Abstracting

Because the matching off of thought with the forms of language cannot be done on a one-to-one basis, an idea may be said many ways. The myriad options for matching thought with speech create, in fact, all the glories and problems of comprehension and composition. Working in the gap, then, between invisible thought and visible language, a teacher needs a concept applying equally to both. The concept of abstracting serves this purpose.

Abstracting is mentally mapping reality. It comprises two opposite processes, analysis and synthesis, working together simultaneously. By virtue of analysis, the mind is able to elaborate global wholes into their particulars. By virtue of synthesis, the mind is able to generalize otherwise disparate particulars into wholes. Elaboration emphasizes differences and leads into the world. From it we gain discrimination and detailed fidelity to reality. Generalization emphasizes similarity and leads into the mind. From it we gain increased scope and the power of mental relating. Neither can function without the other, for just as generalizing presupposes some prior breakdown into particulars from which generalities can be drawn, elaborating presupposes some prior generalities that can be broken down into particulars. Abstraction is a tension between the two processes. It binds mind to world.

This tension stretches across any effort to speak, listen, read, or write. In composition, teachers constantly urge students to be specific, to add concrete details to narrative and description or to give examples to illustrate their ideas in an essay. On the other hand, teachers push students to relate ideas to other ideas and to details, to give emphasis and unity, to "tie things together." All of these are classic issues in relating generality to instance so as to convey meaning. For comprehension, a reader must relate authors' little facts to their main points, draw conclusions from cues and clues, put examples and evidence in proper relation to statements they support, and "pull together" the various big and little things the author has said into an understanding that focuses on the general and subordinates the particular in the ratio an author intends.

Generalizing

I'm using the term *abstract* here in its original meaning—to draw off. Don't be confused by the fact that the noun *abstraction* usually connotes only high-level generalization. I'm using the term here to denote the process of economically selecting and recasting traits of experience. When we speak of a trait, we mean that which is drawn

off, again in accordance with the original meaning. The abstracter selects a trait that for one purpose or another he or she deems an important aspect of an object, event, scene, or experience.

Doing this presupposes some analysis: in order to select out *spotted* as a trait of some things, one first has to differentiate figures from backgrounds and spots from figures—that is, break down reality. A trait is drawn off to reduce and reorder the world. The speckles on fruit, the spots on some animals, the freckles on people, the dots on a blouse, the ground pattern of sunlight through leaves, knotholes in paneling, the dark and bright places in someone's "checkered career"—all become mentally digested in such a way that the spottedness of each dissociates itself from the concrete context in which it was embedded. This stripping off of local and detailed circumstances isolates the trait. Then, once singled out, a trait is ordered in the mind. It joins with the spottedness of the others to form a concept based on a common denominator, a vaguer image that can include sets of spots of different contexts, origins, purposes, colors, regularity. What is drawn from different sources is distilled to make a new mental entity. In this way, synthesis accompanies analysis.

Generalizing is a process of putting mind over matter. People don't draw off traits of things as they do broth from beef, of course, because both contains actual molecules of beef, whereas an abstraction can only *symbolize*—code from a physical to a mental medium—and hence must partake of mental qualities. The mind codes reality within its own medium of bioelectrical circuitry the way a television receiver recapitulates original action electronically on its screen—by forming itself to match the form it is simulating. Whereas the television receiver can recapitulate only temporal and spatial forms of matter in motion, the mind can make logical forms as well because it is a far more complex medium having ocular representation as only one of its submedia.

All that can be abstracted from something is *form*. The basic idea of informing is to put into form, and that's exactly what happens in matching experience with thought. Form is not a something but a relation—succession in time, direction and position in space, conjunction of circumstances or conditions. Relations are intangible, like mind itself. So thought can consist only of relating. Concepts result from sorting things into classes, and sorting is relating different things according to a common trait like spottedness. The traits themselves have to be formal in order to be drawn off—either an aspect of physical form such as spottedness or a relation such as that of owing in the concept of duty.

Abstracting spottedness shows at work the logical faculty responsible for generalization—*analogy.* (*Analogic* is thinking of things as like.) This is the same faculty responsible for metaphor. (The poet Gerard Manley Hopkins drew off spottedness in "Pied Beauty," which begins, "Glory be to God for dappled things. . . .") Generalizing is a form of thought that may take several language forms, as we shall show later; it is not just a class concept in noun or adjective form, as in the example above.

Elaborating

To *elaborate* means to work out. Nothing can be elaborated that is not already contained as germ in the whole or generality to be elaborated. Elaboration is the flowering of an idea; seed differentiates into stem, root, leaves, and blossoms—all of which come from within. Elaboration is unfolding a given, whether the given is an object to be descriptively detailed, a summary of action to be filled in, a statement to be exemplified, or a premise from which corollaries are to be deduced. Buried in someone's use of *spotted* are concrete, remembered instances—fruit, fabric, or face—that he or she "has in mind" and could summon for elaboration. Elaborating particulars makes explicit ("unfolded") the referents of word, whereas generalizing leaves instances implicit, assumed. When the referent of a word is not a physical thing but an idea itself, then elaborating brings out the ramifications ("branchings"), the hidden implications.

Whatever the level, elaborating works by reversing generalization. Generalizing achieves scope by extending the referent over time and space—over all spotted things anywhere, any time. Elaborating achieves discrimination by narrowing the compass of time and space covered—down to some spotted animals at some times and places, for example, or one freckled child at one time and place. Elaborating localizes, puts things back into time and the concrete circumstances from which generalizing drew them. This leads to multiplicity, of course, for as generalizing subsumes many instances into one concept or statement—"uses up" raw material at a great rate, so to speak—specifying particulars restores original quantity, as well as quality, of experience.

Elaborating also turns up instances one had not thought of before. It is a tool for finding out fully what one means. Once armed, for example, with the concept of a spectrum, one could look for instances other than the orderly arrays of color shades and musical tones by which one may have first come to understand the concept and thus think of scaling metals by their degree of tensile strength

or scaling people by their degree of patience. Or one might check how broadly a statement like "opposites attract" applies by thinking of as many instances of it in different domains as one can. So it is that elaboration leads back from mind to world in a reversal of analogy.

Growth Sequence 1: Toward generalizing more broadly while elaborating more finely.

This formulation aims directly at heading off the mistaken notion that either generality alone or detail alone is good of itself. An *overgeneralization* is a statement based on too few instances and hence lacks underpinning. Endless inventory of details, on the other hand, comes to no more than laundry and grocery lists until organized under some generality that relates particulars to each other and to elements in a discourse.

The Dual function of abstracting

The function of abstracting is to enable individuals to match their minds to the world, on the one hand, and to fellow minds, on the other. *Abstracting from* experience makes information, to accommodate oneself to external realities. *Abstracting for* other people makes communication, to benefit from community. (One of the benefits is receiving other people's information.) The dual functions of informing oneself and communicating to others interact with each other, because the same abstracting apparatus is serving both. The habit of communicating information influences how people inform themselves. Thought is private and speech public, but constantly matching thought with speech inevitably causes thinking to become somewhat public and stereotyped. This influence can be reciprocal; thought can cause speaking to become somewhat private and original. The first statement of growth, along the logical dimension of *abstracting from,* should be paired off with the following statement of growth along the rhetorical dimension of *abstracting for.*

Growth Sequence 2: Sending toward more general and more differentiated audiences.

Together, the two very general kinds of growth frame the more specific sorts formulated throughout this book. The second one can-

not be fully explained, however, before "Growth in Kinds of Discourse" later in this book.

The Partialities of abstracting

The very function of abstracting biases it toward personal desire or public conventions (which represent communal desire). Mapping is always for a purpose, if only a playful one, and this purpose necessarily makes abstracting partial. Mental maps always specialize, like geographic maps, which may show mineral resources or air routes or ethnic distribution or temperature zones but never everything. No abstraction can render justice to all aspects of something, in its totality, because selective reduction is the point of abstracting. People can't deal with all aspects of all things. They have to choose traits according to their values. This is why content is a factor of intent. One trades a loss of reality for a gain in control, to get a mental handle on reality toward certain ends. Abstracting is decision-making. This is necessary for survival, but the great and haunting danger of boomeranging always remains: people may exclude from their maps aspects of reality more vital to them than those their desires or their society's conventions direct them to single out.

Abstractions can be true, then, only relative to some given value system and frame of reference guiding the selective reduction. They may be useful or beautiful but never true except in a partial way. Raw phenomena present themselves, and thought can only *re*present them in one or another biased way. This relativity unnerves many people, who simply cannot believe that the maps they and their fellows hold to be self-evident are not *the* maps. Or even if our own maps are not quite correct and complete, surely some maps somewhere are. But it is in the very nature and function of the abstracting process that it should fail to yield the absolute truth some part of a human being seems to hunger for.

Earlier eras made a distinction between human truth and divine truth. Religious beliefs aside, this distinction is necessary to remind us that no human being is desireless and unconditioned by society and that no human being has a vantage point of universal scope or impartiality. No matter how brilliant our mental faculties, our minds work in the service of mortals bound to a certain time and space and inheritance. This is why spiritual leaders have always said, "If you wish to know divine truths, you must link up with the divine, not seek to know in this way with the brain." To claim that one's utilitarian, scientific, and aesthetic statements about the world correctly and completely describe the world is to claim omniscience for reason.

Both mystics and scientists repudiate such intellectual arrogance. They agree that the world is too big for words, that if absolute knowledge comes, it comes by total illumination, not by putting back together with one faculty of reason what we have torn down with another, admirable as this dual process of synthesis and analysis is for its biological purpose. We cannot experience all of reality, cannot render all we experience into thought, and cannot render all we think into words. This may be why Hamlet tells Horatio that there are more things in heaven and earth than are dreamt of in philosophy.

Growth Sequence 3: Toward increasing awareness that people create what they know and that this knowledge is partial.

Abstracting as composing and comprehending

Human beings are born composers. By drawing off traits of the world and rearranging them according to some mental order, people constantly compose reality, for composition literally means putting together, selecting, and arranging the elements of a medium. We put together our own world, more or less like other people's because of social influences and similarities in basic equipment, more or less different because of individual variations in background and heredity. Our mental maps are compositions.

The root idea of *comprehension* resembles remarkably that of composition, despite the fact that they are supposed to be opposing sender and receiver viewpoints. To comprehend means to take together. The difference between "put together" and "take together" is the difference between composing and comprehending. *Put* suggests that one has wider choice of what to select than *take,* which suggests that one is given a previously selected set of things from which to abstract for some purpose. This is in fact exactly the case in reading, for example, where one must make sense of someone else's writing. Writers have a similar problem, however; they have to make sense not of something someone else has abstracted, but of the matter they confront. If people run up against either a text or an experience that they cannot fit into their previous mental maps, they say they don't know what "to make of it." Similarly, we say of speakers or writers, "They don't make sense." The common idea that people *make* sense, create meaning, seems to acknowledge that whether composing something themselves or comprehending someone else's composition, people are in the same basic position. Whether faced with physical events or a book, one has to interpret. Interpreting is one kind of abstracting. Within this similarity

of *making* sense, then, composing and comprehending differ in whether one is abstracting from raw reality or from another's abstraction of it. Listening or reading is digesting someone else's digestion. This is a difference in the *level* at which one is abstracting.

Levels of abstraction

Actually, no reality is truly raw by the time people become conscious of it. All that the nervous system can do is simulate in the medium of the body those phenomena it registers. A retinal image, for example, is the body's equivalent of the artist's conception. So the sensory impressions from which people abstract concepts are themselves abstractions. There are higher and lower orders of abstraction within both perception and conception, as we will explain further on. Moreover, as we just said, people make some of their information by comprehending other people's compositions in various media—that is, by abstracting from others' abstractions. Any such successive abstracting creates higher levels from lower ones. People not only make the reality they know, they make it by abstracting higher abstractions from lower ones. Knowledge-making is hierarchical.

Processing matter into mind comprises several stages that relate to degrees of growth. The nervous system codes external reality from the outside in, first with the muscles or motor apparatus, then with the senses, then with memory, and finally with reason. Stages may be bypassed, as when we learn about something from pictures only or as when we read about something, but when we abstract for ourselves from the ground up, each of these four knowledge-making faculties abstracts from the abstractions created by the faculties below. Reason doesn't go directly to work on raw external reality; it operates on what the senses represent to it of external reality, most of which has been filed away in the memory. And memory depends completely on sensory reports for the material it files away. Sensory perception abstracts information from external reality on the basis of body placement, position, movement, the quality of the sense organs, and interaction with environmental objects. What we see is limited to where the body takes the head and which way the head directs the eyes, so that abstracting begins with the organism's own selective action. (Moreover, some sensors report what is going on just within the body itself.)

It is imperative, however, to understand the two-way nature of abstracting. The case is not that reason is the victim of wayward sensorimotor apparatus and memory. To a point it is fair to say that the muscles, the senses, and the memory have minds of their own, because each is a specialized part made to function in a certain way,

and the information created by each is unique. But the overriding fact is that these components are told what to report on. The mind executes the orders of the will and the emotions by *organi*zing all functions around these orders. Orders are to screen reality according to declared priorities. So the muscles, senses, memory, and reason all abstract under constraints imposed from above at the same time that they report upward. This compares to personnel at different echelons of a social organization sending reports to their superiors about what their superiors want to be informed of, not just about anything they might take it into their heads to say. Each echelon gives form to what it receives according to both its own form and the shaping directions it operates under.

The report at each echelon summarizes the reports submitted to it from echelons below, in pyramidal fashion, so that information becomes more reductive and further removed from original sources the higher it goes. The final report placed on the president's desk or sent to trustees or shareholders has the virtue of being pertinent to what they want most to know about, but the successive abstractions risk loss of fidelity to the original external reality. More and more the organism or organization is processing previous processing. This is how the abstracting *for* cannot in practice be separated from abstracting *from*, and this principle of mind over matter reaches down to the very lowest level of abstracting.