Chapter 6
Summary and Conclusions

The present study investigated the effect of age on psychophysical abilities, speech perception in noise and working memory skills across adult lifespan. The study also assessed the relationship among age, psychophysical abilities, speech perception in noise, and working memory.

A total of 210 participants participated in the study and they were divided into seven cross-sectional age groups from 10 years to 85 years. Each group consisted of 30 participants. Psychophysical abilities, speech perception in noise and working memory were assessed on each participant. Psychophysical abilities were assessed through frequency difference limen (FDL), intensity difference limen (IDL), duration discrimination test (DDT), gap detection test (GDT), peak sensitivity (PS) and bandwidth (BW) of modulation detection thresholds (MDT), duration pattern test (DPT) and backward masking. Speech perception in noise (SPIN) was assessed through quick speech perception in noise test in Kannada. Working memory assessment was done through operation span test, reading span test and various auditory working measures (forward, backward, ascending and descending digit span).

The results showed that the younger participants performed significantly better in psychophysical measures, speech perception in noise and working memory measures. The decline in processing abilities started by 4th decade for FDL (1000, 2000 & 4000 Hz) and SPIN. FDL (500 Hz), IDL (500, 1000 & 4000 Hz), MDT, DPT, backward masking abilities and operation span started to deteriorate by 5th decade of life. Decline in GDT started only by 7th
decade. The Pearson’s product moment correlation showed that working memory measures had significant relationship with most of the psychophysical measures and speech perception in noise. Individuals with higher working memory capacity showed better performance on psychophysical and speech perception tests. Relationship between different working memory measures, psychophysical abilities and speech perception in noise was also assessed through structural equation modeling (SEM). SEM revealed that direct effect of age on speech perception in noise was negligible. However, age had significant indirect effect on speech processing through its effect on temporal and frequency processing skills. Significant proportion of age related variance in working memory could be explained by psychophysical abilities.

6.1. Implications of the Study

- The study contributed to identify age related changes in psychophysical abilities, speech perception in noise and working memory. It helped to determine that all psychophysical skills do not decline to the same degree with age. GDT was more resistant to the effects of ageing than others.
- The present study also helped in determining normative for each test of psychophysical ability, speech perception in noise and working memory measures across age groups.
- Study helped to un-entangle the complex relationship between age, cognition and auditory abilities. Most important finding from the study was that of revealing the
influence of supra threshold auditory abilities on working memory and speech perception skills. Age related decline in psychophysical skills seems to mediate the age related decline in working memory and speech perception in noise abilities. This can open-up a wide range of applications including change of rehabilitation strategies in older adults.

6.2. Future Directions

- Older individuals had slightly higher hearing thresholds at 4000 Hz and 8000 Hz. Possible effects of these elevated thresholds on psychophysical and SPIN are not tested.
- It would be interesting to replicate this study using a longitudinal design. This will help in delineating the possible sequential effects and interactions between auditory and cognitive factors.
- Study could be extended to other senses such as touch and vision in order to get more holistic relationship between global sensory and cognitive factors. On the similar lines influence of sensory processing on other cognitive measures such as processing speed, inhibition and general intelligence could also be investigated.