Chapter 9

IN DEFENSE OF SERIAL PARSING

1. Introduction

With respect to syntactic ambiguity resolution, theories of the HSPM have to explain two related sets of findings: First, for (almost) all ambiguities a preference exists in favor of one of the alternative structures; second, disambiguation towards the non-preferred structure leads to processing difficulties—garden-path effects—of varying strengths. Serial models of the HSPM provide a framework which is perfectly suited to explain these two basic findings: The existence of a preference for one of the possible structures is an immediate consequence of the HSPM pursuing only a single structure at every point of the ongoing analysis. Differences in garden-path strength come about because the initial, erroneous structure has to be replaced by the correct structure, and this can require varying amounts of work. An important task in developing a serial model is to work out the details of this general schema of explanation. The model proposed in this book can be seen as an existence proof that this task is a feasible one.

In contrast to serial models, the hallmark of parallel models is that the HSPM can pursue more than a single analysis after encountering a syntactic ambiguity. Without further assumptions, neither a preference for one of the alternative structures nor a garden-path effect for any of the alternative structures would be expected given a parallel HSPM. Since this is not what is actually observed, further assumptions are necessary to turn parallel parsing into a reasonable account of human syntactic processing. Current parallel models usually make use of two devices in order to account for the way human sentence parsing works: RANKING of structures computed in parallel, and PRUNING of structures which do not seem promising enough to spend further work on.

The assumption that the structures that are computed in parallel (cf. Figure 9.1) are ranked according to some criteria seems to be shared by all current...
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parallel models. According to such ranked parallel parsers, processing at the point of disambiguation will be easiest when disambiguation is in favor of the top-ranked structure; if, in contrast, disambiguation is in favor of some lower ranked structure, processing load is assumed to increase.

In addition to ranking structures which have been computed in parallel, a further mechanism employed by some parallel models of the HSPM is the pruning of certain structures from further consideration (cf. Figure 9.2). That is, if a structure fares too bad with respect to the ranking criteria, it will be dropped from further consideration instead of just being low-ranked. One motivation for pruning is that it prevents the HSPM from becoming overloaded with too many structures (cf. Gibson, 1991; Jurafsky, 1996).

The parallel models of the HSPM that are currently under debate can be classified along two dimensions. The first one is whether the HSPM is considered a symbol-processing device or a connectionist network. The second dimension concerns the criteria used for ranking alternative syntactic structures. In the