telecommunications &
signal processing
laboratory

TSP Speech Database

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Database Version: 2 (2018-11)

Revision History:

- 2018-10-28 v2 – Description of the updated speech database
- 2002-09-04 v1 – Initial version

Table of Contents

TSP Speech Database

This report describes the TSP speech database. The database consists of over 1400 utterances spoken by 24 speakers (half male, half female). The data was recorded to Digital Audio Tape in an anechoic room. The database includes the original samples (48 kHz sampling rate), and the same data filtered and subsampled to different sample rates.

1 Introduction

The TSP speech database consists of over 1400 utterances spoken by 24 speakers. The TSP database is aimed at making available a corpus of speech data to allow researchers and developers to be able to compare results from a common database.

1.1 Recording Conditions

The speech was recorded in an acoustic anechoic room at the Department of Electrical & Computer Engineering at McGill University, Montreal. The microphone was placed on a stand about 15 cm, slightly off-axis from the speaker. This placement was intended to provide as high a signal-to-noise ratio as possible without excessive "pops" due to breath noises (some pops still occur in the recordings). The recording gain was kept constant across all recordings.

The utterances were recorded at one sitting for each speaker. The text for the utterances was taken from the list of Harvard sentences [1]. These sentences are grouped into 72 lists, each with 10 sentences. The main recordings consist of 12 male and 12 female speakers. These speakers were for the most-part native English speakers (Canadian English), but a small number of speakers of other dialects of English and non-native speakers were included. Each speaker read aloud six lists (60 sentences). Each speaker was asked to read the sentences to himself or herself before the recording started. The Harvard sentences often have unusual word order, so even with this practice, some sentences had to be recorded more than once to get the text correct.

The recording equipment used was as follows:

Microphone:	Sony ECM-909A stereo microphone
Recorder:	Sony TCD-D3 DAT recorder

The digitized samples on the DAT tapes (48 kHz sampling rate) were transferred to computer files. The samples were passed through unaltered resulting in computer files with stereo data at a 48 kHz sampling rate.

Even with digital recording, background noise could be detected and seen visually on a waveform display. The predominant sources of noise were the microphone preamplifier and background acoustic noise—the observed noise was proportional to the microphone preamplifier gain.[1] More information on the noise is given in Appendix A.

Out of the 16-bit dynamic range [-32768, +32767], the maximum absolute value across all files is 30722.

1.2   Preliminary Processing

The first stage processing was to form the average of the left and right channels of the stereo output (the stereo microphone has closely spaced elements). This has the effect of reducing the uncorrelated preamplifier noise. At this stage, the recordings were segmented into individual sentences using a graphical waveform editor. We attempted to get to within 100 ms of the start and end of each utterance.

A dc offset could be clearly seen with the noise values in silence being raised above the baseline.[2] The dc offset tended to be fairly constant for each recording session, typically being near 10 units. An integer value of dc offset (the rounded average dc for each file) was subtracted from each file. The resulting samples for each utterance have dc levels between -0.5 and +0.5.

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[1]An alternate recording configuration using a Sennheiser 440HD (noise cancelling) microphone, a dbx 76 microphone preamplifier, and a Tascam D-60 DAT recorder was also tested. However the level of microphone preamplifier noise for this configuration was even larger than that for the setup used for the recordings.

[2] The microphone amplifier itself was AC coupled as could be seen in a baseline jump and decay after a sharp transient such as when the switch on the microphone was turned on or off.

2   Speech File Database

2.1   File Names

There were originally 12 female and 12 male speakers. The female speakers are designated as FA, FB, … , FL. The male speakers are designated as MA, MB, … , ML. Each speaker read aloud 6 groups of 10 sentences. Speakers FA and MA read sentences from the Harvard lists 1–6. Speakers FB and MB read sentences from the Harvard lists 7–12, and so on. Each sentence appears as a separate file. For instance, the file with name FE26_09 is sentence 9 from Harvard list 26, spoken by speaker FE. The text of the Harvard sentences is given in Appendix B.

After gathering the data, several recordings were accidentally overwritten. Thus sentences FE30_09 and FE30_10 are missing, as are all sentences spoke by speaker ME. The number of remaining files is 1378.

The recordings also include some sentences spoken by children. There are 60 sentences spoken by a 12 year old female (CA) and 6 sentences spoken by a 10 year old female (CB).

2.2   File Format

The sound files are WAVE files with a variable length header, followed by 16-bit data (little-endian byte order). In addition to file format information, the header contains documentation fields. To read the sound data from the files or to convert to other formats, the speech data must be extracted from the WAVE file using software that properly handles the header. *Simply assuming the header is fixed length is not appropriate.* Further information on the WAVE format can be found in [2].

The AFsp programs [3], specifically the CopyAudio program, can be used to change the file format, for instance to copy the files to a headerless format. The InfoAudio program can be used to print information on the file format and processing used.

The following printout from InfoAudio shows the layout of the header information for a sample WAVE file from the TSP speech database. The WAVE file format stores data in chunks – each chunk has a 4 byte identification and a 4 byte count, followed by data. The fmt chunk has format information (sampling frequency, number of channels, data format). Some of the information records are stored in the LIST chunk – in this case the title and date information is stored in the LIST chunk. Other information records are stored in the afsp chunk as zero-terminated text strings. The speech data samples are stored in the data chunk, starting 8 bytes after the beginning of the data chunk.

```
WAVE file: .../8k-G712/MC/MC16_03.wav
   Description: Male speaker, MC16_03 8k-G712
   Samples / channel : 14806 (1.851 s)  2018-11-22 22:21:35 UTC
   Sampling frequency: 8000 Hz
   Number of channels: 1 (16-bit integer)

--File format--
File name: MC16_03.wav
Header length: 558
Sampling frequency: 8000
No. frames: 14806
No. channels: 1
Data type: integer16
Data byte order: little-endian
Host byte order: little-endian

--Information records--
title: Male speaker, MC16_03 8k-G712
creation_date: 2018-11-22 22:21:35 UTC
database: TSP Speech Files v2
ID: TSP MC16_03 8k-G712
speaker: MC Male
text: "He broke a new shoelace that day."
recording_conditions:
  Anechoic room, Sony ECM-909A microphone,
  Sony TCD-D2 DAT recorder
processing: Filtered and subsampled 6:1
filter:
  ITU-T G.191 Software Tools Library
  7 kHz lowpass (168 coefficients at 48 kHz), file: STL_LPx3_FIR.cof
  G.712 filter (IIR 4 sections at 16 kHz), file: STL_G712_IIR_16k.cof

--File layout--
 <RIFF> 0 -> 30169
     <WAVE> 8 -> 11
     <fmt > 12 -> 35
       ...
     <LIST> 36 -> 117
          <INFO> 44 -> 47
          <INAM> 48 -> 85
            ...
          <ICRD> 86 -> 117
            ...
     <afsp> 118 -> 549
       ...
     <data> 550 -> 30169
       ...
 <EoF > 30170
```

2.3   Sampling Rates and Processing

The original sampled data is available as files with a 48 kHz sampling rate. Additionally, the data has been filtered and downsampled to other rates.

2.4   48 kHz Sampling Rate (48k)

The files available at a 48 kHz sampling rate are single channel files created by averaging the left and right channels of the raw recording as described above. The only filtering that has been applied is that due to the recording process itself. The Sony TCD-D3 used for recording the speech samples in the TSP speech database uses a sigma-delta converter with 64× oversampling followed by a 3-stage digital filter (linear phase). The A/D converter used in this recorder is the Cirrus Logic Crystal CS-5326. The on-chip filters provide for 0.01 dB passband ripple and an 86 dB stopband rejection. The overall response for recording at 48 kHz is flat from 20–20 000 Hz ±1 dB.

The database includes 1444 recordings with lengths varying from 1.341 s to 4.789 s with an average length 2.372 s. The total length of all files is 3436 s. The data has not been scaled in amplitude after recording. The standard deviations vary from a low of 138 to a high of 3755, with an average value of 1330. The low end is represented by the quiet-talking child CB. The mean values vary between -0.5 to +0.5.

The active speech level and activity factor was determined using the Speech Voltmeter algorithm of ITU-T Recommendation P.56 [4][5]. The active speech levels are between 142 and 3826 with an average value of 1374. The speech activity factor varies from 77% to 98% with an average value of 94%[3].

2.5   16 kHz Sampling Rate (16k-LP7)

The files at a 16 kHz rate were created by filtering and subsampling the 48 kHz data. The filter used is the High-Quality 3:1 Rate Change filter from the ITU-T Software Tools Library [6]. This is a 168 tap linear phase, lowpass FIR filter with normalized 24 bit coefficients.[4] The passband of this filter extends to 7040 Hz with a ripple of ±0.05 dB. The -3 dB point in the transition band is at approximately 7300 Hz. The stopband starts at 8000 Hz with a minimum attenuation of 78.8 dB. The filter response is shown in Fig. 1.

The filter is applied at 48 kHz and the output is subsampled by a factor of 3. The filtering is implemented such that the overall delay is 0.5 samples at 48 kHz (10.4 µs, corresponding to a

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[3] The active speech level gives a measure of the rms value of the speech while speech is active. The speech activity factor gives the fraction of the time that the speech is deemed to be active.

[4] The filter coefficients used here were extracted from the source code in the Software Tools Library and stored as a filter coefficient file. Other filters extracted from the Software Tools Library are available as filter coefficient files in the AFsp distribution [3].
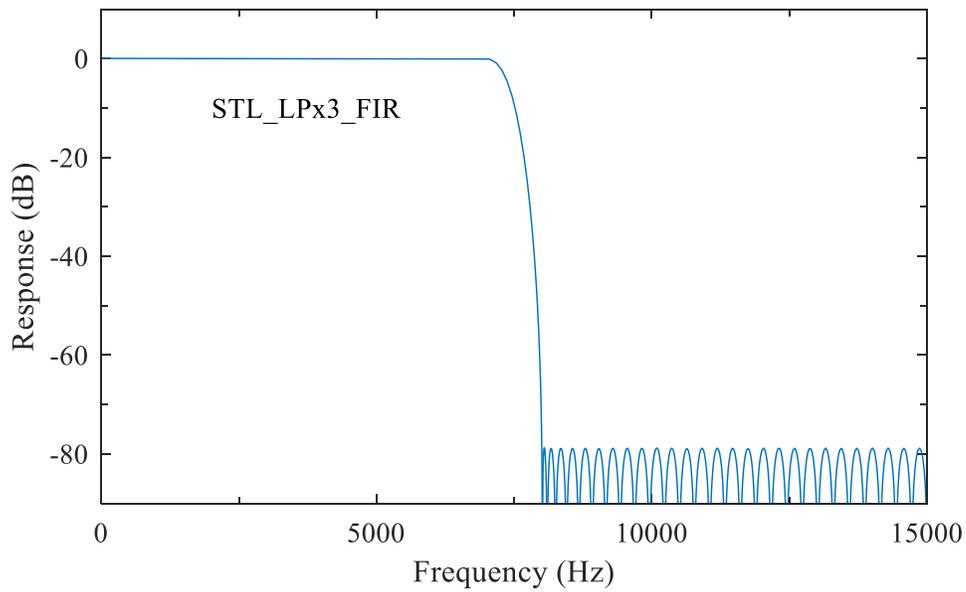
Fig. 1 Lowpass 3:1 decimation filter response at a 48 kHz sampling rate

delay of 1/6 sample at the 16 kHz sampling rate, and the duration of the output in seconds is the same as the length of the input. The effective response for 16 kHz sampling is shown in Fig. 2. Aliasing terms are well suppressed by the stopband attenuation of the filter.
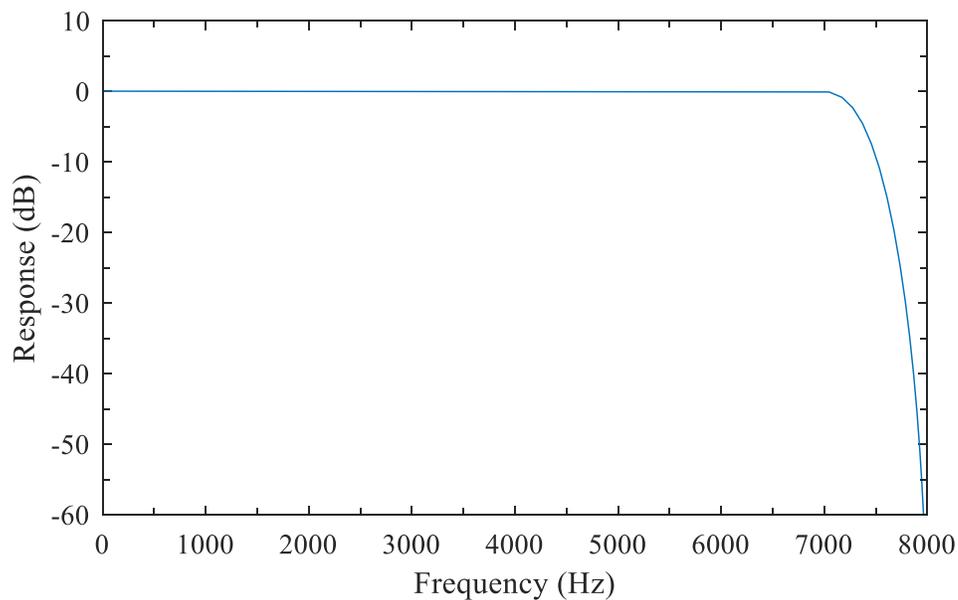

Fig. 2 Lowpass 3:1 decimation filter, response at a 16 kHz sampling rate

The lowpass filtering has little effect on the statistics: the standard deviation (average now 1324) and active speech level (average now 1370) are reduced by a fraction of a percent. This indicates that the original recordings at the 48 kHz sampling rate have very little energy above 7 kHz.

2.6 8 kHz Sampling Rate – Modified IRS Transmit Filtering (8k-mIRSS)

The Intermediate Reference System (IRS) response is specified in [7]. The modified version of this response for the sending end (modified IRS-send) [8] models the response of a telephone system with a coder in the handset. This response has been used for the development of the G.723.1 and G.729 coders and is being used for ITU-T 4 kb/s speech coder development [9].

Conceptually, the processing for modified IRS-send files consists of 3 steps.

1. Create samples at 16 kHz. The 3:1 decimation filter used to create the 16 kHz samples is applied.

2. The modified IRS-send filter is applied. This filter is from the ITU-T Software Tools Library [6] and operates at 16 kHz. The filter is a linear-phase FIR filter with 495 taps with normalized 16-bit coefficients. The modified IRS-send filter response is shown in Fig. 3.
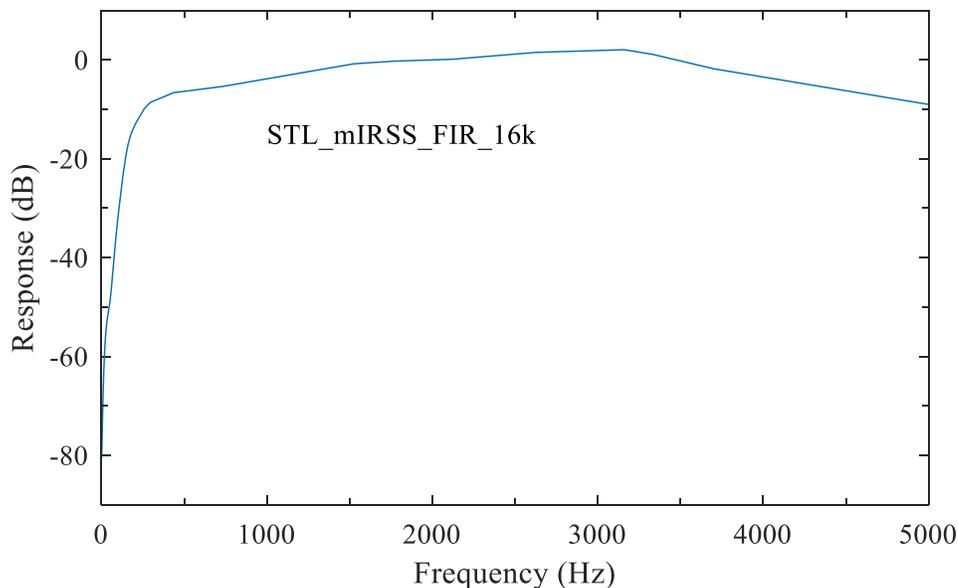

Fig. 3 Modified IRS filter (send side)

The speech is filtered for decimation to an 8 kHz sampling rate. The filter used is the High-Quality 2:1 Rate Change filter from the ITU-T Software Tools Library [6]. This is a 118 tap linear phase, lowpass FIR filter with normalized 24-bit coefficients. The passband of this filter extends

to 3520 Hz with a ripple of ±0.03 dB. The -3dB point in the transition band is at approximately 3660 Hz. The stopband starts at 4000 Hz with a minimum attenuation of 78.8 dB. The filter response is shown in Fig. 4.
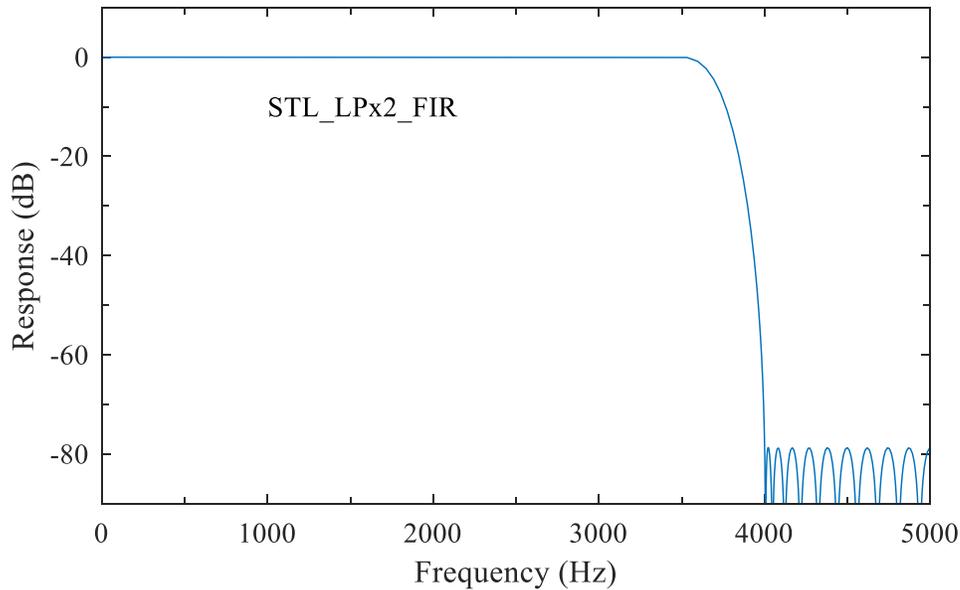

Fig. 4 Lowpass 2:1 Decimation filter

A composite filter was created from the 3 individual filters. The composite filter operates at 48 kHz and is formed as the convolution of (1) the 3:1 decimation filter, (2) the modified IRS-send filter upsampled to 48 kHz, and (3) the 2:1 decimation filter upsampled to 48 kHz. The composite filter is a linear phase FIR filter with 2001 taps. During filtering, the output is subsampled by a factor of 6 to create the samples at the 8 kHz sampling rate. The filtering is implemented with an overall delay of zero. The duration of the output in seconds is the same as the length of the input. The response at 8 kHz is shown in Fig. 5. The aliasing terms are well down, being suppressed by the stopband attenuations of one or both of the decimation filters.

The modified IRS-send filtering has a strong effect on the statistics. It de-emphasizes frequencies below 3 kHz at which the speech has significant energy. The average standard deviation relative to the 48 kHz files is reduced by 45%. The standard deviations for the modified IRS-send filtered files range from 67 to 2079 with an average value of 727. Likewise, the active speech levels are reduced: they now range from 70 to 2162, with an average value of 758. The mean of each file is nearly zero due to the suppression of low frequency components.
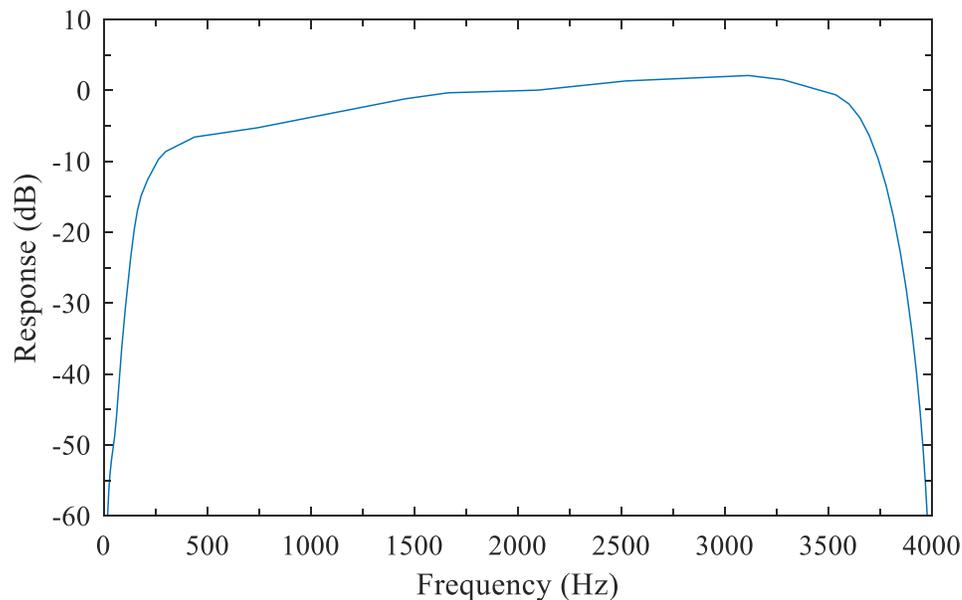
Fig. 5 Modified IRS-send filter at an 8 kHz sampling rate.

2.7   8 kHz Sampling Rate – PCM Filtering (8k-G712)

PCM filtering mimics the response of filters found in the A/D interface of PCM transmission systems as specified in ITU-T Recommendation G.712 [10]. This recommendation gives masks for the attenuation and group delay for the filter. The G.712 filter used is an IIR filter from the ITU-T Software Tools Library [6]. Fig. 6 shows the frequency response of this filter. At low frequencies, there are zeros at zero frequency and at about 50 Hz. The passband extends to about 3400 Hz. At 4000 Hz the response is about 16 dB down. The ultimate stopband attenuation is about 45 dB.

The processing to create the PCM filtered samples is implemented as two steps.

1.   Create samples at 16 kHz. The 3:1 decimation filter used to create the 16 kHz samples is applied. The filtering is implemented such that the overall delay is 0.5 samples at 48 kHz (10.4 μs) and the duration of the output in seconds is the same as the length of the input.The output is stored as 64-bit floating point values.

2.   The G.712 filter is applied and the output subsampled by a factor of two. The overall response at 8 kHz is shown in Fig. 7. Also shown on this figure is the aliased response (dashed line). The relatively small stopband attenuation means that some aliasing is present.
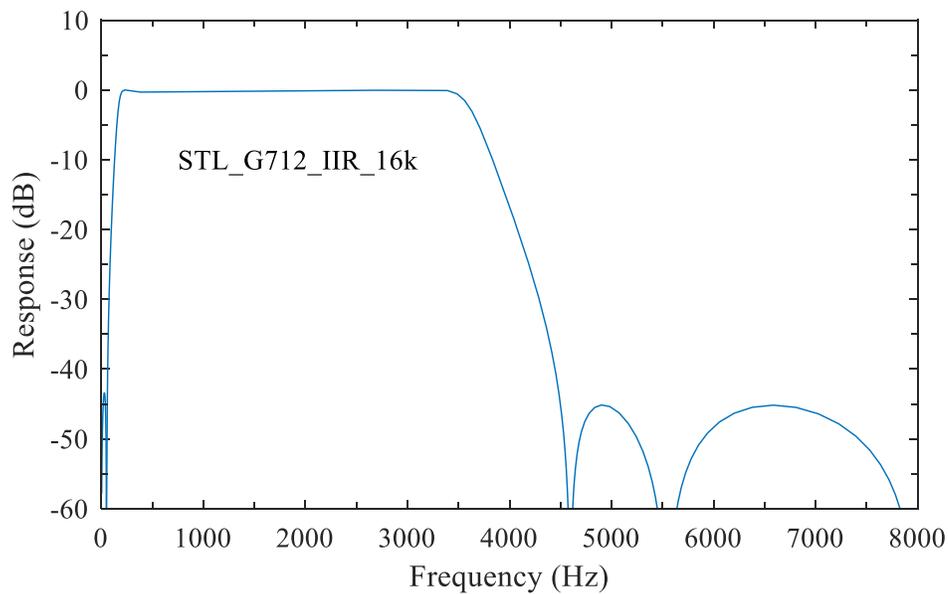
Fig. 6 PCM (G.712) filter response.
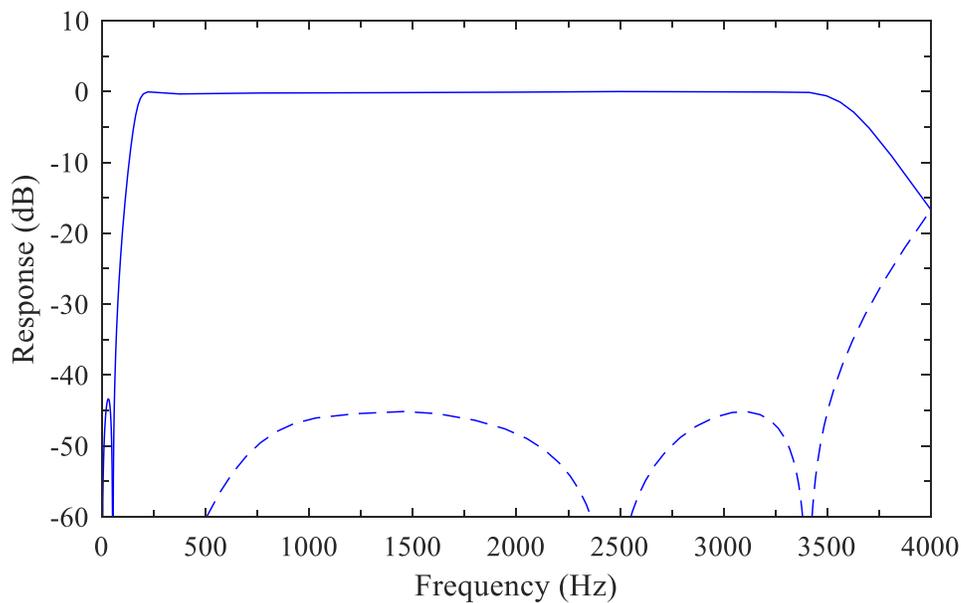
Fig. 7   PCM (G.712) filter response with 8 kHz sampling. The dashed line
                  shows the aliased response

The G.712 filtering has much less effect on the statistics than the modified IRS-send filter-
ing. The average standard deviation relative to the 48 kHz files is reduced by 5%. This reduction
is due to the bandpass filtering removing both low frequency and high frequency speech compo-
nents. The standard deviations range from 132 to 3640, with an average value of 1264. The active

speech levels range from 136 to 3720 with an average value of 1315. The mean of each file is nearly zero due to the suppression of low frequency components.

3   Notes on the TSP Speech Database

3.1   Amplitude Scaling

The amplitudes of the speech files have not been scaled after recording. The range of speech levels is indicative of the variation between speakers. For some applications, scaling to a common active speech level may be appropriate. For instance the test plan for the G.729 codec tests [9] specifies that the speech level should be adjusted to -30.15 dBov (dB relative to overload). This corresponds to an active speech level equal to 1018.

3.2   Children's Voices

The database includes recordings of two children (CA and CB). These may be useful for testing for sensitivity to high pitch values. However, the number of such examples is small. They should be considered to be "extras", outside of the main database of adult male and female voices.

3.3   Training Set / Test Set

For some applications, development is based on a training set, but is evaluated on a separate test set. For such purposes it is suggested that speakers FK, FL, MK and ML be set aside as the test set, with the remaining sentences (excluding the children CA and CB) forming the training set.

3.4   Changes to the Speech Files in this Version

The sound files have been recreated from the original recorded files. The sound data between this version and the previous version was compared. The sound data in 48 kHz files is bit-for-bit the same. For the filtered files, minor changes in sound data was found. In the Version 1 database, the filtering in the FiltAudio program used 32-bit floating point computations, while for the Version 2 database, the updated FiltAudio program uses 64-bit floating point computations. This difference results in a very small number of samples in some files differing by 1 unit in the -32768 to 32767 data scale. In addition, it was noticed that the modified IRS filter coefficients STL_mIRSS_FIR_16k describe a filter response which has a negative valued main lobe. To compensate, in Version 2 the samples for the 8k_mIRSS files are negated relative to those in Version 1.

3.5 Document and Database Repository

This document and other reports can be found at http://www-MMSP.ece.mcgill.ca/Documents/Reports. The TSP speech database can be found at http://www-MMSP.ece.mcgill.ca/Documents/Data.

3.6 Database Licence

The database is made available subject to the terms of the following permissive Simplified BSD licence.

4   References

1. IEEE Subcommittee on Subjective Measurements, "IEEE Recommended Practice for Speech Quality Measurements", *IEEE Trans. Audio and Electroacoustics*, vol. AU-17, no. 3, pp. 225–246, Sept. 1969 (IEEE Standards Publication No. 297-1969).

2. P. Kabal, *Audio File Format Specifications*, web document: http://www-mmsp.ece.mcgill.ca/Documents/AudioFormats.

3. P. Kabal, *Audio File I/O Routines*, web address: http://www-mmsp.ece.mcgill.ca/Documents/Software.

4. ITU-T Recommendation P.56, *Objective Measurement of Active Speech Level*, Geneva, Dec. 2011.

5. P. Kabal, *Measuring Speech Activity*, Technical Report, Aug. 1997 (revised Aug. 1999), web document: http://www-mmsp.ece.mcgill.ca/Documents/Reports.

6. ITU-T, Recommendation G.191, *Software Tools for Speech and Audio Coding Standardization*, Geneva, March 2010.

7. ITU-T, Recommendation P.48, *Specification for an Intermediate Reference System, Geneva*, Nov. 1988.

8. ITU-T, Recommendation P.830, *Subjective Performance Assessment of Telephone-Band and Wideband Digital Codecs*, Geneva, Feb. 1996.

9. ITU-T Study Group 12, *Subjective Test Plan for Characterization of an 8 kbit/s Speech Codec*, Document SQ-46.95R3 (Issue 2), Sept. 1995, (included in ITU-T Supplement P.23, *ITU-T Speech Database*, Feb. 1998).

10. ITU-T, Recommendation G.712. *Transmission Performance Characteristics for Pulse Code Modulation Channels*, Geneva, Nov. 2001.

Appendix A   Background Noise

Samples of the *open*-microphone signal were recorded. The DAT recorder was running on battery power. The resulting signal consists of mostly preamplifier noise, but also includes ambient acoustic noise. The figure below shows the noise signal for the left channel, the right channel, and the combined result. The waveforms (48 kHz sampling rate) show the noise near the beginning of a 3 second recording and near the end of the same recording.

The standard deviation for each of the left and right signals is about 8.4 units. Averaging the channels reduces the standard deviation to about 6.7. The reduction in amplitude is about 2 dB, less than the amount that would be expected if the noise in the channels was uncorrelated. The combined result has also had the mean removed. In this case the value 8 was subtracted from the averaged channels.
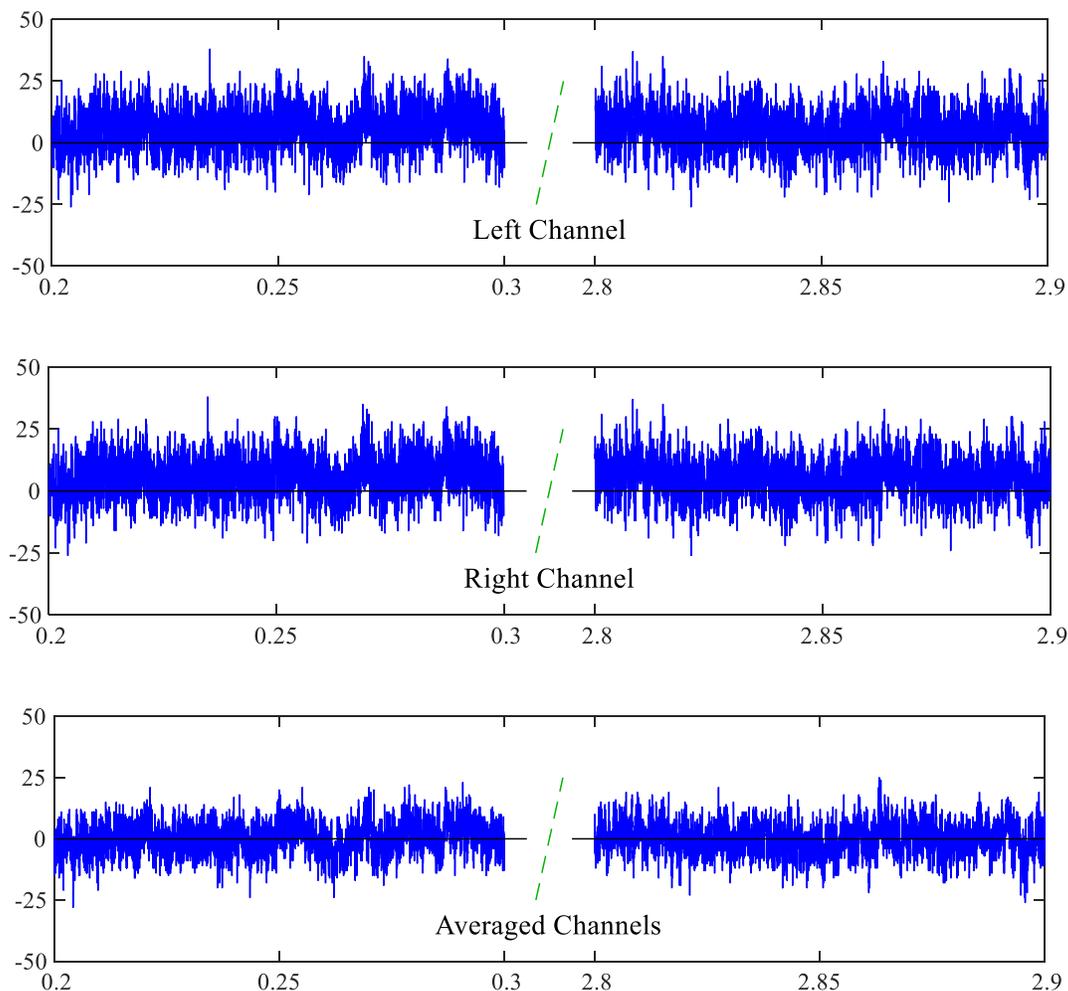
Fig. 8 Noise waveforms: Top: left channel, Middle: right channel, Bottom: combined channels

The signal-to-noise ratio for a full-scale sine (rms value 23170) for the sample noise is 70.5 dB. For the utterances recorded at 48 kHz, the average active speech level of 1374 gives an SNR of about 46 dB.

When the noise is filtered to 16 kHz, the rms value of the noise is reduced by 2 dB, less than the amount to be expected if the noise were white. The SNR's increase by the same amount.

When filtering with the modified IRS-send filter, the rms value of the noise is 3.1. However, the speech amplitude is also reduced by this type of filtering. For the average active speech level of the filtered speech (758), the SNR is 48 dB (compared to 46 dB for the 48 kHz sampled speech).

When filtered with the G.712 filter, the rms value of the noise is 4.0. For the average active speech level of 1315, the SNR is 50 dB.

Appendix B Harvard Sentences

This appendix contains the revised list of phonetically balanced sentences (the Harvard Sentences). These sentences appear as Appendix C in [1].[5]

List 1

The birch canoe slid on the smooth planks.
Glue the sheet to the dark blue background.
It's easy to tell the depth of a well.
These days a chicken leg is a rare dish.
Rice is often served in round bowls.
The juice of lemons makes fine punch.
The box was thrown beside the parked truck.
The hogs were fed chopped corn and garbage.
Four hours of steady work faced us.
A large size in stockings is hard to sell.

List 2

The boy was there when the sun rose.
A rod is used to catch pink salmon.
The source of the huge river is the clear spring.
Kick the ball straight and follow through.
Help the woman get back to her feet.
A pot of tea helps to pass the evening.
Smoky fires lack flame and heat.
The soft cushion broke the man's fall.
The salt breeze came across from the sea.
The girl at the booth sold fifty bonds.

List 3

The small pup gnawed a hole in the sock.
The fish twisted and turned on the bent hook.
Press the pants and sew a button on the vest.
The swan dive was far short of perfect.
The beauty of the view stunned the young boy.
Two blue fish swam in the tank.
Her purse was full of useless trash.
The colt reared and threw the tall rider.
It snowed, rained, and hailed the same morning.
Read verse out loud for pleasure.

List 4

Hoist the load to your left shoulder.
Take the winding path to reach the lake.
Note closely the size of the gas tank.
Wipe the grease off his dirty face.
Mend the coat before you go out.
The wrist was badly strained and hung limp.
The stray cat gave birth to kittens.
The young girl gave no clear response.
The meal was cooked before the bell rang.
What joy there is in living.

List 5

A king ruled the state in the early days.
The ship was torn apart on the sharp reef.
Sickness kept him home the third week.
The wide road shimmered in the hot sun.
The lazy cow lay in the cool grass.
Lift the square stone over the fence.
The rope will bind the seven books at once.
Hop over the fence and plunge in.
The friendly gang left the drug store.
Mesh wire keeps chicks inside.

List 6

The frost air passed through the coat.
The crooked maze failed to fool the mouse.
Adding fast leads to wrong sums.
The show was a flop from the very start.
A saw is a tool used for making boards.
The wagon moved on well oiled wheels.
March the soldiers past the next hill.
A cup of sugar makes sweet fudge.
Place a rosebush near the porch steps.
Both lost their lives in the raging storm.

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[5] In List 33, second sentence, "smoke" was changed to the more grammatical "smoked".

List 7

We talked of the side show in the circus.
Use a pencil to write the first draft.
He ran half way to the hardware store.
The clock struck to mark the third period.
A small creek cut across the field.
Cars and busses stalled in snow drifts.
The set of china hit the floor with a crash.
This is a grand season for hikes on the road.
The dune rose from the edge of the water.
Those words were the cue for the actor to leave.

List 8

A yacht slid around the point into the bay.
The two met while playing on the sand.
The ink stain dried on the finished page.
The walled town was seized without a fight.
The lease ran out in sixteen weeks.
A tame squirrel makes a nice pet.
The horn of the car woke the sleeping cop.
The heart beat strongly and with firm strokes.
The pearl was worn in a thin silver ring.
The fruit peel was cut in thick slices.

List 9

The Navy attacked the big task force.
See the cat glaring at the scared mouse.
There are more than two factors here.
The hat brim was wide and too droopy.
The lawyer tried to lose his case.
The grass curled around the fence post.
Cut the pie into large parts.
Men strive but seldom get rich.
Always close the barn door tight.
He lay prone and hardly moved a limb.

List 10

The slush lay deep along the street.
A wisp of cloud hung in the blue air.
A pound of sugar costs more than eggs.
The fin was sharp and cut the clear water.
The play seems dull and quite stupid.
Bail the boat to stop it from sinking.
The term ended in late June that year.
A tusk is used to make costly gifts.
Ten pins were set in order.
The bill was paid every third week.

List 11

Oak is strong and also gives shade.
Cats and dogs each hate the other.
The pipe began to rust while new.
Open the crate but don't break the glass.
Add the sum to the product of these three.
Thieves who rob friends deserve jail.
The ripe taste of cheese improves with age.
Act on these orders with great speed.
The hog crawled under the high fence.
Move the vat over the hot fire.

List 12

The bark of the pine tree was shiny and dark.
Leaves turn brown and yellow in the fall.
The pennant waved when the wind blew.
Split the log with a quick, sharp blow.
Burn peat after the logs give out.
He ordered peach pie with ice cream.
Weave the carpet on the right hand side.
Hemp is a weed found in parts of the tropics.
A lame back kept his score low.
We find joy in the simplest things.

List 13

Type out three lists of orders.
The harder he tried the less he got done.
The boss ran the show with a watchful eye.
The cup cracked and spilled its contents.
Paste can cleanse the most dirty brass.
The slang word for raw whiskey is booze.
It caught its hind paw in a rusty trap.
The wharf could be seen at the farther shore.
Feel the heat of the weak dying flame.
The tiny girl took off her hat.

List 14

A cramp is no small danger on a swim.
He said the same phrase thirty times.
Pluck the bright rose without leaves.
Two plus seven is less than ten.
The glow deepened in the eyes of the sweet girl.
Bring your problems to the wise chief.
Write a fond note to the friend you cherish.
Clothes and lodging are free to new men.
We frown when events take a bad turn.
Port is a strong wine with a smoky taste.

List 15

The young kid jumped the rusty gate.
Guess the results from the first scores.
A salt pickle tastes fine with ham.
The just claim got the right verdict.
These thistles bend in a high wind.
Pure bred poodles have curls.
The tree top waved in a graceful way.
The spot on the blotter was made by green ink.
Mud was spattered on the front of his white shirt.
The cigar burned a hole in the desk top.

List 16

The empty flask stood on the tin tray.
A speedy man can beat this track mark.
He broke a new shoelace that day.
The coffee stand is too high for the couch.
The urge to write short stories is rare.
The pencils have all been used.
The pirates seized the crew of the lost ship.
We tried to replace the coin but failed.
She sewed the torn coat quite neatly.
The sofa cushion is red and of light weight.

List 17

The jacket hung on the back of the wide chair.
At that high level the air is pure.
Drop the two when you add the figures.
A filing case is now hard to buy.
An abrupt start does not win the prize.
Wood is best for making toys and blocks.
The office paint was a dull, sad tan.
He knew the skill of the great young actress.
A rag will soak up spilled water.
A shower of dirt fell from the hot pipes.

List 18

Steam hissed from the broken valve.
The child almost hurt the small dog.
There was a sound of dry leaves outside.
The sky that morning was clear and bright blue.
Torn scraps littered the stone floor.
Sunday is the best part of the week.
The doctor cured him with these pills.
The new girl was fired today at noon.
They felt gay when the ship arrived in port.
Add the store's account to the last cent.

List 19

Acid burns holes in wool cloth.
Fairy tales should be fun to write.
Eight miles of woodland burned to waste.
The third act was dull and tired the players.
A young child should not suffer fright.
Add the column and put the sum here.
We admire and love a good cook.
There the flood mark is ten inches.
He carved a head from the round block of marble.
She has a smart way of wearing clothes.

List 20

The fruit of a fig tree is apple-shaped.
Corn cobs can be used to kindle a fire.
Where were they when the noise started?
The paper box is full of thumb tacks.
Sell your gift to a buyer at a good gain.
The tongs lay beside the ice pail.
The petals fall with the next puff of wind.
Bring your best compass to the third class.
They could laugh although they were sad.
Farmers came in to thresh the oat crop.

List 21

The brown house was on fire to the attic.
The lure is used to catch trout and flounder.
Float the soap on top of the bath water.
A blue crane is a tall wading bird.
A fresh start will work such wonders.
The club rented the rink for the fifth night.
After the dance, they went straight home.
The hostess taught the new maid to serve.
He wrote his last novel there at the inn.
Even the worst will beat his low score.

List 22

The cement had dried when he moved it.
The loss of the second ship was hard to take.
The fly made its way along the wall.
Do that with a wooden stick.
Live wires should be kept covered.
The large house had hot water taps.
It is hard to erase blue or red ink.
Write at once or you may forget it.
The doorknob was made of bright clean brass.
The wreck occurred by the bank on Main Street.

List 23

A pencil with black lead writes best.
Coax a young calf to drink from a bucket.
Schools for ladies teach charm and grace.
The lamp shone with a steady green flame.
They took the axe and the saw to the forest.
The ancient coin was quite dull and worn.
The shaky barn fell with a loud crash.
Jazz and swing fans like fast music.
Rake the rubbish up and then burn it.
Slash the gold cloth into fine ribbons.

List 24

Try to have the court decide the case.
They are pushed back each time they attack.
He broke his ties with groups of former friends.
They floated on the raft to sun their white backs.
The map had an X that meant nothing.
Whitings are small fish caught in nets.
Some ads serve to cheat buyers.
Jerk the rope and the bell rings weakly.
A waxed floor makes us lose balance.
Madam, this is the best brand of corn.

List 25

On the islands the sea breeze is soft and mild.
The play began as soon as we sat down.
This will lead the world to more sound and fury.
Add salt before you fry the egg.
The rush for funds reached its peak Tuesday.
The birch looked stark white and lonesome.
The box is held by a bright red snapper.
To make pure ice, you freeze water.
The first worm gets snapped early.
Jump the fence and hurry up the bank.

List 26

Yell and clap as the curtain slides back.
They are men who walk the middle of the road.
Both brothers wear the same size.
In some form or other we need fun.
The prince ordered his head chopped off.
The houses are built of red clay bricks.
Ducks fly north but lack a compass.
Fruit flavors are used in fizz drinks.
These pills do less good than others.
Canned pears lack full flavor.

List 27

The dark pot hung in the front closet.
Carry the pail to the wall and spill it there.
The train brought our hero to the big town.
We are sure that one war is enough.
Gray paint stretched for miles around.
The rude laugh filled the empty room.
High seats are best for football fans.
Tea served from the brown jug is tasty.
A dash of pepper spoils beef stew.
A zestful food is the hot-cross bun.

List 28

The horse trotted around the field at a brisk pace.
Find the twin who stole the pearl necklace.
Cut the cord that binds the box tightly.
The red tape bound the smuggled food.
Look in the corner to find the tan shirt.
The cold drizzle will halt the bond drive.
Nine men were hired to dig the ruins.
The junk yard had a mouldy smell.
The flint sputtered and lit a pine torch.
Soak the cloth and drown the sharp odor.

List 29

The shelves were bare of both jam or crackers.
A joy to every child is the swan boat.
All sat frozen and watched the screen.
A cloud of dust stung his tender eyes.
To reach the end he needs much courage.
Shape the clay gently into block form.
A ridge on a smooth surface is a bump or flaw.
Hedge apples may stain your hands green.
Quench your thirst, then eat the crackers.
Tight curls get limp on rainy days.

List 30

The mute muffled the high tones of the horn.
The gold ring fits only a pierced ear.
The old pan was covered with hard fudge.
Watch the log float in the wide river.
The node on the stalk of wheat grew daily.
The heap of fallen leaves was set on fire.
Write fast if you want to finish early.
His shirt was clean but one button was gone.
The barrel of beer was a brew of malt and hops.
Tin cans are absent from store shelves.

List 31

Slide the box into that empty space.
The plant grew large and green in the window.
The beam dropped down on the workman's head.
Pink clouds floated with the breeze.
She danced like a swan, tall and graceful.
The tube was blown and the tire flat and useless.
It is late morning on the old wall clock.
Let's all join as we sing the last chorus.
The last switch cannot be turned off.
The fight will end in just six minutes.

List 32

The store walls were lined with colored frocks.
The peace league met to discuss their plans.
The rise to fame of a person takes luck.
Paper is scarce, so write with much care.
The quick fox jumped on the sleeping cat.
The nozzle of the fire hose was bright brass.
Screw the round cap on as tight as needed.
Time brings us many changes.
The purple tie was ten years old.
Men think and plan and sometimes act.

List 33

Fill the ink jar with sticky glue.
He smoked a big pipe with strong contents.
We need grain to keep our mules healthy.
Pack the records in a neat thin case.
The crunch of feet in the snow was the only sound.
The copper bowl shone in the sun's rays.
Boards will warp unless kept dry.
The plush chair leaned against the wall.
Glass will clink when struck by metal.
Bathe and relax in the cool green grass.

List 34

Nine rows of soldiers stood in line.
The beach is dry and shallow at low tide.
The idea is to sew both edges straight.
The kitten chased the dog down the street.
Pages bound in cloth make a book.
Try to trace the fine lines of the painting.
Women form less than half of the group.
The zones merge in the central part of town.
A gem in the rough needs work to polish.
Code is used when secrets are sent.

List 35

Most of the news is easy for us to hear.
He used the lathe to make brass objects.
The vane on top of the pole revolved in the wind.
Mince pie is a dish served to children.
The clan gathered on each dull night.
Let it burn, it gives us warmth and comfort.
A castle built from sand fails to endure.
A child's wit saved the day for us.
Tack the strip of carpet to the worn floor.
Next Tuesday we must vote.

List 36

Pour stew from the pot into the plate.
Each penny shone like new.
The man went to the woods to gather sticks.
The dirt piles were lines along the road.
The logs fell and tumbled into the clear stream.
Just hoist it up and take it away.
A ripe plum is fit for a king's palate.
Our plans right now are hazy.
Brass rings are sold by these natives.
It takes a good trap to capture a bear.

List 37

Feed the white mouse some flower seeds.
The thaw came early and freed the stream.
He took the lead and kept it the whole distance.
The key you designed will fit the lock.
Plead to the council to free the poor thief.
Better hash is made of rare beef.
This plank was made for walking on.
The lake sparkled in the red hot son.
He crawled with care along the ledge.
Tend the sheep while the dog wanders.

List 38

It takes a lot of help to finish these.
Mark the spot with a sign painted red.
Take two shares as a fair profit.
The fur of cats goes by many names.
North winds bring colds and fevers.
He asks no person to vouch for him.
Go now and come here later.
A sash of gold silk will trim her dress.
Soap can wash most dirt away.
That move means the game is over.

List 39

He wrote down a long list of items.
A siege will crack the strong defense.
Grape juice and water mix well.
Roads are paved with sticky tar.
Fake stones shine but cost little.
The drop of the rain made a pleasant sound.
Smoke poured out of every crack.
Serve the hot rum to the tired heroes.
Much of the story makes good sense.
The sun came up to light the eastern sky.

List 40

Heave the line over the port side.
A lathe cuts and trims any wood.
It's a dense crowd in two distinct ways.
His hip struck the knee of the next player.
The stale smell of old beer lingers.
The desk was firm on the shaky floor.
It takes heat to bring out the odor.
Beef is scarcer than some lamb.
Raise the sail and steer the ship northward.
A cone cost five cents on Mondays.

List 41

A pod is what peas always grow in.
Jerk the dart from the cork target.
No cement will hold hard wood.
We now have a new base for shipping.
A list of names is carved around the base.
The sheep were led home by a dog.
Three for a dime, the young peddler cried.
The sense of smell is better than that of touch.
No hardship seemed to keep him sad.
Grace makes up for lack of beauty.

List 42

Nudge gently but wake her now.
The news struck doubt into restless minds.
Once we stood beside the shore.
A chink in the wall allowed a draft to blow.
Fasten two pins on each side.
A cold dip restores health and zest.
He takes the oath of office each March.
The sand drifts over the sill of the old house.
The point of the steel pen was bent and twisted.
There is a lag between thought and act.

List 43

Seed is needed to plant the spring corn.
Draw the chart with heavy black lines.
The boy owed his pal thirty cents.
The chap slipped into the crowd and was lost.
Hats are worn to tea and not to dinner.
The ramp led up to the wide highway.
Beat the dust from the rug onto the lawn.
Say it slowly but make it ring clear.
The straw nest housed five robins.
Screen the porch with woven straw mats.

List 44

This horse will nose his way to the finish.
The dry wax protects the deep scratch.
He picked up the dice for a second roll.
These coins will be needed to pay his debt.
The nag pulled the frail cart along.
Twist the valve and release hot steam.
The vamp of the shoe had a gold buckle.
The smell of burned rags itches my nose.
New pants lack cuffs and pockets.
The marsh will freeze when cold enough.

List 45

They slice the sausage thin with a knife.
The bloom of the rose lasts a few days.
A gray mare walked before the colt.
Breakfast buns are fine with a hot drink.
Bottles hold four kinds of rum.
The man wore a feather in his felt hat.
He wheeled the bike past the winding road.
Drop the ashes on the worn old rug.
The desk and both chairs were painted tan.
Throw out the used paper cup and plate.

List 46

A clean neck means a neat collar.
The couch cover and hall drapes were blue.
The stems of the tall glasses cracked and broke.
The wall phone rang loud and often.
The clothes dried on a thin wooden rack.
Turn on the lantern which gives us light.
The cleat sank deeply into the soft turf.
The bills were mailed promptly on the tenth of the month.
To have is better than to wait and hope.
The price is fair for a good antique clock.

List 47

The music played on while they talked.
Dispense with a vest on a day like this.
The bunch of grapes was pressed into wine.
He sent the figs, but kept the ripe cherries.
The hinge on the door creaked with old age.
The screen before the fire kept in the sparks.
Fly by night, and you waste little time.
Thick glasses helped him read the print.
Birth and death mark the limits of life.
The chair looked strong but had no bottom.

List 48

The kite flew wildly in the high wind.
A fur muff is stylish once more.
The tin box held priceless stones.
We need an end of all such matters.
The case was puzzling to the old and wise.
The bright lanterns were gay on the dark lawn.
We don't get much money but we have fun.
The youth drove with zest, but little skill.
Five years he lived with a shaggy dog.
A fence cuts through the corner lot.

List 49

The way to save money is not to spend much.
Shut the hatch before the waves push it in.
The odor of spring makes young hearts jump.
Crack the walnut with your sharp side teeth.
He offered proof in the form of a large chart.
Send the stuff in a thick paper bag.
A quart if milk is water for the most part.
They told wild tales to frighten him.
The three story house was built of stone.
In the rear of the ground floor was a large passage.

List 50

A man in a blue sweater sat at the desk.
Oats are a food eaten by horse and man.
Their eyelids droop for want of sleep.
A sip of tea revives his tired friend.
There are many ways to do these things.
Tuck the sheet under the edge of the mat.
A force equal to that would move the earth.
We like to see clear weather.
The work of the tailor is seen on each side.
Take a chance and win a china doll.

List 51

Shake the dust from your shoes, stranger.
She was kind to sick old people.
The square wooden crate was packed to be shipped.
The dusty bench stood by the stone wall.
We dress to suit the weather of most days.
Smile when you say nasty words.
A bowl of rice is free with chicken stew.
The water in this well is a source of good health.
Take shelter in this tent, but keep still.
That guy is the writer of a few banned books.

List 52

The little tales they tell are false.
The door was barred, locked, and bolted as well.
Ripe pears are fit for a queen's table.
A big wet stain was on the round carpet.
The kite dipped and swayed, but stayed aloft.
The pleasant hours fly by much too soon.
The room was crowded with a wild mob.
This strong arm shall shield your honor.
She blushed when he gave her a white orchid.
The beetle droned in the hot June sun.

List 53

Press the pedal with your left foot.
Neat plans fail without luck.
The black trunk fell from the landing.
The bank pressed for payment of the debt.
The theft of the pearl pin was kept secret.
Shake hands with this friendly child.
The vast space stretched into the far distance.
A rich farm is rare in this sandy waste.
His wide grin earned many friends.
Flax makes a fine brand of paper.

List 54

Hurdle the pit with the aid of a long pole.
A strong bid may scare your partner stiff.
Even a just cause needs power to win.
Peep under the tent and see the clowns.
The leaf drifts along with a slow spin.
Cheap clothes are flashy but don't last.
A thing of small note can cause despair.
Flood the mails with requests for this book.
A thick coat of black paint covered all.
The pencil was cut to be sharp at both ends.

List 55

Those last words were a strong statement.
He wrote his name boldly at the top of the sheet.
Dill pickles are sour but taste fine.
Down that road is the way to the grain farmer.
Either mud or dust are found at all times.
The best method is to fix it in place with clips.
If you mumble your speech will be lost.
At night the alarm roused him from a deep sleep.
Read just what the meter says.
Fill your pack with bright trinkets for the poor.

List 56

The small red neon lamp went out.
Clams are small, round, soft, and tasty.
The fan whirled its round blades softly.
The line where the edges join was clean.
Breathe deep and smell the piney air.
It matters not if he reads these words or those.
A brown leather bag hung from its strap.
A toad and a frog are hard to tell apart.
A white silk jacket goes with any shoes.
A break in the dam almost caused a flood.

List 57

Paint the sockets in the wall dull green.
The child crawled into the dense grass.
Bribes fail where honest men work.
Trample the spark, else the flames will spread.
The hilt of the sword was carved with fine designs.
A round hole was drilled through the thin board.
Footprints showed the path he took up the beach.
She was waiting at my front lawn.
A vent near the edge brought in fresh air.
Prod the old mule with a crooked stick.

List 58

It is a band of steel three inches wide.
The pipe ran almost the length of the ditch.
It was hidden from sight by a mass of leaves and shrubs.
The weight of the package was seen on the high scale.
Wake and rise, and step into the green outdoors.
The green light in the brown box flickered.
The brass tube circled the high wall.
The lobes of her ears were pierced to hold rings.
Hold the hammer near the end to drive the nail.
Next Sunday is the twelfth of the month.

List 59

Every word and phrase he speaks is true.
He put his last cartridge into the gun and fired.
They took their kids from the public school.
Drive the screw straight into the wood.
Keep the hatch tight and the watch constant.
Sever the twine with a quick snip of the knife.
Paper will dry out when wet.
Slide the catch back and open the desk.
Help the weak to preserve their strength.
A sullen smile gets few friends.

List 60

Stop whistling and watch the boys march.
Jerk the cord, and out tumbles the gold.
Slide the tray across the glass top.
The cloud moved in a stately way and was gone.
Light maple makes for a swell room.
Set the piece here and say nothing.
Dull stories make her laugh.
A stiff cord will do to fasten your shoe.
Get the trust fund to the bank early.
Choose between the high road and the low.

List 61

A plea for funds seems to come again.
He lent his coat to the tall gaunt stranger.
There is a strong chance it will happen once more.
The duke left the park in a silver coach.
Greet the new guests and leave quickly.
When the frost has come it is time for turkey.
Sweet words work better than fierce.
A thin stripe runs down the middle.
A six comes up more often than a ten.
Lush fern grow on the lofty rocks.

List 62

The ram scared the school children off.
The team with the best timing looks good.
The farmer swapped his horse for a brown ox.
Sit on the perch and tell the others what to do.
A steep trail is painful for our feet.
The early phase of life moves fast.
Green moss grows on the northern side.
Tea in thin china has a sweet taste.
Pitch the straw through the door of the stable.
The latch on the back gate needed a nail

List 63

The goose was brought straight from the old market.
The sink is the thing in which we pile dishes.
A whiff of it will cure the most stubborn cold.
The facts don't always show who is right.
She flaps her cape as she parades the street.
The loss of the cruiser was a blow to the fleet.
Loop the braid to the left and then over.
Plead with the lawyer to drop the lost cause.
Calves thrive on tender spring grass.
Post no bills on this office wall.

List 64

Tear a thin sheet from the yellow pad.
A cruise in warm waters in a sleep yacht is fun.
A streak of color ran down the left edge.
It was done before the boy could see it.
Crouch before you jump or miss the mark.
Pack the kits and don't forget the salt.
The square peg will settle in the round hole.
Fine soap saves tender skin.
Poached eggs and tea must suffice.
Bad nerves are jangled by a door slam.

List 65

Ship maps are different from those for planes.
Dimes showered down from all sides.
They sang the same tunes at each party.
The sky in the west is tinged with orange red.
The pods of peas ferment in bare fields.
The horse balked and threw the tall rider.
The hitch between the horse and cart broke.
Pile the coal high in the shed corner.
A gold vase is both rare and costly.
The knife was hung inside its bright sheath.

List 66

The rarest spice comes from the far East.
The roof should be tilted at a sharp slant.
A smatter of French is worse than none.
The mule trod the treadmill day and night.
The aim of the contest is to raise a great fund.
To send it now in large amounts is bad.
There is a fine hard tang in salty air.
Cod is the main business of the north shore.
The slab was hewn from heavy blocks of slate.
Dunk the stale biscuits into strong drink.

List 67

Hang tinsel from both branches.
Cap the jar with a tight brass cover.
The poor boy missed the boat again.
Be sure to set the lamp firmly in the hole.
Pick a card and slip it under the pack.
A round mat will cover the dull spot.
The first part of the plan needs changing.
A good book informs of what we ought to know.
The mail comes in three batches per day.
You cannot brew tea in a cold pot.

List 68

Dots of light betrayed the black cat.
Put the chart on the mantel and tack it down.
The night shift men rate extra pay.
The red paper brightened the dim stage.
See the player scoot to third base.
Slide the bill between the two leaves.
Many hands help get the job done.
We don't like to admit our small faults.
No doubt about the way the wind blows.
Dig deep in the earth for pirate's gold.

List 69

The steady drip is worse than a drenching rain.
A flat pack takes less luggage space.
Green ice frosted the punch bowl.
A stuffed chair slipped from the moving van.
The stitch will serve but needs to be shortened.
A thin book fits in the side pocket.
The gloss on top made it unfit to read.
The hail pattered on the burnt brown grass.
Seven seals were stamped on great sheets.
Our troops are set to strike heavy blows.

List 70

The store was jammed before the sale could start.
It was a bad error on the part of the new judge.
One step more and the board will collapse.
Take the match and strike it against your shoe.
The pot boiled, but the contents failed to jell.
The baby puts his right foot in his mouth.
The bombs left most of the town in ruins.
Stop and stare at the hard working man.
The streets are narrow and full of sharp turns.
The pup jerked the leash as he saw a feline shape.

List 71

Open your book to the first page.
Fish evade the net and swim off.
Dip the pail once and let it settle.
Will you please answer that phone.
The big red apple fell to the ground.
The curtain rose and the show was on.
The young prince became heir to the throne.
He sent the boy on a short errand.
Leave now and you will arrive on time.
The corner store was robbed last night.

List 72

A gold ring will please most any girl.
The long journey home took a year.
She saw a cat in the neighbor's house.
A pink shell was found on the sandy beach.
Small children came to see him.
The grass and bushes were wet with dew.
The blind man counted his old coins.
A severe storm tore down the barn.
She called his name many times.
When you hear the bell, come quickly.