The preference for natural sounds in an urban residential area. Effects of demographic variables

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A representative sample of urban residents was asked to rate common verbally presented urban sound types along a scale of pleasantness. Three types of natural sounds ('bird song', 'sounds from wind', 'sounds from water') received the highest scores, followed by 'silence', and 'sounds from children playing'. Mechanical sounds ('lawn mowers' and traffic) and 'dog barking' were rated as moderately unpleasant. Differences across demographic groups were small. However, significant positive associations emerged between the rating of natural sounds and age, and educational level. Women more than men, rated natural sounds to be pleasant. Rating of mechanical sounds did not vary across demographic groups. Women more than men, and respondents with children in the household more than other respondents, rated 'sounds from children playing' as pleasant. The results are consistent with previous research on attitudes toward animals, and on adults' responsiveness to children. The value assigned by urban residents to natural sounds should instigate urban planners to pay more attention to the conservation of animals and their habitat.

Keywords: sound preferences, natural sounds, gender, age, education

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INTRODUCTION

The dominance of the visual modality in modern humans' information processing has been discussed by prominent theorists (e.g., Schafer 1977). Likewise, within the research field of environmental aesthetics, evaluations based upon visual information have dominated in empirical studies. Much less attention has been paid to how pleasurable sounds influence human well being and preferences. When acoustic stimuli have been studied researchers primarily have focused upon the negative effects of noise (e.g., Stansfeld 1992; Lercher 1996; Passchier-Vermeer & Passchier 2000). We obviously try to reduce or avoid noise, and express a higher affinity to silence, music, or low-intensity natural sounds. To what degrees are these alternatives preferred or available in urban environments? More knowledge about sound preferences should be of value in urban planning.

However, a few researchers have focused upon human appraisal of non-noisy sounds. Anderson et al. (1983) found that natural sounds (bird song, crickets, wind) were most preferred, that sounds from humans and domesticated animals fell in a neutral range, and that mechanical sounds were least preferred. Similar results (including also a preference for sound of water) have been reported by Kariel (1980), Bjørk (1986, 1995), and Carles et al. (1992). Viollon et al. (2002) found that students judged bird song to be pleasant and relaxing. When bird song was heard together with background traffic noise, the sound scene was judged relatively pleasant and relaxing. Voices, traffic noise, and footstep sounds (without accompanying bird song) were judged unpleasant and stressful. In addition, Ulrich et al. (1991) found that physiological stress reductions were faster when subjects were exposed to natural settings rather than urban environments; the setting 'nature vegetation' was accom-

panied by bird sounds. Even the natural sound of a thunderstorm has been found to be pleasant among Spanish University students (Carles et al. 1999). However, Finnish students found cries of gulls to be both unpleasant and annoying (Björk 1986). This finding could perhaps be associated with that the sound recording was from a colony of gulls, rather than from an individual bird. Some sounds from animals may be relatively unpleasant/neutral and startling, because of their abrupt onset, high frequency, and intensity (like dogs barking and crow calls). More recently, Bradley & Lang (2000) asked college students to rate each of 60 sounds on the dimensions of pleasure, arousal, and dominance. The results showed that acoustic stimuli varied a lot in rated pleasure. For example, bird song (the cardinal) rated high in pleasure and low in arousal, while dog growl and sounds from bees rated low in pleasure and high in arousal.

Other sounds common in residential areas emanate from humans. In a laboratory study, Bjørk (1995) found a more prolonged heart rate deceleration after the onset of a human voice (40 dBA) compared with bird song and cries of gulls. This indicates that human voice more easily than other sounds presented leads to an orienting response, and Bjørk speculates that the orienting capacity of human voices contributes to its annoying quality. Often human voices occur in concert with broadcast or recorded sounds, as when the soundscape of neighbours reaches us. In fact, a survey from 1993 of public attitudes toward noise in the U.K. showed that the category 'neighbours' was the premier source of irritation (dethroning traffic in previous surveys) (Wrightson 1999).

Even though some sounds are inherently annoying and others are absolutely pleasing, interactions are found between sound appraisal, visual input, and the expectations people have in a particular situation. Southworth (1969) held that subjects' evaluation of an urban sound environment depended upon the information contained in the sound, the context in which it was perceived, and on its level. Anderson et al. (1983) argued for an interaction of visual and auditory characteristics in people's evaluation of a setting. For example, natural (including animals) sounds had an enhancing, while other sounds had a detracting effect on evaluations of natural and residential areas. Expectations about matching sounds and visual input may underlie such interactions. Also Carles et al. (1999) reported evidence that congruence between sounds and visual image influence preferences. In their study, congruent combinations were rated higher than the mean of the component stimuli. But natural sounds consistently increased the rating of both urban and rural settings. For example, sounds from water created a more positive attitude toward the landscape shown. Also relevant is the finding by Rohrmann & Bishop (2002) that adding appropriate sounds enhanced the perceived familiarity and liking of visual simulations of urban environments. In the study by Viollon et al. (2002), some types of sound environments were judged more negatively when associated with urban scenes, like bird song and all the traffic noises. Thus, both relaxing sounds and stressful sounds were influenced by the visual degree of urbanisation.

Sounds that are considered appropriate or common in a specific site may be less annoying at that site than in a different setting. For example, traffic noise is often the main target in noise control efforts. But it has been shown that for some people, traffic noise in urban areas, especially if heard from a distance, may enhance the appraisal responses (Southworth 1969, Anderson et al. 1983). In contrast, motor vehicle sounds may be very annoying in a natural area or in a recreational setting (Vittersø et al. 2004). On this background it is evident that it is important to specify the actual setting when we ask people to judge sounds.

Noise exposure has been shown to have negative impacts on various aspects of physical and psychological health (Berglund & Lindvall 1995, Lercher 1996), and psychological states or processes have been shown to influence people's evaluation and reactions to noise exposure (e.g., Hatfield et al. 2002; Västfjell 2002). But very few attempts have been made to identify demographic, social, or psychological variables that hypothetically could influence human evaluation of non-noisy sounds, like the natural sounds we are exposed to daily in our residential area. One exception is the study by Anderson et al. (1983) that showed no effects of gender on the evaluations of various natural and mechanical sounds. In a survey focusing on adults' attitudes and activities related to the visual and auditory elements of their residential urban area, we attempted to identify possible influencing demographic variables.

Hypotheses

Which reasons exist to expect demographic variables to influence people's evaluations of or preferences for elements of our residential soundscape? Girls have been shown to have higher scores than boys on humanistic (affection/interest for individual animals) and moralistic (opposition to exploitation of animals) attitude scales (Kellert & Westerveld 1983, Bjerke et al. 1998a). In a large survey among adults in the U.S.A., Kellert & Berry (1987) found that females more than males valued wild animals as objects of affection. Further, women more than men have been found to express a higher preference score (like – dislike) for birds (except for birds of prey) in their residential area, while the reverse gender difference applies to preference for insects (Bjerke & Østdahl 2004). Similarly, women more than men observed and fed birds. The same study showed a positive association between age and preference scores for both birds (except for birds of prey) and some invertebrate species, and a negative association with age and preference for species like the dog, cat, mouse and rat. Animal-related activities like observing and feeding birds, reading books and watching TV programs about nature, increased in frequency with increasing

age. Preference as well as animal-related activity scores were positively associated with educational level for a majority of the (groups of) species listed in the study. On this background we formulated the first three hypotheses (H):

H 1: Sounds from birds (included bird song) should receive a higher preference score from women than from men.

H 2: Preference scores for sounds from insects and birds should be positively associated with age.

H 3: Generally, a positive association should be found between level of education and preference for sounds emanating from animals.

Other sounds in urban residential areas are mechanical sounds of various intensities, like traffic noise and sounds from machines such as lawn mowers. Taylor and Hall (1977) concluded that sex, age and socioeconomic factors were not important considerations in relation to road noise. Later, reviews by Stansfeld (1992) and Morrell et al. (1997) have indicated that socio demographic factors have low correlations with responses to various types of noise. Likewise, Miedema & Vos (1999) concluded that sex of respondents does not relate to transportation noise annoyance (although they found an effect for age). Thus, regarding mechanical sounds (often considered as noise) in a residential area we did not expect preference scores regarding mechanical sounds to vary across demographic groups.

Sounds emanating from people constitute a third category of daily urban auditory stimuli. One salient sub-group of human-produced sounds is 'sounds from children playing'. These sounds are composed of elements like talking, screaming, laughing and sometimes crying. In all species where parental care is essential for the survival of the offspring, attention to their vocalizations must be important. Theoretically, such a proposition parallels the research interest previously invested in the positive affective effects of infants' physical appearance, e.g. 'the infantile head shape' (Lorenz 1943, Eibl-Eibesfeldt 1975). In such studies, gender differences often appear, women usually being more sensitive to 'babyishness' than do men (Berman 1980). Similarly, gender differences in reactivity to vocalizations from offspring may exist. Animal studies have shown sex differences in mammalian brain mechanisms that participate in the regulation of reproductive behaviour (Simerly 2002). Although differences most likely exist between human and non-human mammalian neurobiological regulation of reproductive behaviour, it is highly relevant that Seifritz et al. (2003) showed that a specific brain response to children's vocalizations (laughter or crying) appeared among women but not among men (independent of parental status).

However, when males enter parenthood hormonal changes that affect paternal behaviour toward offspring seems to take place (Dixson & George 1982). For example, fathers being most responsive to infant cues (including vocalizations like crying) respond with reduced testosterone and higher prolactin level (Storey et al. 2000, Fleming et al. 2002). Further, Seifritz et al. (2003) found that with parental experience, activation in the amygdala and interconnected limbic regions was stronger for exposure to crying for both sexes. Thus, the next hypothesis was:

H 4: a) Women more than men, and

b) those with children in the household, more than those without children, should express higher preference for vocalizations from children playing in their residential area.

METHODS

Study area, sampling and data collection

The city of Trondheim in Central Norway houses 156 000 inhabitants. A sample of residents in the city (n = 1750) was drawn from the telephone directory by a professional sampling and marketing company, with the aim to compose a sample representative of the population in the area. A questionnaire with a pre-stamped envelope was sent by post in November 2001. A reminder was sent two months later to all persons that had not answered. Of these 500 received another copy of the questionnaire. 48 % completed and returned the questionnaire (49% male, 51% females).

The questionnaire

Respondents were asked several questions about their attitudes and activities related to animals, landscape, and parks in their residential area. One question related to sound preferences: "What is your opinion about the various sound types to be heard in the area where you live?" Thirteen common urban sound types were intuitively selected by the researchers (see Figure 1). They were listed in the questionnaire, and the respondents were asked to indicate their preference for each sound type along a five-point scale from "very unpleasant" to "very pleasant" (and "do not know"). (Further information about Methods are presented in Bjerke & Østdahl 2004).

Statistics

Linear regression analysis was used to measure the effect of the socio demographic variables gender, age and education on the dependent variables. For all statistical analyses the Statistical Package for the Social Sciences (SPSS) is used. The variable gender is coded 1 for woman and 0 for men, while age is a continuous variable. Education is an ordinal variable (primary school = 1, secondary school and vocational training = 2, 1-3 years in college = 3 and >3 years in college = 4).

RESULTS

Figure 1 show large differences in attitudes towards the different sound types along the five-point scale from "very unpleasant" to "very pleasant". The most pleasant sound types are 'bird song' (mean value 4.57), 'sound from wind blowing in trees' (mean value 4.15), and 'sound from running water' (mean value 4.10), while the most unpleasant sound types are 'dog barking' (mean value 2.23), 'sound from lawn mowers' (mean value 2.25), and 'sound from nearby traffic' (mean value 2.32).

Women tend to have higher score than men for six sound types (Table 1). The differences are significant for 'bird song', 'wind blowing in trees', 'children playing', 'sounds from magpie', 'sounds from seagulls' and 'running water'. For sounds from traffic (both 'sounds from nearby traffic and 'sounds from distant traffic') there are no differences in preference scores between genders.

The preference scores are also significantly related to the age of the respondents for four of the 13 types of sounds in the study. For 'bird song', 'insect buzzing', 'sounds from magpie', and 'sounds from nearby traffic' the score is increasing with increasing age of the respondents.

Education is a significant variable for six of the 13 types of sounds; 'wind blowing in trees', 'running water', 'children playing', 'insect buzzing', 'sounds from magpie' and 'sounds from seagulls'. All scores are increasing with higher education.

The different types of sounds in the study can be grouped into 3 main categories; *mechanical sounds* consisting of 'sounds from lawn mowers', 'sounds from nearby traffic' and 'sounds from distant traffic' (Cronbach alpha: 0.60, mean value: 2.43 and standard deviation 0.59), *sounds from nature* consisting of 'bird song', 'wind blowing in trees', 'running water', 'insect buzzing', 'sounds from magpie', 'sounds from seagulls' and 'dog barking'(Cronbach alpha: 0.73, mean value: 3.41 and standard deviation 0.56), and *sounds from people* consisting of 'children playing' and 'people talking in the neighbourhood' (Cronbach alpha: 0.53, mean value: 3.39 and standard deviation 0.59). The sound category 'silence / very little sound' were excluded from the categorization. A linear regression analysis on these three main categories of sounds show that the gender difference in preference score, and the difference between young and older people, is evident only for the sounds from nature, while the difference between groups across educational levels is evident both for 'sounds from nature' and 'sounds from people' (Table 2).

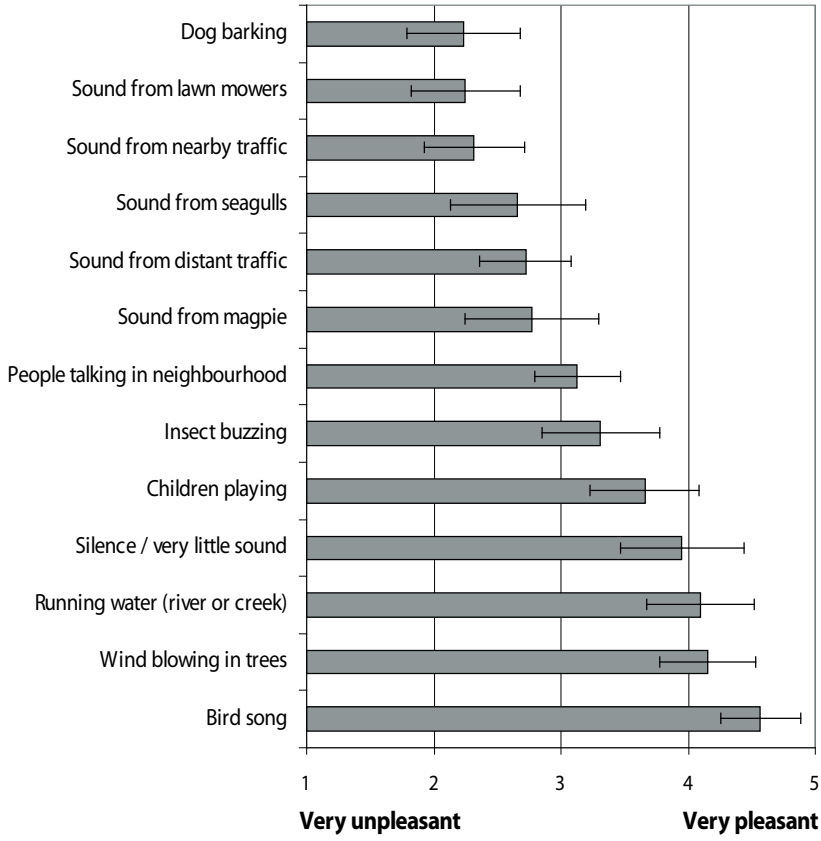

Fig. 1. Sound preferences. Mean values for different types of sound along a five-point scale from 1 (very unpleasant) to 5 (very pleasant).

Table 1. Sound preferences by independent variables (gender, age and education). Results from linear regression analysis. *** p<0.001, ** p<0.01, * p<0.05. Standard errors of B are in brackets. F = F-value from ANOVA-test

	Coefficients (B) for independent variables				R.sq.	F
	Constant	Gender	Age	Education		
Sounds from lawn mowers	2.419***	0.048	-0.003	-0.022	0.003	0.755
	(0.172)	(0.068)	(0.002)	(0.034)		
Dog barking	1.929***	0.107	-0.002	0.133	0.034	7.436***
	(0.174)	(0.069)	(0.002)	(0.035)		
Sounds from nearby traffic	2.270***	0.018	0.004*	-0.049	0.015	3.185*
	(0.156)	(0.062)	(0.002)	(0.031)		
Sounds from distant traffic	2.516***	0.012	0.003	0.015	0.005	1.111
	(0.146)	(0.058)	(0.002)	(0.029)		
Sounds from seagulls	1.912***	0.308***	0.005	0.130**	0.033	7.201***
	(0.210)	(0.083)	(0.003)	(0.042)		
Sounds from magpie	1.968***	0.202*	0.009***	0.086*	0.027	5.962**
	(0.209)	(0.083)	(0.003)	(0.041)		
People talking in neighbourhood	2.993***	0.024	0.001	0.033	0.002	0.503
	(0.139)	(0.055)	(0.002)	(0.028)		
Insect buzzing	2.350***	0.076	0.006**	0.224***	0.059	13.347***
	(0.179)	(0.071)	(0.002)	(0.036)		
Children playing	3.173***	0.184**	0.003	0.078*	0.018	4.050**
	(0.170)	(0.068)	(0.002)	(0.034)		
Silence / very little sound	4.072***	0.054	-0.003	0.004	0.004	0.891
	(0.197)	(0.078)	(0.002)	(0.039)		
Running water (river or creek)	3.793***	0.311***	-0.003	0.092*	0.047	9.162***
	(0.187)	(0.075)	(0.002)	(0.037)		
Wind blowing in trees	3.725***	0.297***	-0.003	0.149***	0.090	21.139***
	(0.145)	(0.058)	(0.002)	(0.029)		
Bird song	3.997***	0.224***	0.006***	0.048	0.048	10.848***
	(0.127)	(0.050)	(0.002)	(0.025)		

Table 2. Sound preferences by independent variables (gender, age and education). Results from linear regression analysis. *** p<0.001, ** p<0.01, * p<0.05. Standard errors of B are in brackets. F = F-value from ANOVA-test

	Coefficients (B) for independent variables				R.sq.	F
	Constant	Gender	Age	Education		
Mechanical sounds	2.357***	0.025	0.002	-0.012	0.005	1.083
	(0.120)	(0.048)	(0.001)	(0.024)		
Sounds from nature	2.742***	0.211***	0.003*	0.136***	0.084	16.552***
	(0.117)	(0.047)	(0.001)	(0.023)		
Sounds from people	3.078***	0.096	0.002	0.059*	0.013	2.676*
	(0.130)	(0.052)	(0.002)	(0.026)		

DISCUSSION

The results confirm previous findings that three types of natural sounds are the best liked soundscape elements, i.e., bird song (very pleasant), sounds from wind, and from running water (both moderately pleasant). Mechanical sounds (lawn mowers, nearby traffic), in addition to dog barking are rated as moderately unpleasant, while sounds from distant traffic, gulls and magpies, people talking, and from insects, are considered to be more or less neutral as to pleasantness. The evaluation of sounds from children playing approaches the value of moderate pleasantness. Two findings contrast with previous research, however. Unlike Bjørk's (1986) study in Finland, the subjects in the present study did not evaluate gulls' sounds as unpleasant, neither did they rate 'people talking in the neighbourhood' as more unpleasant than sounds from traffic (cf. Wrightson 1999). On the other hand, our results are in accord with previous studies (Southworth 1969, Anderson et al. 1983) in showing that sounds from distant traffic is not rated as unpleasant. The respondents were asked about their opinion about sounds in their residential urban area, and distant traffic sounds probably are perceived as appropriate and familiar, and not as annoying in this context.

Our literature review did not reveal that focus has been directed to differences in the evaluation of natural sounds across demographic groups (but see Anderson et al. 1983). We found this to be surprising, since several studies have shown statistical effects of gender, age, and education on the experience- and existence-values ascribed by both children, adolescents, and adults to a variety of (groups of) animal species (e.g., Kellert & Berry 1987, Bjerke et al. 1998a, Bjerke et al. 1998b, Bjerke & Østdahl 2004). There are no theoretical reasons why the evaluation of sounds from such natural categories should be dissociated from other components of people's attitudes toward them, thus we formulated Hypotheses 1-4 upon the previous studies of attitudes toward animals.

However, before relating the results to these hypotheses, we emphasise that group differences are small (although some are significant), ranging from scale scores of 0.29 to 0 for gender differences, from 0.79 to 0.17 for age differences, and from 0.58 to 0.02 for differences between educational groups. We have accounted for a small part of the variance in the sound-response relationship. Obviously, unknown variables moderate people's responses to sound types. Several such moderators have been identified in the study of noise-response relationships. Personality factors (noise sensitivity, neuroticism, type A/B pattern, etc.) as well as situational factors have been shown to be important moderators for reactions to noise (e.g., Lercher 1996). Regarding our reactions to natural stimuli, sounds included, further research is necessary to find additional relevant influencing variables.

Another limitation of our study is that 'sounds' were presented as verbal labels. Real-life exposure could of course give somewhat different results. In addition, we need to distinguish between sources *per se*, and the sources of the sounds. When responding to verbally presented labels like "children playing" or "bird song" we do not evaluate the isolated sound; we also act upon a mentally complex picture involving also the sound sources. We might, for example, reflect on our children having fun, or on nice, colourful birds signalling the coming of springtime. Unravelling these association and meanings of sounds and their sources would necessitate the use of more qualitative methods.

As hypothesised (H 1) women more than men expressed a higher preference score for bird sounds (bird song, magpie, gulls). This gender difference, although small, extended to all natural sounds listed in the questionnaire (Table 2), except for dog barking. The results are consistent with the previous findings that more women than men express a positive, humanistic and moralistic attitude toward many (groups of) animals, like small birds, pets and small wild mammals (Kellert & Berry 1987, Bjerke et al. 1998a, Bjerke & Østdahl 2004). In contrast Norwegian women more than men verbally express negative and fear-related attitudes toward large carnivores (Bjerke et al. 2001), snakes (Bjerke & Bevanger 2002) and spiders (Bjerke & Thrane 2003), few of which exist in urban residential areas. Thus, compared to males, females in our culture seem to like small and non-provoking animals better, and carnivorous and potentially biting or stinging species worse. There is a tendency for women to express stronger pro-environmental attitudes than do men (Zelezny et al. 2000). Such attitudes often encompass an ethic of care, including a tendency towards nurturance and helping behaviour. Our study does not allow any speculation as to the origin and development of altruistic tendencies, but the higher preference scores and frequency of feeding behaviour reported by women related to birds seem to be consistent with the reported gender differences in pro-environmental attitudes.

However, since almost no previous research exists on gender differences in human appraisal of natural sounds, more research is needed before definitive conclusions can be drawn. The results could vary across different socio-cultural samples.

Hypothesis 2 also received support from the sound preferences data. Previous findings that a positive association exists between age of respondents and preference scores for several small birds, as well as for some invertebrates (Bjerke & Østdahl 2004) are consistent with the present findings of a positive correlation between age and the evaluation of sounds from birds and insects. Regarding the rating of insect buzzing, the association with age may partly be explained by previous findings (e.g., Fredrikson et al. 1996, Arrindell 2000, Bjerke & Thrane 2003) showing a negative correlation between self-reported fear of invertebrates (e.g., spiders) and age. If younger people in aver-

age are more afraid of invertebrates than are older persons, they should rate sounds from such animals as less pleasant. Possibly, the age group differences in self-reported fear of invertebrates may be due to more experience with these animals among older persons (exposure to a potentially frightening object is known to reduce the fear of it).

As stated in Hypothesis 3, a positive correlation was found between level of respondents' education, and sounds from gulls, magpies, and insects (but not bird song). The combined measure of 'sounds from nature' (Table 2) correlated positively with educational level. Kellert (1996, p. 54) stated that (in the U.S.A.), "the higher a person's education, the more likely that person is to express greater concern, affection, interest, and knowledge…toward animals and the natural world". He also suggested that higher (college) education appears to foster appreciation and concern regarding nature. It is possible that education may contribute to a biocentric value orientation and an openness for new perspectives like those forwarded by recent environmental movements.

It could be argued that the positive associations between both age and education, and preference scores for some natural sounds could appear because ownership of gardens (which likely would implicate more experience with small birds and insects) might be more frequent among older, well educated persons than among other groups. Therefore, garden ownership was entered into the analyses, but the associations presented above remained. These supplemental analyses, however, showed that persons who had a garden liked bird song and insect buzzing better than did respondents without a garden.

The preference scores regarding mechanical sounds (lawn mowers, distant and nearby traffic) did not vary across the three demographic groups. This finding is also consistent with previous research on human appraisal of annoying sounds. But significant associations were found between preference scores for sounds from 'children playing nearby' and two demographic variables (gender (Hypothesis 4a) and education). The gender difference may be related to previous research showing differences between men and women in specific brain responses to infant laughing and crying (Seifritz et al. 2003). However, Seifritz et al. (2003, p. 1372) associated the lateralization of this gender difference (to the right hemisphere) to withdrawal and fear-related behaviour, which could be important for a better evaluation of vocalizations from children. In the present study, respondents were not exposed to infant crying or laughing. Instead they were asked to evaluate sounds from children playing nearby, a rather complex verbal and acoustic category that most probably leads to associations like children talking, laughing, and screaming (but little crying). The fact that this acoustic category was evaluated to be almost moderately pleasant indicates that fear-relevant mental processes are not dominant.

Our data do of course not allow any conclusion regarding whether genetic or experiential (or both) factors lie behind the observed gender difference. The larger responsibility placed upon women relative to men in caring and attending to children in our culture may be the most important factor. Sensitivity to children has traditionally been considered a salient part of stereotypes of the feminine sex role (Bem 1974). Similarly, the higher preference score expressed by respondents of both genders who have children in the household (Hypothesis 4b) could be a result of their parental and positive experience of registering that children are heard to be safely playing nearby. It has been shown previously that life stage and parenthood influence men's self-report responsiveness to pictures of children (Berman 1980).

Although demographic groups were used as independent variables in the present study, we do of course admit and expect considerable variations to exist across sub-samples within each of the demographic groups. We consider these to be an interesting topic for future analyses.

Cross-cultural comparisons of responses of adults to children's vocalizations could provide some information about the importance of experiential variables. It has been shown that parents in Western industrialised cultures emphasise verbal and distal interaction with their children, and try to promote independence and autonomy. Parents in traditional non-Western cultures more often stress proximal interaction (e.g., Hewlett et al. 1998). The extent to which the gender difference in responsiveness to children exists, also varies across intra-culture populations (Berman 1980). Consequently, the appraisal of children's vocalizations outside home could be different in other cultures than in a Norwegian urban area.

Although of theoretical significance, the influence of demographic variables on sound preferences may seem to be of little practical significance. After all, all demographic groups have to live in the same environment. The development of natural areas specified for one gender, or for the elderly, is not a viable strategy. But if we had identified and targeted respondent groups with specific needs regarding natural stimulation, however, the practical implications most likely would have been more visible. It has been shown that various types of 'healing gardens' have promising effects on groups with specific needs caused by disabilities or illness (e.g., Marcus & Barnes 1999, Stigsdotter & Grahn 2002). Such gardens, as parts of traditional urban parks, could be found to have preventive, in addition to curative effects.

However, we would like to highlight one *general* practical implication. Today, urban parks in the study area are often dominated by relatively open fields, characterised by a limited degree of biological diversity. But since some segments of the population endorse natural sounds to the degree shown, plan-

ners should allow for more (dense) vegetation in urban parks, since denser vegetation hosts more bird and insect species compared with open fields. This conclusion was reached also in a study where the residents in the study area *visually* rated urban parks varying in vegetation density (Bjerke et al. 2006): People expressing a high level of interest in wildlife preferred denser vegetation for recreational purposes.

A general message of the present material relates to the statement that the ideals of urbanisation has been based upon the notion of progress, revealed as the conquest of nature by culture, and that modern urban theory contains no mention of animals (or other natural elements) (Wolch et al. 1995). However, the strong value assigned by urban residents to natural sounds (and animals in general, Bjerke & Østdahl, 2004) suggest that the existence of wildlife and natural areas in urban areas positively contribute to their well-being. Consequently, urban planners and politicians should give a higher priority to the establishment, conservation, and ecological management of urban habitats for wildlife. Soundscape research in landscape planning has been uncommon, but recent theoretical and methodological contributions (e.g., Hedfors 2003) indicate that our soundscape will be given a higher priority in the future.

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SAMMENDRAG

Preferanser for naturlige lyder i et urbant boligområde. Effekter av demografiske variabler

Et representativt utvalg (n=1750) i en del av Trondheim ble tilsendt et spørreskjema der de kunne uttrykke sine holdninger til dyr, planter og grøntområder i området der de bor. Ett av temaene handlet om hva folk synes om lyder som er vanligst i byen.

Resultatene viste at tre typer naturlige lyder ble oppfattet som mest behagelige, nemlig 'fuglesang', 'sus fra vind i trærne' og lyd fra 'rennende vann'. Deretter fulgte 'stillhet/minst mulig lyder' og lyd fra 'barn som leker i nærheten'. Mekaniske lyder ('lyd fra plenklippere' og trafikklyder) samt lyd fra 'hunder som bjeffer' ble oppfattet som moderat ubehagelige.

Forskjeller i holdninger mellom demografiske grupper var relativt små. Men noen forskjeller var signifikante: Flere kvinner enn menn oppfattet naturlige lyder som behagelige, og flere eldre enn yngre betraktet noen typer naturlige lyder, samt lyder fra trafikk i nærheten som behagelige. Oppfattet behag ved lyder som fra vind, vann, barns lek, og lyder fra insekter, måker og skjære økte med økende utdanningsnivå. Vurderinger av mekaniske lyder varierte ikke på tvers av demografiske grupper. I tillegg fant vi at flere kvinner enn menn, og flere respondenter med barn hjemme (sammenlignet med folk uten barn hjemme) syntes lyder fra barn som leker var behagelig

At flere typer naturlyder oppfattes som svært behagelige betyr sannsynligvis at natur i byen bidrar til bedre livskvalitet. Byplanleggere og politikere bør derfor vektlegge bevaring og re-etablering av naturlige områder i byer høyere enn hva tilfellet er i dag.

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