1-4 The effects of irrelevant speech

Imagine watching a computer screen, on which a series of digits is flashed, at a nice easy rate of one per second. After six items you have to report what the digits had been, in the order presented (this is called serial recall). Not a very difficult task, you might think, but what if someone were talking nearby? It turns out that, even when participants are instructed to ignore the speech completely, their recall performance drops by at least 30 per cent (Jones, 1999).

In the context of dichotic listening (Section 1-2 Auditory Attention: Attending to sounds), it was shown that ignored auditory material may nevertheless be processed, and hence its meaning influences perception of attended material. However, meaning appears to have no special impact, when speech interferes with memory for visually presented material. Thus, hearing numbers spoken, while trying to remember digits, is no more damaging than listening to other irrelevant speech items (Buchner et al., 1996). In fact, even a foreign language, or English played backwards are no less disruptive than other irrelevant speech items (Jones et al., 1990). On the other hand, simple white noise (a constant hissing like a mis-tuned radio) is almost as benign as silence. Interference presumably results from speech because, unlike white noise, it is not constant: it is broken into different sounds.

The importance of 'difference' in the speech can be shown by presenting lists of either rhyming or non-rhyming words. It turns out that a sequence such as 'cat, hat, sat, bat…' is less disruptive than a sequence such as 'cat, dog, hit, bus …' (Jones and Macken, 1995). Jones (1999) proposes that, whether listening to speech, music, or many other types of sound, the process requires the string of sounds to be organised into perceptual 'objects'. To recognise an auditory object, such as a word or melody, requires that the segments of the stream of sounds are identified, and it is also necessary to keep track of the order of the segments. This ordering process, which occurs automatically, interferes with attempts to remember the order of visually presented items. When the sounds contain simple repetitions (as with the rhyming 'at' sound) the ordering becomes simpler, so the memory task is less disrupted. This was demonstrated in a surprising but convincing way by Jones et al. (1999). Their participants attempted to remember visually presented lists, while listening through headphones to a repeating sequence of three syllables, such as the letter names 'k … l … m … k … l … m'. These were disruptive, since the three letters have quite different sounds. The experimenters then changed the way in which the speech was delivered. The 'l' was played through both headphones, so sounded in the middle (see Section Section 1-2 Auditory Attention: Attending to sounds, Box 1), but the 'k' was played only to the left ear and the 'm' was heard in the right. This manipulation results in the perception of three 'streams' of speech, one on the left, saying 'kay, kay, kay …', one in the middle, repeating 'ell', and the last on the right saying 'em'. The significant point is that instead of hearing a continually changing sequence, the new way of playing *exactly the same sounds* results in them sounding like three separate sequences each of which never changes. Remarkably, the result is that they are no longer as disruptive to the visual recall task.

This section has taken the concept of attention into a new area. Previously we have seen it as a means of separating information, or of directing the assembly of different aspects of the attended item. In most of the earlier examples it has appeared that a great deal of processing can take place in parallel, although the results may not all reach conscious awareness. The impact of irrelevant speech shows that parallel processing is not always possible. It seems to break down in this case because demands are made on the same process – the process that places items in a sequence. Here it would seem that we have a situation where there really is a 'bottleneck', of the sort envisaged in early theories of attention (see Section Section 1-2 Auditory Attention: Attending to sounds).

What of trying to study with music? Undoubtedly, 'Silence is Golden', but if music is to be played, then a suggestion is that it should perhaps be something that changes very slowly, such as the pieces produced by some of the minimalist composers.