INTRODUCTION

- Spatial release from masking (SRM) is the improvement in the speech reception threshold (SRT) when target and maskers are spatially separated.
- Bilateral cochlear implant (CI) users have shown high variability in being able to benefit from SRM, with some CI users showing no benefit of SRM (Loizou et al., 2009; Misuñelli and Litovsky, 2012).
- This study investigates whether there is a relationship between age at onset of deafness, years of CI experience, and ability to obtain a benefit from SRM.

METHOD

Stimuli
- Male Target, CNC Words (10 Lists of 50 words each)
- 2x Female Masker, IEEE Sentences
- Maskers always presented at 50 dB SPL, starting 250 ms before and finishing 250 ms after the target

Task
- Identify the word spoken by the male target talker from a list of 50 words displayed on a graphical user interface

Conditions
- Signal-to-noise ratios (SNRs) tested (dB): 15, 10, 5, 0, -5, -10
- Each SNR tested 3 times per listener

- Two target-masker configurations tested:
  1. Co-located
  2. Separated

Listeners
- 21 adult bilateral Cochlear (Freedom and N5 processors) users (Table 1)

Data analysis
- Percent correct as a function of SNR was fit with a psychometric function (Wichmann and Hill, 2001) and the 50% correct SRT calculated for each target-masker configuration
- SRM = SRTCo-located – SRTSeparate

RESULTS

- SRTs were typically lower (better) in the separated condition (Fig. 1, a)
- SRM performance ranged from -1 to 9 dB (Fig. 1, b)
- SRM appears to fall systematically with years of CI experience (both bilateral and total), but not because of systematic changes in SRTs (Fig. 2, a & b). No strong trend observed with age factors (Fig. 2, c & d).

ANALYSIS

- A stepwise AIC (Akaike information criterion) algorithm (Akaike, 1974) was used to find an optimal linear model to fit the SRM data, where age, age at onset of deafness, years of CI experience, and years of bilateral experience were entered as factors (Table 2, Model 1). A better model was found when proportion of lifetime with hearing loss was added as a factor (Table 2, Model 2)
- Predictions made from Model 2 (Fig. 3) suggest that with later onset of hearing loss, SRM benefits are greatest immediately after implantation but steadily decrease with time. With earlier onset of deafness, the predicted SRM benefits were smaller but more stable over time. Maximal benefit appears to be achieved with simultaneous implantation.
- It is important to note that these model results should be interpreted only for CI patients bilaterally implanted as adults.

CONCLUSION

- High variability in SRM benefit among adult bilateral CI users appears to be affected by the proportion of lifetime with hearing loss and years of bilateral CI experience, such that SRM benefits appear to decrease with years of bilateral experience for most CI users.