music situations (such as discos or rock concerts) bring the judgements of soundscapes in venues such as cafes, bistros, restaurants and pubs down, regardless how loud the music actually is there. Also, the younger people interviewed in this experiment tended to have less strict anchors.

## 2.5 Validity considerations

The findings have to be taken with care - the sample sizes (for venues, customers, staff) are mostly small, and fully representative sound measurements were not always feasible in an unobtrusive manner.

However, the surveys have been well accepted by the participants, and they were quite open-minded when responding to the researchers' questions, including socio-psychological facets such verbal communication with mates or friends.

One essential validity issue is whether respondents use coherent reference experiences when rating whether music in venues is "loud" or not. The study described above, "Loudness of music: A psychometric approach" demonstrated that people differ in their anchor for what is 'truly' loud, and experiences with very loud music events obviously moderate judgements of 'every-day' venues.

## 2.6 Interpretation of findings

The results reveal that both live and recorded music is frequently played at sound levels well above levels recommended by health authorities. Yet people's tolerance for 'noisy' soundscapes appeared to be considerable - most customers have no problems with high sound/noise exposure.

There is a price though: It seems that the quality of human interactive communication in music-dominated environments is impaired. Also, the needs and preferences of customers versus venue staff are likely to differ.

These findings can be interpreted as part of a wider context: Quiet localities have become rare, and a need for music in about every kind of public place seems to be postulated - is this a principal feature of the contemporary culture? And how is this linked to the long-time presence of 'industrial' music (called "muzak" (Lanza 1994), after the company which invented this). Also, to intertwine two essential qualities, "loud music" and "noise" (Attali 1985, Rohrman 2003, Schick 2000) is questionable, because loudness is often a vital attribute of music, is wished, and thereby by definition not "noise". The seductive effect of loud (or too loud) music has become an interest of applied psychology (e.g., Blesser 2007, Kunert 2012) - yet there are no easy answers.

In an international workshop about the Project SPP (Rohrman 2009), the author stimulated a brainstorming about why loud music soundscapes are increasingly appealing; in **Box 11**, some considerations are listed.

The discussants agreed that the issue has cultural aspects beyond psychoacoustics. This thought leads to further questions: Do people who live in large-scale urban environments know and need 'quiet' soundscapes at all? What kind of soundscapes do humans 'really' desire? And how about young people who are permanently linked (via mobile tools) to music provision and have never been in a 'music-less' situation?

**Box 11**

**Potential reasons for the appeal of loud music soundscapes** [Study: Workshop SPP]

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- !/? Intense music symbolizes optimism, confidence, power, enthusiasm.
- !/? Loud powerful music amplifiers are employed about everywhere.
- !/? It could be used to indicate non-conventional manners, craze, some mild unruliness.
- !/? Venues without intense music could be seen as 'out', behind the times.
- !/? Overly quiet situations may induce worry and be perceived as stress.
- !/? Verbal communication seems to lose social relevance, thus is less likely to be harmed.
- !/? Quiet environments are not known anymore by young urban people.

Obviously further research needs to explicate these facets - research which links environmental and cultural and sociological perspectives (cf. North & Hargreaves 2008, Rohrman 2009, Lercher 2007).

### <3> **OUTLOOK: ISSUES FOR FURTHER RESEARCH**

In order to widen and deepen our understanding of how music influences "soundscapes in public places", potent research designs are needed. This should comprise: Experimental variation of sound exposure, longer sound measurements, wider samples re types and sizes of restaurants, and surveys with customers and staff & management.

Relevant socio-psychological questions include:

- o How do acoustic and social factors interact when people attend venues?
- o Do what extend do people talk faster or shorter or 'harsher' in loud pubs or bistros?
- o Can music compensate for shortcomings in a restaurant or gym?
- o In which way do cultural and ethnic background influence the acceptance of loudness?
- o What is people's knowledge of and experience with "quietness"?
- o How is the response to and acceptance of *no*-music conditions in public places?

Such research could provide several valuable outcomes -- enhancing our understanding of people's dealing with music-based soundscapes, identifying sincere versus harmless impacts of loud music on communication, and then enabling us to develop socio-psychological propositions for those who manage public places.

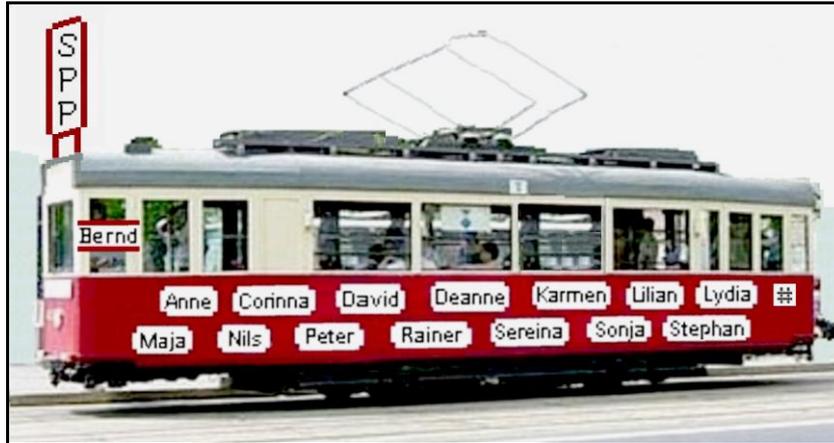
However, there are alternative thoughts. May be it's simply that 'times have changed', that loud music isn't "loud" in the current world, that worries about impaired communication ignore cultural conversions?

Eventually all this is not just a research affair, it comes down to human values and goals, and thus is ultimately a philosophical issue.

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