anatomy of TEX **1**

`anatomy of TEX.` *The TEXbook* describes the way that TEX processes its input in terms of TEX's "digestive tract"—its "eyes", "mouth", "gullet", "stomach", and "intestines". Knowing how this processing works can be helpful when you're trying to understand subtle aspects of TEX's behavior as it's digesting a document.

- Using its "eyes", TEX reads characters from input files and passes them to its mouth. Since an input file can contain `\input` commands (p. '`\input`'), TEX can in effect "shift its gaze" from one file to another.
- Using its "mouth", TEX assembles the characters into tokens and passes them to its gullet. Each token is either a control sequence or a single character. A control sequence always starts with an escape character. Note that spaces and ends-of-line are characters in their own right, although TEX compresses a sequence of input spaces into a single space token. See pages 46–47 of *The TEXbook* for the rules by which TEX assembles characters into tokens.
- Using its "gullet", TEX expands any macros, conditionals, and similar constructs that it finds (see pages 212–216 of *The TEXbook*) and passes the resulting sequence of tokens to TEX's stomach. Expanding one token may yield other tokens that in turn need to be expanded. TEX carries out this expansion from left to right unless the order is modified by a command such as `\expandafter` (p. '`\expandafter`'). In other words, TEX's gullet always expands the leftmost unexpanded token that it has not yet sent to TEX's stomach.
- Using its "stomach", TEX processes the tokens in groups. Each group contains a primitive command followed by its arguments, if any. Most of the commands are of the "typeset this character" variety, so their groups consist of just one token. Obeying the instructions given by the commands, TEX's stomach assembles larger and larger units, starting with characters and ending with pages, and passes the pages to TEX's intestines. TEX's stomach handles the tasks of line breaking—i.e., breaking each paragraph into a sequence of lines—and of page breaking—i.e., breaking a continuous sequence of lines and other vertical mode material into pages.
- Using its "intestines", TEX transforms the pages produced by its stomach into a form intended for processing by other programs. It then sends the transformed output to the `.dvi` file.

Most of the time you can think of the processes that take place in TEX's eyes, mouth, gullet, stomach, and intestines as happening one after the other. But the truth of the matter is that commands executed in TEX's stomach can influence the earlier stages of digestion. For instance, when TEX's stomach encounters the `\input` command (p. '`\input`'), its eyes start reading from a different file; when TEX's stomach encounters

a `\catcode` command (p. '`\catcode`') specifying a category code for a character c, the interpretation of c by TEX's mouth is affected. And when TEX's stomach encounters a macro definition, the expansions carried out in TEX's gullet are affected.

You can understand how the processes interact by imagining that each process eagerly gobbles up the output of its predecessor as soon as it becomes available. For instance, once TEX's stomach has seen the last character of the filename in an `\input` command, TEX's gaze immediately shifts to the first character of the specified input file.