# Grammars

### E+T Grammar

1. <E> → <E> + <T>
2. <E> → <T>
3. <T> → <T> \* <F>
4. <T> → <F>
5. <F> → <P> ↑ <F>
6. <F> → <P>
7. <P> → ( <E> )
8. <P> → const

### E-List Grammar

1. <E> → <T><E-LIST>
2. <E-LIST> → + <T><E-LIST>
3. <E-LIST> → ϵ
4. <T> → <P><T-LIST>
5. <T-LIST> → \* <P><T-LIST>
6. <T-LIST> → ϵ
7. <P> → ( <E> )
8. <P> → const

# Error Detection

### Prefix Property

**Top-down recognisers** have the prefix property.

They will detect an error at the **earliest possible position** in the input.

A recogniser has the prefix property if the offending symbol is the **first input** inconsistent with the hypothesis that the input sequence is going to be acceptable.

The prefix property allows **good error messages** to be obtained by assuming the error occurred **at or near** the offending symbol. The compiler can analyse the input string and stack contents at the time of rejection.

# Error Recovery

### Local Recovery

Fill in each **reject entry** in the control table with **ordinary** stack and input operations.

### Global Recovery

Following an error, **scan ahead** in the input until some **synchronising symbol** is found.

Then, **pop the stack** until a stack symbol is found to which the synchronising input symbol can be **correctly applied**.

# L-Attributed Grammars

### Copy Rules

An **attribute evaluation rule** is a copy rule if and only if it is of the form:

The RHS is called the **source** of the copy rule.

Each attribute on the LHS is called the **sink** of the copy rule.

A set of copy rules is **independent** if and only if the **source** of each rule in the set does not appear elsewhere in any other rules in the set.

### Single Assignment Form

An **ATG** is in single assignment form if and only if:

1. The only rules that are **not** copy rules are rules for computing the **synthesized attributes** of **action symbols**.
2. The set of copy rules associated with each production in the grammar is **independent**.

It is sometimes possible to consolidate **several copy rules** into a **single rule**.