There is a long history and much controversy about the extent to which auditory processing deficits are important factors in the genesis of a variety of language disorders, in particular Specific Language Impairment (SLI) and dyslexia (or Specific Reading Disability — SRD). I will review the history of work in this area, and then focus on recent studies in an attempt to answer the following questions.

- **Are any auditory processing deficits associated with SLI/SRD?** Yes. Dozens of studies show group differences on a variety of speech and nonspeech auditory tasks.

- **Are all auditory skills impaired in SLI/SRD groups?** No. In fact, the finding of a deficit in a particular auditory task (e.g., backward detection masking) with no deficit in a closely related task (e.g., forward detection masking) lends much more credence to the notion that any auditory deficit found is genuinely auditory, and does not simply arise from a more general problem in, for example, attention or memory.

- **How consistent are any deficits found?** Although there are a few tasks that appear to show consistent differences between SLI/SRD groups and controls (frequency discrimination of short, rapidly presented sounds, detection of frequency modulation), others have sometimes led to group differences and sometimes not (e.g., backward masking).

- **What distinguishes auditory skills which are impaired from those which are unimpaired?** There is much evidence against the notion that it is only rapid auditory processing that is affected, both for speech and nonspeech. In studies which measure discrimination performance as a function of inter-stimulus interval (ISI), performance deficits, when they occur, are just as frequent for long as for short ISIs, as long as performance is not at ceiling for the long ISIs. There are also a number of tasks of rapid auditory processing that do not lead to deficits in SLI/SRD groups (gap detection, forward detection masking). Furthermore, there appear to be a number of speech and nonspeech contrasts embodying static or slowly varying sounds which are also problematic for SLI/SRD groups (detection of FM, frequency discrimination of long tones). In some studies, acoustic contrasts embedded in a speech sound (formant transitions) lead to difficulties in SLI/SRD groups, whereas a similar acoustic feature in a nonspeech analogue lead to no difficulties. However, these stimuli also differ in acoustic complexity, and it may be that only more complex stimuli are problematic for SLI/SRD groups. In summary, there is no good theory which predicts which auditory skills will be impaired in SLI/SRD groups, and which will be normal.

- **Can any demonstrated nonspeech deficit be shown to explain a related speech deficit?** A crucial aspect of the hypothesis that an auditory processing deficiency can underlie a language disorder is that the auditory processing problem has a serious impact on the developing phonological system of the SLI/SRD child through impaired perception of speech sounds. Yet the direct evidence for such links is more or less non-existent. Early work attributed poor ba/da discrimination abilities in SLI to difficulties with rapidly varying acoustic features, but no direct evidence for this link has ever been provided. More recently, it has been suggested that excessive backward masking in SLI/SRD could account for discrimination difficulties with
ba/da, because the vowels would mask the preceding formant transitions. However, a recent study of SRD teenagers shows equivalently poor performance with ab/ad (where the vowel precedes the formant transitions) as for ba/da, even though the SRD teenagers were impaired in backward masking, but evidenced normal performance in forward masking. No other convincing link between a nonspeech and a speech deficit has been demonstrated.

• **To what extent does the auditory deficit correlate with the language ability within, as opposed to across, groups?** In most studies, the focus has been on comparing auditory performance of control listeners and groups of SLI/SRD listeners. Striking recent evidence shows that reading ability is much more strongly correlated with auditory abilities in control populations, than in those with SRD, where the relationship is weak or non-existent. For example, a re-analysis of a recent study shows, from the predictive point of view, that detection of frequency modulation (FM) accounts for only a tiny proportion of the variance in explaining the reading ability of all the listeners (≈4%) in comparison to other factors (≈50%). Similar results have been found in a study of SLI teenagers.

• **What other cognitive abilities are associated with auditory processing?** There is a long history of work using an auditory inspection time (AIT) task, which has much in common with at least one of the tasks often shown to lead to poor performance in SLI/SRD groups. Interestingly, performance on this task has been linked to IQ generally, without much real difference between verbal and non-verbal scales. Many studies have failed to measure other cognitive abilities, even though there is a great deal of evidence that performance on a wide variety of tasks correlates with non-verbal IQ. But there is also good evidence that at least some auditory tasks account for a significant proportion of the variability in reading scores even when non-verbal IQ is partialled out.

• **Does the auditory deficit explain SLI/SRD?** Even if auditory deficits do occur more frequently in SLI/SRD groups than in control listeners, this is far from providing proof that the auditory deficit causes SLI/SRD. An auditory deficit appears to be neither necessary nor sufficient for a language disorder. Two recent studies of people with relatively pure forms of SLI/SRD reveal many (SLI) or most (SRD) to have normal auditory processing even on the tasks claimed to be most sensitive to a language disorder. Thus the auditory processing problem is not necessary. Similarly, there are control listeners with poor auditory performance but normal language, so the auditory deficit is not sufficient. There is a distinct possibility that the auditory deficits are not causally related to the language disorder, but only occur in association with them.

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