1) What does this study add to Halpern/Blake/Hillenbrands work? What does it tell us that we didnt already know?

One of the main results of the study of Halpern Blake and Hillenbrand (1985) was the observation, that mainly the low frequency part of the spectrum is responsable for the unpleasantness of the squeaking sound. When they said "low frequency part" the authors talk about frequencies below 4000 Hz. This is remarkable (and not mentioned in the paper of Halpern et al.), because frequencies below 4000 Hz can be very high (e.g. the very high pitches of the piccolo flute are in this area directly below 4000 Hz). In the area between 2000 and 4000 Hz our ears are exceptional sensible because of the self-resonance of the outer ears ear canal. Halpern et al didn't measure the influence of frequencies below 2000 Hz, so they could not see this physiological connection between ear canal resonance and the very strong transmission of the frequency band between 2000 and 4000 Hz. Furthermore new resynthesizing techniques have been applied (see: http://viennatalk.mdw.ac.at/papers/Pap_01_22_Reuter.pdf), which allowed to separate the harmonics (or partials) from the noisy parts of a sound and other spectral manipulations. So noise-only and partial-only stimuli could be resynthesized as well as the amplitude envelope of the squeaking sound filled with pink noise or the squeking sound without pitch modulations etc. The main result of our paper is, that the noisy parts of the spectrum are not responsible for the unpleasant feeling as well as the pitch modulation or the amplitude envelope. The unpleasantness is mainly caused by the tonal parts (the harmonics) of the spectrum and if they fall into a frequency band between 2000 and 4000 Hz, they cause extremly discomfort.

2) What pitch information did you delete? All frequencies between 2000-4000 Hz?

The modifications have been done in the following parts of the spectrum:
1.) low pass filtering: frequencies above 2000 Hz have been deleted
2.) high pass filtering: frequencies below 4000 Hz have been deleted
3.) bandpass filtering: frequencies between 2000 and 4000 Hz have been deleted
4.) notch filtering: frequencies outside the area between 2000 and 4000 Hz have been deleted
5.) harmonics only: all noisy parts have been deleted
6.) noisy parts only: all harmonics have been deleted
7.) without pitch modulation: the pitch movement of the squeaking sound have been hold on one stable pitch
8.) amplitude envelope only: the envelope of the squeaking sound has been filled with pink noise.

3) How many people did you use for this study? How did were they asked to rate their discomfort?

In a pretest 104 test subjects chosed the two most unpleasant noises out of six chalkboard squeaking noises. They had to rate their discomfort on a likert scale between the numbers 1 (very pleasant) and 6 (very unpleasant).
In the following main exploratory study 24 test subjects have been asked about these two most unpleasant noises and the manipulations (see above) using the same scale, while being connected to a Nexus-10 biotrace device. So heart rate, blood volume pressure, temperature, skin resistance, respiration etc. had been logged while listening to the noises and filling the questionnaire.

4) Did the volume of the sound play a role as well?

The test subjects listened to the sounds via an electrostatic Headphone which amplitude was calibrated to 90 dB(A) (corresponding to the sound pressure level of a squeaking chalkboard sound, when you stand directly before a blackboard writing/squeaking with chalk). Of course the effect of the ear canal resonance increase with increasing loudness, but this was not in the focus of our study.

5) Can we quantify how much less discomfort the sounds caused when you deleted pitch information?

The stimuli without pitch information were perceived significantly more pleasant than the original sounds (p=.000 for the chalk-stimuli as well as for the fingernail-stimuli). The effect size Cohens d is rather high (d=1.68 for the chalk-stimuli and d=1.42 for the fingernail-stimuli).

6) Does this study support any particular theory of why we find certain sounds annoying?

In a physiological view the results of our study correspond very well with the behaviour of our ear canal resonance. In a psychoacoustical view the results of our study support the results of the reseach about sensory pleasantness, which has been done by Aures, Benedini, Bismarck, Terhardt and Stoll since 1978 (e.g. described in chapter 9 of Hugo Fastl and Eberhard Zwicker: Psychoacoustics - Facts and Models. Springer. 2006, p. 239-246.): they found also that the unpleasantness of a noise increases with the increasing presence of a pitch impression (they called it "tonality"; e.g. thinking of pitchy sounds like a circular saw or a moskito buzz (one can see also in these examples that unpleasentness is not really connected with loudness at all).
The study does not support the theory of Halpern et al. (1968), that the unpleasentness is caused by the similarity between the squeaking chalk and the warning cries of macaque monkeys (the timbre of a machine gun and a fluttering swarm of pigeons are also very similar but the pigeons have nothing to do with machine guns).