Module 6 Homework (Timbre)

Student Name: ________________________________

1) (60pts) Indicate whether the statement is true or false by printing T or F.

_____ According to D. Huron, timbre’s main purposes are source identification and obtaining state cues about the world around us.

_____ Musical instruments tend to have the same relative spectrum (i.e. spectral envelope) throughout their playing range (i.e. regardless of what note is being played).

_____ Timbre plays an important role in speech recognition, communication, and simulation.

_____ Spectral distribution of signals is the only important physical correlate in timbre perception.

_____ When it comes to timbre perception, regardless of the type of signal, the attack is the most important portion of a signal’s envelope.

_____ For continuous (as opposed to impulse) signals, the steady state portion of the signal envelope contains most of the signal’s energy.

_____ Sound-morphing perceptual experiments provide evidence for categorical, rather than continuous timbre perception.

_____ Timbre perception depends not only on physics and physiology considerations but also on stimulus presentation context.
The degree of perceived beating/roughness of a signal depends on the frequency and amplitude relationships among spectral components occupying the same critical band(s).

“Sensory consonance” and “consonance” refer to the same phenomenon.

Time-variant spectral information is important to the perceived naturalness of sound signals.

How rough a signal will sound depends only on its spectral distribution and on the physiology of the ear.

How pleasant a given amount of roughness in a sound will be depends on the corresponding signal’s spectral distribution and on the physiology of the ear.

Mijwiz is a type of singing common in Bosnia and Ganga is an instrument common in the Middle East.

There are examples from several musical traditions suggesting that consonance and dissonance are culture-dependent concepts.

2) *(5pts)* Sensory dissonance is a term describing
   a) the degree of unpleasantness or “unfittingness” a sound.
   b) the degree of perceptual roughness associated with a sound.
   c) the degree of non-blending between two simultaneous sounds.
   d) the main perceptual manifestation of spectral distribution, in terms of timbre.

3) *(5pts)* Time-variant characteristics of spectra can be displayed in the form of
   a) signal envelopes and long-term average spectral distributions.
   b) long-term average spectral distributions and equal loudness contours.
   c) long-term average spectral distributions and neural tuning curves.
   d) sonograms and short-term amplitude/frequency envelopes of spectral components.

4) *(5pts)* The timbre studies addressed in class can be broadly classified into
   a) psychoacoustic (Helmholtz/Schaeffer), perceptual (Grey), and cognitive (Huron/Kendall).
   b) pitch-based (Zwicker), loudness-based (Plomp), and spectral-based (Helmholtz).
   c) spectral-based (Helmholtz, Kendall), envelope-based (Grey), and context-based (Huron).
   d) attack-based (Grey), steady-state based (Helmholtz), and decay-based (Kendall).
5) *(5pts)* One of the criticisms to Helmholtz’s timbre studies is that

   a) he only focused on German instruments.
   b) he only focused on the attack portion of signals.
   c) he only focused on the steady state portion of harmonic signals.
   d) he only focused on the contribution of the low-frequency spectral components.

6) *(5pts)* According to P. Schaeffer, all of a signal’s acoustic characteristics that are relevant to timbre perception can be described on the three following “planes”:

   a) dynamic, melodic, and chromatic.
   b) simple, complex, and mixed.
   c) melodic, dynamic, and harmonic.
   d) temporal, spectral, and contextual

7) *(5pts)* According to many timbre studies, the physical correlates corresponding to the two most important timbre perception cues are

   a) spectral density and decay spectral content.
   b) the resonant characteristics of the source and the nonlinear response of the ear.
   c) spectral centroid and onset (attack) transient spectral content.
   d) spectral centroid and temporal envelope differences among spectral components.

8) *(5pts)* Approaches to the understanding of consonance/dissonance can be broadly divided into

   a) tonal, atonal, and contextual.
   b) early, intermediate, and contemporary.
   c) physical modeling based, additive synthesis based, and perception based.
   d) acoustic, psychoacoustic, cognitive, and cultural (contextual).

9) *(5pts)* Studies by Grey, Kendall, McAdams, etc.

   a) attempt to infer the main perceptual dimensions of timbre through similarity rating experiments.
   b) attempt to infer the main perceptual dimensions of timbre through similarity rating experiments, and link them to some spectral and/or signal variable.
   c) attempt to infer how timbre perception is influenced by cultural background and how it relates to listening context.
   d) attempt to infer the main physical dimensions of timbre through various forms of spectral analysis.