



1976

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Recommended Citation

Gardner, H. (1976). On the Acquisition of First Symbol Symbols. 3 (1), 22-37. Retrieved from <https://repository.upenn.edu/svc/vol3/iss1/3>

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On the Acquisition of First Symbol Symbols

ON THE ACQUISITION OF FIRST SYMBOL SYSTEMS

HOWARD GARDNER

I am able to enter into other systems of expression, at first by grasping them as variants of my own, and then by letting myself be inhabited by them until my own language becomes a variant of them.

—Maurice Merleau-Ponty

The Problem: Required to master an unfamiliar ritual, code, game, domain, or field of knowledge, the normal adult may invoke powerful aids. At his disposal are a number of symbol systems acquired earlier in life, including those of natural language, pictorial representation, and mathematics. These symbol systems may be drawn upon freely as the adult seeks to translate the foreign material into terms more accessible to him, or, alternatively, to adapt or impose an already-mastered language upon the less-well-known terrain. Even when such translation is of dubious accuracy, the adult is driven to search for links between symbols already known and a domain in need of conquest.

I focus here on the problem confronted by the individual who is seeking to master a symbol system, but who lacks an already-mastered symbol system upon which he may draw. Such acquisitions are crucial for human beings, whose daily life is permeated, indeed dominated, by every manner of symbol: words, pictures, numbers, works of art, maps, diagrams, models, special codes of assorted design. There has been among scholars increasing interest in the steps by which the young organism masters the dominant symbol system in our culture, that of natural language. And yet, the underlying question of *what* skills, capacities, strategies, and other equipment must be presupposed for a first symbol system to be mastered, has received little discussion in the psychological or philosophical literature.

The issue posed here has sometimes been side-stepped. It may be held, on the one hand, that symbolization is an inevitable human characteristic, like eating or walking, and should be taken for granted; it may be argued that symbolization is just an elaborated form of contact or communication, not differentiable from the signaling common throughout the animal kingdom, and, as such, unworthy

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of isolation for special study; or it may be conceded that symbol use is an important human capacity, but inasmuch as it is fundamentally akin to other psychological systems, its study should be collapsed with the investigation of more general principles of learning.

Without restating the case *for* symbolization, which has been exhaustively set out elsewhere (Langer 1962), let me simply respond to these objections. Perhaps some symbolic capacity is indeed available to infrahuman organisms; in all likelihood the processing of symbols shares features with other cognitive activity. Even so, however, the relative prominence of symbolic activity is so much greater among humans than among other organisms that a qualitative difference in importance seems indicated (see Ploog and Melnechuk 1971). Moreover, whatever parallels symbolization shares with other mental functions does not dim the fact that a number of characteristics of symbols and symbol systems do differentiate them from, say, highly mastered motor skills or enduring traits of personality (see Bruner, Olver, and Greenfield 1966). Finally, and of greatest importance, it is simply not the case that all organisms routinely acquire symbolic capacities. Much evidence indicates that certain symbol systems, say visual language, mathematics, or music, pose considerable difficulties for otherwise normal individuals (see Cruickshank and Hallahan 1975); and even after an individual acquires working familiarity with such symbols, the degree of effort entailed in their use, and the extent to which the individual feels comfortable with them is likely to differ enormously across symbol systems.

This last point motivates much of the present treatment. In the past few years, investigators have become increasingly aware of the great variety of symbol systems which figure prominently in human activity; the disparate media and sensory systems which facilitate comprehension and construction of the world; and, in particular, the reliance of central artistic and scientific functions upon communally-shared systems of symbols (see Goodman 1968). And yet, astonishingly little is known about the way in which these various systems are acquired; the kinds of differences obtaining among individuals in the course of acquisition; the degree of translatability among these systems; the means available to the individual for parrying various symbolic difficulties. Accordingly, I seek here to fix more precisely the nature of this set of issues and to provide some initial empirical suggestions about the acquisition of first systems of symbols. Clearly, any discussion of such vexing questions will be tentative and preliminary, the data still sparse and disputable. Nonetheless, given growing interest in these questions, initiation of a scholarly debate seems desirable.

How, then, to approach this topic? There is, first of all, a small body of relevant literature. Various conceptual considerations should also be brought to bear. But two groups of subjects promise to provide especially powerful insights: young children, who have not yet gained proficiency in any symbol system of their culture; and brain-injured patients who, in seeming defiance of their prior symbolic competence, have been left in a position where they, too, must construct new symbol systems more or less "from scratch." Insights into the processes of acquisition of new symbol systems appear likely to come from these two subject populations.

PRELIMINARY CONSIDERATIONS

Before considering the data furnished by these two groups, three brief discussions seem indicated: (1) statement of the point of view adhered to, and the terminology adopted in the following discussion; (2) citation of selected earlier stances on the question under consideration; and (3) a listing of critical issues to which our own research has been directed. Following these preliminaries, we will then review the findings obtained with children and with brain-damaged patients; indicate the parallels and divergences in first symbol use among the two populations; and revert, in closing, to the principal issues of the paper.

Point of View and Terminology:

Symbols are to be considered as those elements which refer to, represent, or denote in some fashion other objects, elements, concepts, or, in certain instances, the denoting element itself. When these elements are organized into some pattern or system wherein the elements occupy a definable and functional relationship to one another, one may speak of a *symbol system*. The referential aspect of symbol use will be considered its semantic portion; the formal relations obtaining among the symbols within a system will be considered the syntax of that system.

Though (within human society) symbolization occurs almost invariably for communicative purposes, a useful distinction can nonetheless be drawn between *communication* and *symbolization*. Communication will consist in the transmission of information from one organism to another, where at least one of the organisms has the intention to convey or infer meanings: if the infant cries and the mother responds by feeding, or if the mother and child eye one another playfully, information may be said to have been intentionally conveyed, and communication will have occurred. Yet, *because no independent element represents, by convention, another element*, there has on this definition been no symbolization.

Whether symbolization can occur without communication proves a more delicate matter. My inclination is to consider as communicative only such symbolization as involves *two* organisms intent on transmitting information, and who are mutually engaged in such an endeavor. On this definition, I would exclude transmission of information within mechanical systems, as well as the activities of the solipsistic individual who plays with a symbol system for his own edification alone. However, I recognize the validity of a position which would regard any symbolic message as potential communication.

The distinction between symbolization and communication serves two purposes. It allows us to differentiate the activities of the communicating infant from that of the symbol-using toddler; and the activities of the brain-damaged patient who cannot utilize mediated forms of communication from the acts of the patient who can. Moreover, the distinction proves relevant to a symbolic area on which we will focus here, that of the arts. An individual may devise a symbolic art object which fails to communicate what was intended, or perhaps even fails to communicate anything at all. By the same token, the distinction points up the

difference between the child who fails to use a symbol system appropriately, but who nonetheless communicates some information; and the child whose intended communication is embodied in symbolic garb.

I do not argue that symbols constitute a simple and readily defined group, nor that non-symbol use can be handily differentiated from symbol use. If it has confirmed nothing else, our own work documents the complexity of both these issues. It was an understandable, but potentially misleading, practice of many early semioticians to lump together all manner of symbols. However, as Nelson Goodman (1968) has clearly demonstrated, symbol systems differ from one another in the extent to which they resemble a digital or language-like system—as opposed to an analog or picture-like system. Other distinctions also need making: some symbols, like those which figure in music, emphasize a syntactic element; some, as in painting, highlight semantic properties; others, like the literary arts, feature syntactic and semantic properties with allied prominence. Viewed along other lines, symbol systems can be usefully differentiated on the extent to which they draw upon the body itself (e.g., mime, dance, finger paintings), as opposed to “foreign” elements (sculpture, easel painting, instrumental music).

Even as the variety of symbol systems is manifest, the levels of symbol use are multiple. No pursuit is more thankless than the quest for a certain moment in time, a certain point in complexity, which bifurcates the world, one side cast as symbolic, the other forever barred from the promised semiotic land. Far more fruitful is a search for levels of symbolization. One may, for instance, posit the following symbolic understandings which come in turn to characterize the young child: (1) a single element can stand for some other element; (2) a set of elements can stand for a situation or a composed scene; (3) the same idea or principle can be expressed symbolically in a number of ways; (4) there are symbol systems, which one can use deliberately for certain ends, and which one may alter or create anew. Such levels of understanding emerge at distinct points in the life of the individual and should not be carelessly collapsed into a single skill called “symbolic competence.”

Tensions Within the Literature on Symbolization

Among the rather circumscribed circle of philosophers, psychologists, anthropologists, and educators who have pondered such questions, certain bones of contention have periodically surfaced. Semioticians can be divided, roughly speaking, into those who focus on the *individual* symbol user, and those who focus on the *cultural context* within which symbol use unfolds; those who focus on *microgenesis* (the stages which unfold over a brief compass of time) and those who examine *macrogenesis* (the evolution of symbolic understanding over the course of years or even centuries); those who investigate the *formal* characteristics of symbol systems and those who ponder the *biological* prerequisites or underpinnings of symbolic activity; those who see symbolism as an inevitable emergence, and possibly even an *innate* human characteristic, as contrasted with those who adopt a more *empirical* and *tentative* stance *vis-à-vis* the emergence of symbolic behavior; those who regard the emergence of symbolic activity as a *qualitative leap* in individual and

cultural evolution, as compared with those who view semiotic skill as a more natural, gradual, and *quantitative transition* in the development of organisms.

The contrasting sets of views sketched here are rarely held any longer in extreme form, though their echoes still redound prominently in contemporary writing. While not attempting to mediate directly among the various emphases, we will retain them as background for our own discussion: and perhaps some new clues about where the balance among them should be struck will emerge from our studies of symbolization.

FOCAL ISSUES

While the contrasts just described lurk in the wings of any semiotic study, our research has been directly designed to confront a number of questions concerning initial symbol use. Here these questions will be briefly stated; following a review of the available evidence, some tentative resolutions will be offered.

(A) *The Question of Simultaneity*

Given that all symbol systems cannot justifiably be lumped into one semiotic mound, the question still remains: Does symbolization tend to emerge at approximately the same time in a variety of media or symbol systems; or is the particular medium of such importance that level of symbolization with one medium in no way predicts one's accomplishment with other symbol systems? Evidence of an emergence at a given moment of sophistication across several symbol systems would confirm the initial hypothesis; evidence of a staggered or irregular emergence would favor the second.

(B) *Order of Emergence*

Assuming that all symbol systems do not emerge at the same time, and with the same degree of sophistication, the question arises as to the specific differences in emergences and the factors underlying them. Mastery of A might always precede B, and B always C; in such a case, one would want to know the reasons for this fixed order. However, it might well be that some individuals commenced with one symbol system, others with different symbol systems; and, along these lines, that mastery of one symbol system was more advanced in one individual while sophistication with a second was prepotent in his peer. Again, interest would ultimately center on the causes of this more flexible picture.

(C) *Universality of Stages*

Any individual, confronted with a new symbol system, might be expected to pass through the same stages *en route* to mastery. However, some established facts, such as greater difficulty in adulthood of learning a new language, suggest that the individual's stage of life, his accumulated experience at the time of learning, and the condition of his nervous system, may well govern the particular contours of his symbol use. Whether all individuals master a new symbol system by passing through the same stages in the same order remains to be determined.

(D) *Individual Differences and Individual Creativity*

Were the experiences undergone by all individuals with all symbol systems identical, were all symbolic products simply replicas of one another, the nature of symbolic processes would assume no greater psychological importance than the processes of digestion or breathing. Yet striking differences are patent among individuals in their symbolic skills and preferences; moreover, certain gifted individuals have the ability to create moving new symbolic products. Just how originality and individuality emerge out of the uniformity of early symbol use still remains an enigma.

(E) *Methodological Issues*

Questions of method loom large in any study of symbolization. Particularly pressing are the issues of how to determine whether a given behavior is mere imitation, or a "genuine" symbolic act; and whether someone understands a symbolic communication or is merely behaving "as if" he comprehends. These questions gain acuteness when interrogation is precluded as a means of ascertaining the degree of mastery of a symbol system.

Here we touch on the grounds ably surveyed by Roger Brown (1973) in his consideration of the pigeon ping-pong game. May one attribute to the pigeon knowledge of the game of ping-pong if he hits the ball properly across the net, or must he exhibit some understanding of the scoring system and the purpose of the game; moreover, how does one determine whether the pigeon has such an understanding unless he tells you that he does? By the same token, if one has exposed an aphasic patient to a new symbol system, and he now "plays his role" appropriately, can one verify that genuine communication rather than habitual execution of certain actions has taken place? While methodological in nature, these questions invade the essence of the processes we are attempting to elucidate.

(F) *Factors Contributing to Symbolic Mastery*

That a number of factors (e.g., motor facility, motivation, ability to adopt the perspective of another) all enter into mature symbol use hardly requires argument. Yet a full understanding of symbolic processes can come about only when the precise contribution of these various factors can be fixed with relation to specific aspects of symbolization, to particular kinds of symbol systems, and to specific aspects of communication. A tall order, but no less necessary in need of filling on that account.

These, then, constitute the general point of view adopted here, the background issues lurking in the semiotic literature, and the particular issues to which our own research has been directed. By now, the reader's desire for data will understandably be flamed; and so with some relief we can turn to our first group of subjects.

SYMBOL USE IN CHILDREN: THE FIRST STAGES

Within a few years, the young child evolves from communication which is entirely unmediated by symbols to communication which utilizes a variety of symbol systems.

He becomes able, over the same period, to appreciate the meanings of these symbols as they are employed by others. Among the systems commonly mastered are natural language and story telling, two-dimensional depiction (as in pen drawing), three-dimensional depiction (as in clay sculpture), and symbolic play (as with hobby horses or puppets).

Using two separate populations, we have been charting the unfolding of these symbolic capacities. We have observed one dozen subjects, ranging in age from three to five on a cross-sectional basis, and we are currently working with a larger and older population of 45 five- to eight-years-olds. Each subject has been required to perform four different tasks, employing each of four separate media. One task being probed across media is "*spontaneous*" creation: the child is asked to tell a story, make a drawing, sculpt what he wishes out of clay, or enact a "scene" with two blocks which can "stand for" characters. A second task involves *completion*: the subject is provided with the beginning of a story, drawing, etc., and then asked to devise an appropriate ending. A third task features *assembling*: the subject is furnished with a large number of elements which could potentially be arranged into a symbolic product—lines of a story, parts of a drawing, pieces of clay, segments of an action sequence. The final task, again probed with all four symbolic media, involves *copying*: the child is exposed to a finished product (story, drawing, etc.) and asked to duplicate it as best he can. Findings obtained from youngsters aged three to eight are providing detailed inventory of the range of symbolic products which can be elicited, under various circumstances, from normal children.

Competent participation in these tasks is not possible until subjects have achieved considerable symbolic mastery. Insight concerning the very first stages of symbol use requires a much younger group. Moreover, if the texture of developmental process is to be conveyed, it is advisable to follow the same subjects over a period of time. We have, accordingly, undertaken a longitudinal study in which we are following five first-born middle-class infants from the first year of life for at least the following two years.

These studies are still continuing and earliest findings have been reported elsewhere (see Gardner, Wolf, and Smith 1975; Wolf and Gardner 1976). Let us therefore focus on the implications of the evidence as it pertains to the principal theoretical issues outlined above.

(A) *The Question of Simultaneity*

Our cross-sectional study provides unequivocal evidence that symbolic development is of separate pieces. The same individual stands at different levels of sophistication, depending upon the symbol system being sampled. Many children can tell complex stories before they can represent the simplest human figure in drawing or clay; the opposite profiles of skills characterizes certain other youngsters.

This said, we should add that each level of symbol use seems to entail certain prerequisites; once these prerequisites have been fulfilled, symbolic growth proceeds apace across a variety of media. For instance, the pivotal appreciation that one element can systematically stand for some object or referent seems to depend upon emergence of at least two prior capacities: (1) ability of child and caretaker to

communicate in a reciprocal manner with one another; (2) appreciation that objects exist in time and space even when out of sight—the well-known object concept described by Jean Piaget (1954). Symbolic use awaits these milestones: once achieved, the child's level of symbol use is likely to advance across different symbol systems.

By the same token, subsequent levels of symbol use may also await certain milestones. For instance, there seems to come a time, often around the age of three, at which the child first appreciates that a *set of symbols* can relate to one another in a manner analogous to a set of objects in the real world. A correlative realization, at a still later time in childhood, signals that a particular symbol can be looked at in a variety of ways; one may attend to its surface characteristics and its non-literal meanings as well as to its referential properties (see Silverman, Winner, and Gardner 1976). Again, once achieved, this realization may yield rich dividends across a variety of symbolic media, as when the child comes to comprehend the concepts of style or metaphor in a number of art forms.

(B) *Order of Emergence*

A fixed order of emergence among the various symbol systems seems unlikely, and the achievement of mastery of individual symbol systems most certainly differs widely across children, as suggested in Figures 1 and 2a,b. We find some youngsters to be inveterate *verbalizers*: their use of language is extremely advanced; and they tend to respond verbally at every opportunity, even when only a non-linguistic response is appropriate. Others among their peers are wedded with equal strength to visual-pictorial and spatial-gestural means of expression; such *visualizers* or *non-verbalizers* explore with enthusiasm the visual and design features of a medium, resist formulation in language, experiment continually with visually-regulated schemes. Not surprisingly, relative to linguistic accomplishment this latter group is much more advanced in its two- and three-dimensional visual depiction.

Whether, despite these obvious differences in skill and "richness" of symbol use, a regular order of emergence may obtain among symbol systems remains an open question. Our general impression is that the child advances first with those symbol systems which highlight motor patterns such as symbolic play, and whose early stages incorporate normal bodily actions (such as waving one's arms back and forth in the case of drawing). In general, progress in use of a symbol system occurs rapidly, especially in the case of language. Yet, certain symbol systems, for example those used in music, seem to differ dramatically across youngsters in both the time of their original emergence and the rate at which they unfold. We feel, overall, that the order of emergence across symbol systems, while reflecting some regularity, has not been fixed by some inviolate rule.

(C) *Universality of Stages*

A converging body of clinical and experimental evidence challenges the assumption that a symbol system is always learned in the same way, irrespective of the age or prior experience, or cultural context of the subject. It may well be the case, on logical or psychological grounds, that certain



Figure 1 —drawing by Max, age 3½, a typical visualizer; the drawing is made in complete silence, except for a final comment, "Here, I'm done."

steps in symbolic mastery must occur in a certain order. And yet, evidence on learning by older normal individuals and by brain-damaged adults suggests different approaches in learning a symbol system reflecting the individual's facility with diverse modes of cognition. As a consequence of these diverse approaches, the texture of mastery of a symbol system differs among such subjects. We find, for instance, that in learning new gestures, dance steps, or musical passages, adults often "lean upon" linguistic or other symbol systems which have already crystallized. Such encoding may shorten and sharpen the task; but if the coding should highlight irrelevant or incidental properties of the new system, while obscuring its more salient or defining characteristics, these bootstraps may ultimately strangle the learner.

(D) Individual Differences and Creativity

Our studies have documented the enormous individual differences among symbol users as young as two and three years of age. In addition to the intriguing dichotomy

between verbalizers and visualizers, other differentiae have emerged. Youngsters can be classified as relatively person-centered or relatively object-centered; as adopting a planning or a playful approach to tasks; as advancing from one to another symbolic stage at a steady and regular rate or as progressing more quickly, more slowly, or at a more irregular pace. Some children tend to feature trademarks, fixed schemes, or themes in their works, while the work of others is relatively bereft of such characteristic features. There are, finally, "self-starters" who tend to commence symbolizing without prompting and are motivated to continue on their own. There are also subjects who, while pained when confronted by an unstructured task, may well succeed more efficiently and with greater success when asked to finish up or to copy another's product. We speculate that such "self-starters" have a greater potential to become practicing artists; their "completing" counterparts may be better suited for editorial, performing, critical, or audience-member roles.

Examined separately, these dichotomies (and others like them) may appear interesting but not especially revealing. Combined, however, these resulting clusters yield new insights about the nature of individual accomplishment in the symbolic realm. No two individuals achieve identical scores on this raft of dimensions: and each score which departs from the mean contributes to a final product which *may* possess remarkable distinctiveness and value.

In this summation of individualizing factors may lie a clue to the cognitive and affective components of symbolic activity. Nearly any work can be considered on a purely structural or formal level: the number of elements in the work; the extent and appropriateness of their organization; the manner in which they are mapped onto a field of reference. This approach taps what is often termed the *cognitive level* of the product, or the producer. Of equivalent import are the idiosyncratic features, the particular stylization and style of the work, the special emphases, details, and expressiveness, which command attention. These identifying marks stem less from any single dimension cited above than from a *combination* or *interaction* among them. Distinct or even unique symbolic creations may be viewed as the products of individuals, such individuals presenting profiles which differ on the dimensions listed above. Those works

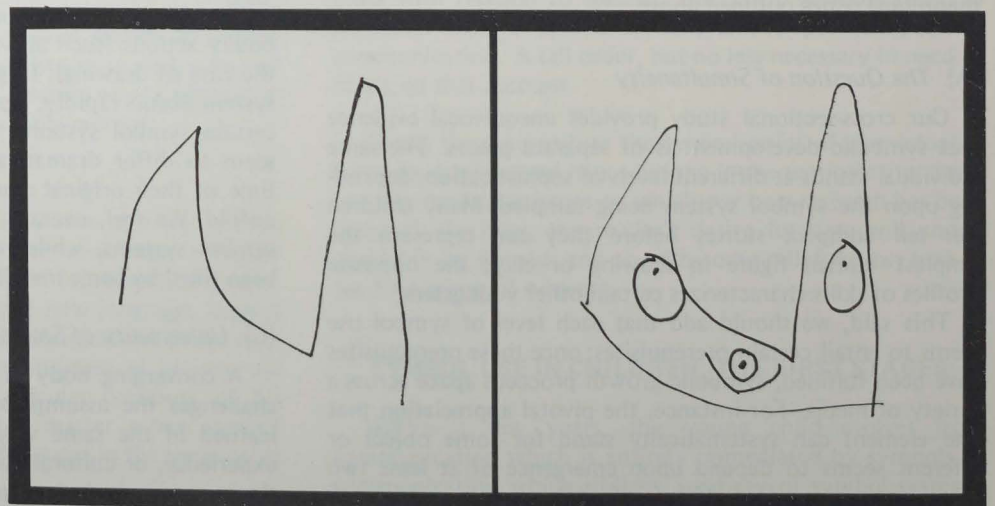


Figure 2 —drawings by Molly, age 3½, a typical verbalizer; the first drawing elicits a comment on writing, while the second stimulates a dramatic recitation.

which become especially treasured may be those which, however conceived, nonetheless can speak to individuals whose own profiles of psychological dimensions differ significantly.

All this is somewhat apart from the question of intentional efforts to achieve originality or arrive at one's own style. At that stage of life where our attention is focused, differences emerge from the child's non-conscious use of the symbolic media.

(E) *Methodological Issues*

Examined in isolation, a legitimate symbolic product may not readily reveal its distinctiveness from blind imitation or from an unmediated communicative effort. However, by judicious use of contextual information and by clever use of experimental techniques, the analyst may achieve a reliable degree of confidence about the extent and level of symbolic achievement.

Consider, for instance, a circle with two lines dangling underneath it, produced by a three-year-old subject. Should this be considered the depiction of a human being or simply a geometric form with two straggling lines happening to fall underneath? On its own one might hesitate to consider this scribble as a symbolic representation. If, however, one encounters a variety of other drawings produced at the same time; one overhears the child's comments while making the drawing, or in response to questioning; or examines the order in which the parts were made and the degree of determination which characterizes the whole effort; or notes in the vicinity some forms to be traced—then a more judicious decision about the status of the product becomes possible.

Experimental interventions can also provide helpful information. For instance, consider an assessment of the level of symbolic play. Should the child simply mime a model's behavior, conclusions about symbolic competence are risky. If, however, the child treats the model's behaviors as a point of departure for his or her own appropriate elaboration, then an inference of some symbolic sophistication can justifiably be drawn. Inclusion by the child of other individuals in the realm of the symbolic play, as well as involvement of objects which can potentially assume symbolic significance, may also testify to symbolic competence.

Examination of a subject's strategies can provide a fresh perspective on assessing symbolic competence. Some subjects are especially likely to attain a higher level of symbolization at times when they return to familiar themes, or territories—be these physical or psychological. Such "known locales" appear to stimulate a flight of inventiveness. Other subjects amplify their symbolic products by "verbal romancing"; this elaboration of a product through storytelling signals an incipient awareness that a product is not successfully communicating within its own symbolic language.

Certain strategies or practices seem to be nigh unto universal among children: among these are the principles according to which early stories are constructed; the ways in which clay is initially molded; the "faces" of first drawings. When these emerge in their usual order, one may infer that symbolization is following its normal course. When, however, a product appears at a time, or in a context, where it is not ordinarily expected, this serves as a signal that a fresh form

of symbolization (or perhaps a variety of non-symbolization) may have emerged. Our studies suggest that within each medium, a child typically passes through a number of stages. Originally, he simply manipulates the potentially symbolic material; next, he *makes* an organized but non-referential product of some sort; finally, he matches the symbolic product to elements, referents, or emotions in the world, thereby achieving genuine symbolization.¹ So long as this particular course is being followed, conclusions can be drawn with some confidence. If, however, a child who has not yet manipulated materials seems to be effecting a match to the world, the analyst is well advised to exercise caution before inferring symbolization.

(F) *Factors Yielding Symbolic Mastery*

The relation among the various factors which contribute to symbolization is extremely complex and until now only modest progress has been made in unravelling them. Our tentative conclusions will be best stated later on, in conjunction with findings about symbol use among the brain-injured. It does seem apposite to note, however, that some aspects of symbol use proceed with a speed, accuracy, and comprehensiveness, that is staggering to behold. After witnessing one child after another acquiring a series of grammatical morphemes in the same order, or passing through highly akin stages of musical or pictorial development, or exploring with great intensity and depth the realms of drawing or storytelling, one may well conclude that the human brain is predisposed to proceed in this way; and that "language," "music," or "visual-picturing" devices may be "set" or "predisposed" to go off on their own, with but scant attention to various "real-world" factors. Perhaps various coding capacities possessed by the young child help him to impose structure and coherence upon his early symbol use, particularly its syntactic facets; perhaps, indeed, biological constraints render certain syntactic and semantic relations highly probable, others highly unlikely.

SYMBOL USE IN BRAIN-DAMAGED PATIENTS

There are many etiologies of brain damage, and many forms of injury even within the same disease process. As the brain is highly differentiated and patterns of injury are varied, efforts to generalize across brain damage and brain-damaged patients should be regarded with suspicion. Moreover, each individual's developmental history is unique; and so the same objective brain damage may evoke varying results across patients. All the same, consistent and revealing regularities between types of brain damage and resulting behavioral sequelae have been verified in the century or so of neuropsychological research (see Gardner 1975).

In right-handed individuals, the use of language and language-like symbol systems is the particular province of the left hemisphere, whereas pictorial and visual-spatial forms of knowledge have a relative (though not an equally pronounced) proclivity for the right hemisphere (again in right-handed persons). This fact in itself undercuts the assumption that all symbol use is of a piece in the brain-injured person, and, by extension in the normal person. yet surprisingly little has been established about the fate of

TABLE 1
SPECIMEN MESSAGE TYPES IN VIC

<i>Message Types</i>	<i>Occasion of Use</i>
Commands	Issued by one communicator to another; directs the performance of a physical action (e.g., pick up an object) or a communicative action (e.g., to write a description of an action).
Interrogatives	
A	Used in conjunction with the specific "wh" interrogative particles. Elicits the patient's production of the correct answer regarding a temporally immediate event.
B	Used in conjunction with a simple declarative message for truth testing. A "yes" or "no" particle is the desired response.
Simple Declaratives	Used to express wishes such as "I want a cookie" or in response to a request for a description.
Phatic or Emotional Utterances	Used to comment upon one of the communicator's actions, to express a mood, or to greet another person.

non-linguistic symbol systems in the brain-damaged individual.

It is known that individuals can sustain a severe aphasia and still paint competently; that individuals with left-hemisphere disease are able to "read" pictorial presentations; and that different facets of musical capacity are implicated by each hemisphere. For instance, perception of timbre and tone seems to be associated chiefly with the right hemisphere, sensitivity to rhythm is more prone to be lateralized to the left hemisphere. Individuals who become aphasic lose the ability to communicate with related language-like systems, such as gesture, sign language, or morse code; and, given sizable brain damage in either hemisphere, the patient tends to become "concrete" in his behavior and understanding; grasp of abstract concepts proves difficult, independent of whether these seem to be mediated verbally.

At the Aphasia Research Center at the Boston Veteran's Administration Hospital, we wondered whether individuals who were severely aphasic—such that they could neither understand nor produce comprehensible language—might nonetheless be able to acquire a language-like symbol system with which they could then communicate effectively. These were patients devoid of demonstrable symbolic capacity; ones who could communicate in only the most primitive ways—by screaming, pointing, or, perhaps, pulling. Conspicuously lacking were customary substitutes for language, such as the ability to visually depict a desired element, or to express meaning through gesture. By and large, these patients showed depressingly little inclination to communicate, although, of course, one could never prove that they were devoid of all semiotic functions.

As a way of confronting this question, we devised a new visual symbol system called VIC (for Visual Communication). In this "language," messages written on cards were laid down from left to right, each card standing for the equivalent of an English word, particle, concept, or sentence mode. Sample VIC symbols are depicted in Figure 3; specimen message types are cited in Table 1. As an introduction to VIC, patients observed accomplished VIC users employing this system; then the patients were gradually drawn into the VIC conversation. Our goal for the first phase of the project was to enable patients to master three basic aspects of communication: (1) carrying out commands issued to them (e.g., pick up the glass of water); (2) describing actions

executed by another (John is shaking the fork); (3) answering questions (Who picked up the spoon?). Of the initial patients enrolled in this research-therapy program, several had to be dropped because they could not learn to associate a card to an object, and others had to be terminated because of medical complications. Of the remaining eight, all mastered some aspects of the language, five eventually passed through the "bare bones" described above, and two have achieved a somewhat greater command of VIC. The latter patients were able to express sample requests (I want a cookie), describe their feelings (I feel sad), and use the VIC cards spontaneously and productively.

For all its imperfections, our method of exposing severely aphasic patients to VIC does provide an opportunity to study how an adult deprived of conventional symbol systems acquires a new one; to determine the degree to which he understands the nature of the system; and to contrast the behaviors and capacities of brain damaged adults with a group of normal, non-symbol using infants. We will now review the results of our project (cf. Baker et al. 1975; see also Gardner et al. 1976), drawing as well on other empirical studies, as they pertain to the principal issues raised above.

(A) and (B) *Simultaneity and Order of Emergence*

In the case of focal or limited lesions, symbolic capacities can break down in a variety of ways. It is worth noting, however, that in the wake of more generalized brain disease such as certain forms of dementia, a somewhat more regular order of breakdown may obtain among symbol systems. For instance, the ability to draw with some accuracy is relatively fragile, whereas ordinary language functions usually prove more robust. In a limited way, then, at least a modest regularity of breakdown among symbolic capacities may occur, one which may signal the relative complexities of these systems. However, contrary to the passionate claims of some, it is erroneous to speak of a general decline of symbolic capacity, at least in cases of focal brain damage. The ability to master VIC displayed by certain severely aphasic patients is in itself decisive confirmation of this fact.

(C) *Universality of Stages*

Our research, and other studies as well, suggest that the older an individual becomes, the more difficult for him to

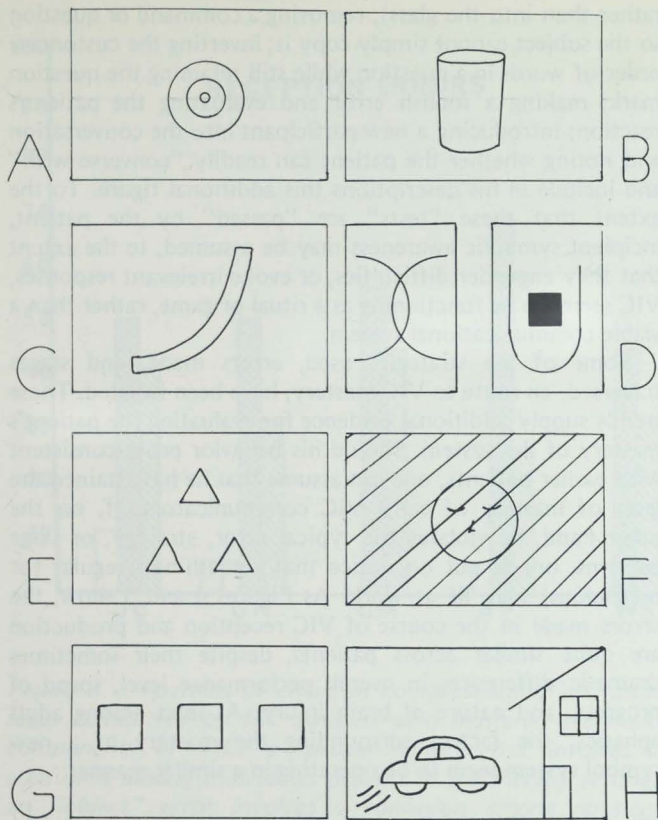


Figure 3 —a selection of symbols used in VIC, with their English translations: (a) proper noun, "Lynn" (a therapist's name); (b) common noun, "glass"; (c) verb, "pick up"; (d) grammatical morphemes, "and," "in"; (e) punctuation, "??"; (f) interrogative particle, "who"; (g) metalinguistic marker, "describe" (or "write it"); (h) activity particle, "to go home."

acquire a symbol system. An aphasic patient still in his twenties can expect to re-acquire natural language quite well and may with relative ease acquire a new symbol system: aphasics with comparable pathology at age 60 encounter far graver problems in recovery and in new learning. Whether differences in flexibility are qualitative or quantitative is difficult to determine; but, in my view, there may well be a qualitative shift occurring between the middle years of childhood (during which an individual can lose an entire hemisphere and yet master symbol systems) and middle adulthood (where even a limited amount of damage in the dominant hemisphere suffices to produce a permanent aphasia). These different recovery trends probably reflect basic reorganizations in the brain, ones correlated in some manner with the advent of adolescence; conceivably, however, the very mastery and consequent overlearning of a symbol system during early adulthood may complicate the learning of new symbol systems later on. Evidence bolstering this assumption comes from the tendency of older individuals to suffer relatively greater impairments following focal lesions and relatively milder impairments following "patchy" lesions; and also from the fact that certain varieties of aphasia, which feature fluent speech and an effortless parroting of over-learned phrases, are encountered only

among post-puberty patients.

One other factor is worth noting. Focal brain damage is most unlikely to impair the individual's ability to make his way about the world. Those individuals who learn VIC seem to be those able to draw on their experiences gained over a lifetime; those who have marked difficulties tend either to remain wholly within the system (learning a pointless game), or wholly within the "world-space" (ignoring the new symbol system), without effecting the translation between the two. Whether or not they can utilize knowledge for symbolic purposes, both these groups differ from the young child. The latter subject has many fewer experiences on which to draw; and even these are less well-established and reliable. Moreover, the young child has but a simple model of communication on which to draw; the brain-injured patient has, in the past, been involved in a variety of communication systems which, even if remembered only partially, should nonetheless retain some salience.

(D) Individual Differences and Creativity

The distinctive life histories of each individual, coupled with the limitless variety of possible brain lesions, insure that the pattern of symbolic competences and deficiencies is never identical across patients. Contributing yet further to differences among patients are two factors bearing relatively less weight among children: (1) the attainment by some adults of certain specialized, highly developed skills, which may buttress the individual against certain forms of brain damage (for instance, an individual skilled in "speed" or "sight" reading is less likely to be impaired by aphasia than one who relied primarily on auditory input and oral rehearsal in decoding graphical materials); (2) strong personality or motivational factors. Given two patients of equivalent background and lesions, one a highly motivated person, the other relatively passive and unmotivated, the former is likely to fare better in rehabilitative efforts. These factors combine to insure a gallery of differences among the victims of brain disease.

While differences among individuals are certainly preserved in brain damage, the possibility for creations of some distinctiveness and interest is definitely minimized. This situation suggests that differences in brain injury do not in themselves suffice to produce interesting differences in symbolic creation: such highly personal and significant products are far more likely to emerge when a healthy brain is working to its full capacity. The diseased brain has as its primary task coping with the daily presses of life; possibilities for involvement in symbolic inventiveness or novelty are greatly reduced. Indeed, a major problem in implementing VIC is the relatively reduced level of interest and motivation encountered among brain damaged patients. Success in VIC is most likely within that cadre of patients who remain "bright-eyed" (see Velletri-Glass, Gazzaniga, and Premack 1973), and who engage in games, humorous exchanges, eye-to-eye contact, and other signs of a continuing communicative engagement—though not lingering symbolic competence—with the events and persons of their environment.

(E) Methodological Questions

For the reasons already suggested, determining the extent

of the patient's symbolic and/or communicative involvement in VIC is a tortuous matter. With the young child, motivation and capacity to communicate seems relatively straightforward, but mastery of the symbol system is in dispute. For their part brain-damaged patients seem able to enter into the "rules" of the exchange with relatively little difficulty: in many situations they behave in ways highly appropriate to the situation. And yet, occasional complete lapses and total misunderstandings, coupled with a reluctance or refusal to employ the symbol system outside the usual training room, calls into fundamental question the extent to which this culturally-defined system is in fact functioning as a communication mode.

For experimenters, normal controls, and other "observers," VIC's potential functioning as a substitute communication system had been self-evident. And yet our research team was soon confronted with a conundrum: How do you convey to an individual that certain elements are designed as symbols in a communication system, if no alternative way remains of communicating anything to him? The difficulty of saying, in effect, "Look, here, VIC is a language," provides the best evidence that the brain-damaged patient resembles the asymbolic child. After all, the average adult could simply be told, in one or another way, that VIC is a visual communication system; the brain-damaged patient must learn this as part of a complete bootstrap operation.

The strategies of the aphasic patients are revealing. They feature the partial, and often inappropriate importation to the VIC sessions of a raft of earlier schemes. At times VIC patients place cards in their mouths; put them on top of objects, whether or not the cards even match the objects; tend to manipulate objects idly when they have no grasp of the utterance; confuse the cards with the object; match the card in an utterance to a card in their response; erroneously assume that all utterances fall into a certain syntactic frame (Agent-Verb-Object); search for non-VIC cues to guide their symbol use; and so on. Revealingly, several patients have evinced a particular fascination with one of the VIC objects, an empty glass; in a manner reminiscent of the toddler's "fixed idea" or "familiar territory," these aphasics return almost involuntarily to the glass irrespective of its appropriateness to the VIC scenario. They will confuse objects with glasses, stick objects into glasses, lift glasses along with each requested object, shift the glass from hand to hand, and so on. Whether reflecting a desire to "do something," or a primitive "modal" (Gardner 1973, Ch. 3) attraction to the tangible, inviting vessel-and-hole, this inappropriate perseveration signals that a patient has, at best, a very partial grasp of the rules of the symbol system.

What evidence, then, can indicate that the communicative potential of VIC has been grasped? Spontaneous yet appropriate use of the symbol system is the most reliable indicator. And yet, just because spontaneous utterances can occur only in the absence of an experimental cue, these are unlikely to emerge. This result stands, of course, in striking contrast to that obtained with most children, for whom spontaneous use of the symbolic medium is an early and constant companion. In lieu of spontaneous use of VIC, less direct measures of competence are necessary. Relevant data can be gained by altering the customary form of an utterance (e.g., asking the patient to inject the pencil into the fork,

rather than into the glass); removing a command or question so the subject cannot simply copy it; inverting the customary order of words in a question while still retaining the question mark; making a foolish error and evaluating the patient's reaction; introducing a new participant into the conversation and noting whether the patient can readily "converse with" and include in his descriptions this additional figure. To the extent that these "tests" are "passed" by the patient, incipient symbolic awareness may be assumed; to the extent that they engender difficulties, or evoke irrelevant responses, VIC seems to be functioning as a ritual or game, rather than a viable communicational system.

Some of the strategies used, errors made, and stages traversed, en route to VIC mastery, have been isolated. These trends supply additional evidence for evaluating the patient's mastery of the system. Should his behavior prove consistent with earlier patients, one can assume that he has attained the level of mastery of early VIC communicators. If, on the other hand, he violates the typical error, strategy, or stage patterns, one is put on notice that something irregular (or precocious) may be at work. As Figures 4 and 5 show, the errors made in the course of VIC reception and production are quite similar across patients, despite their sometimes dramatic differences in overall performance level, speed of progress, and nature of brain injury. At least among adult aphasics, the factors surrounding the mastery of a new symbol system seem to be operating in a similar manner.

(F) *Factors Yielding Symbolic Mastery*

The various factors affecting early symbol use in children are also manifest in brain-damaged patients, but the relative contributions of each may differ. For instance, while motor difficulties pose minimal obstacles to children, they present persistent difficulties for brain-damaged patients, most of whom are paralyzed. Surprisingly, however, the paralysis *per se* does not produce the difficulty; rather, the culprit is apraxia, (see Geschwind 1967), a difficulty in voluntary control of movements which leads to a performance other than that which the patient intends. Lamentably, these praxic difficulties are not readily corrected, and so the patient may find himself repeatedly intending to do (or say) something, while something quite apart results. The greatest tact and patience may be needed to overcome these praxic difficulties and to ascertain the actual level of the patient's sophistication.

Motivation is another pivotal factor in symbolic mastery. In general, most normal youngsters are sufficiently motivated; however, brain-damaged patients, either because of age, personality change, or sheer effects of cortical injury, very often appear to lack the will or desire to enter into and master a new activity or system. Insufficient motivation, like apraxia, can of itself be so overwhelming that failure to symbolize results. Here, then, are areas where the child is better served than the brain-damaged patients.

On the other hand, the brain-damaged patient also has some advantages. As indicated above, he has available and may draw upon a lifetime of experience. Principles, strategies, or clues learned during these years may put him in good stead as he tackles a new task. For instance, even if he can no longer symbolize, he knows, upon entering the room, that a task lies in front of him, that he is expected to behave

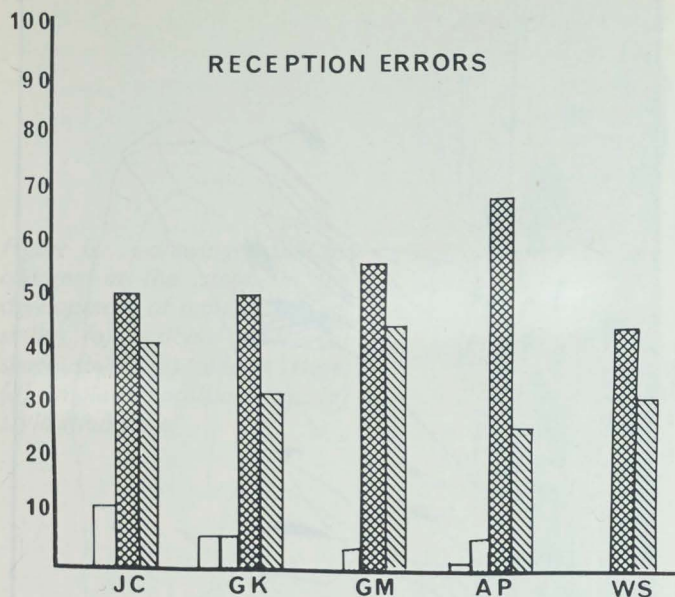


Figure 4 —pattern of errors in comprehending VIC messages committed by five patients who mastered the basic components of VIC: a “proper name” error involves a confusion among individuals present in the therapy setting; an “object” error involves a confusion among physical objects; a “verb” error involves the patient’s performance of an action other than the one that has been signalled; a “grammatical morpheme” error involves a confusion among prepositions or conjunctions (e.g., confusing “pencil in cup” with “pencil and cup”).

in a socially appropriate matter, and that rewards (or non-rewards) signal his mastery of the task. Young children are ignorant of these factors and thus may fail altogether to enter into the experimental situation. Or, after entry, children are more likely to reject the whole situation altogether; brain-damaged patients, even if they themselves apparently have reservations, will keep these to themselves. Countering these trends is the fact that symbolic systems like VIC may seem inherently foolish to adults; they may therefore exhibit minimal motivation to master them, particularly if, as is often the case, the relevance to one’s recovery is not clear. Children are less likely to develop reservations of this sort; assuming their mood is favorable, they will plunge with enthusiasm into most any new task.

Along with his wealth of experience, the brain-damaged patient also retains an armamentarium of schemes and strategies which he may bring to bear on the new learning activity. Such habits and strategies are often firmly established, and as a consequence, much less readily changed than those encountered among young children. While this fact can cause great difficulty in teaching a new symbol system, it may at times be used to advantage: the new symbol system can be so arrayed that it draws on established schemes which are readily aroused in evocative situations. Unfortunately for our aims, however, the kinds of “card schemes” which tend to be preserved are seldom ones

appropriate to VIC (e.g., touching, eating, fingering, cutting). Thus far, we have not been able to adapt our system so that it taps just those responses which the patient is likely to produce on his own.

Perhaps the biggest difference between child and brain-damaged patient is one both obvious and imponderable: possession of a young and healthy brain (as opposed to an old diseased brain). No one yet knows exactly the properties and potentials of the young brain, nor even how to characterize them. But that the young brain—even in apes—is spectacularly equipped to master dizzying amounts of information about the physical, social, and symbolic world, is acknowledged by everyone. Moreover, the youthful brain has particular genius in acquiring syntactic regularities, coding patterns and features, across such diverse systems as pictorial representations, natural language, numerical language, and music. Precocity in such areas as music, mathematics, and chess found among children whose knowledge of the real world is yet meager seems compelling evidence that an abstractive capacity for picking out the formal properties of certain “language-like” systems is a potent feature of the young brain. And just here the brain-damaged patient is especially weak. Although patients with lesions confined to

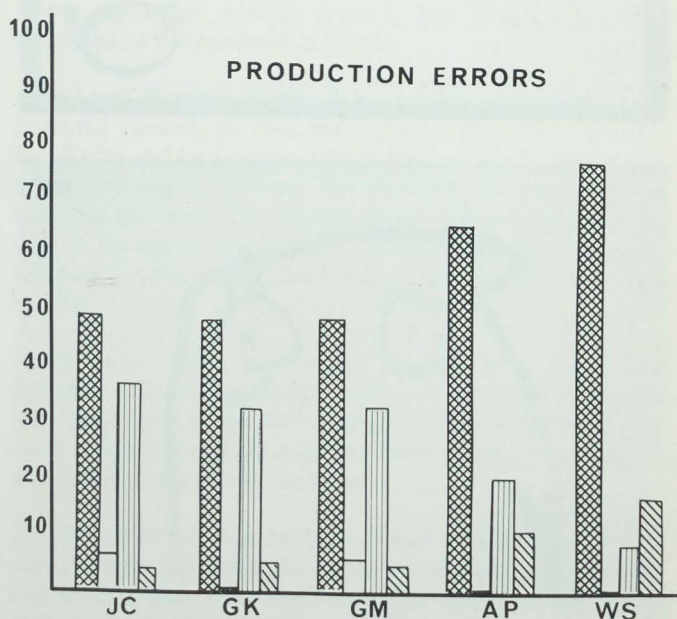


Figure 5 —pattern of errors in producing VIC messages committed by five patients who mastered the basic components of VIC: a “same category” error involves a confusion among two items in the same syntactical category (e.g., confusing one object with another object); a “different category” error involves a confusion among items drawn from different syntactical categories (e.g., confusing a noun with a verb); a “grammatical morpheme” error involves a confusion among prepositions or conjunctions (e.g., confusing “in” with “and”); a word order error involves a violation of the normal order among VIC elements (e.g., “John pencil shake” instead of “John shake pencil.”)

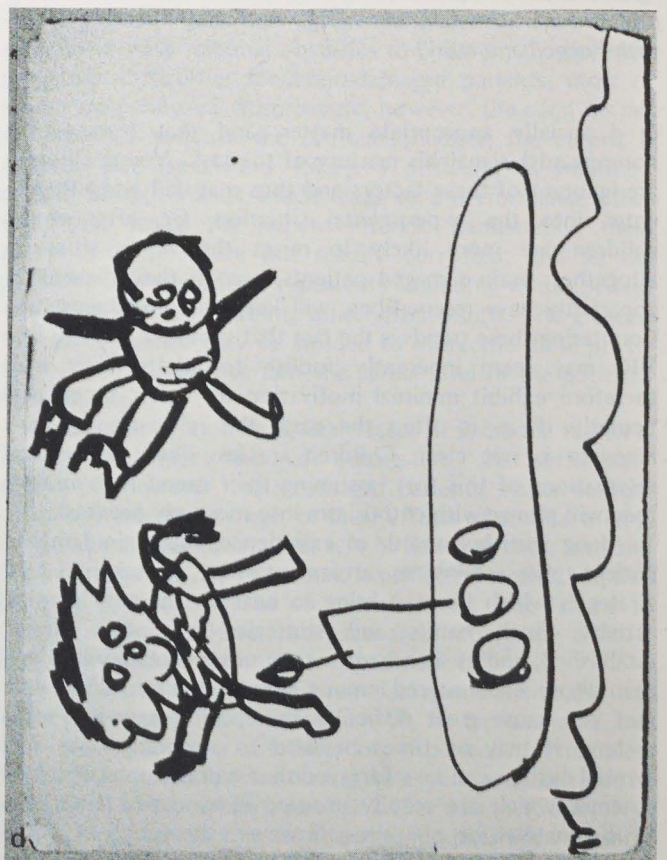
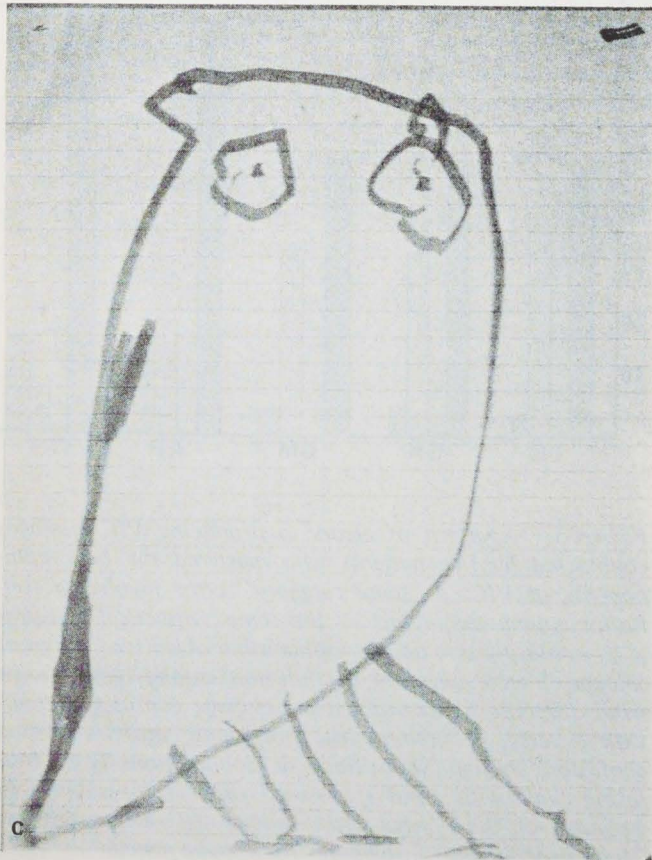
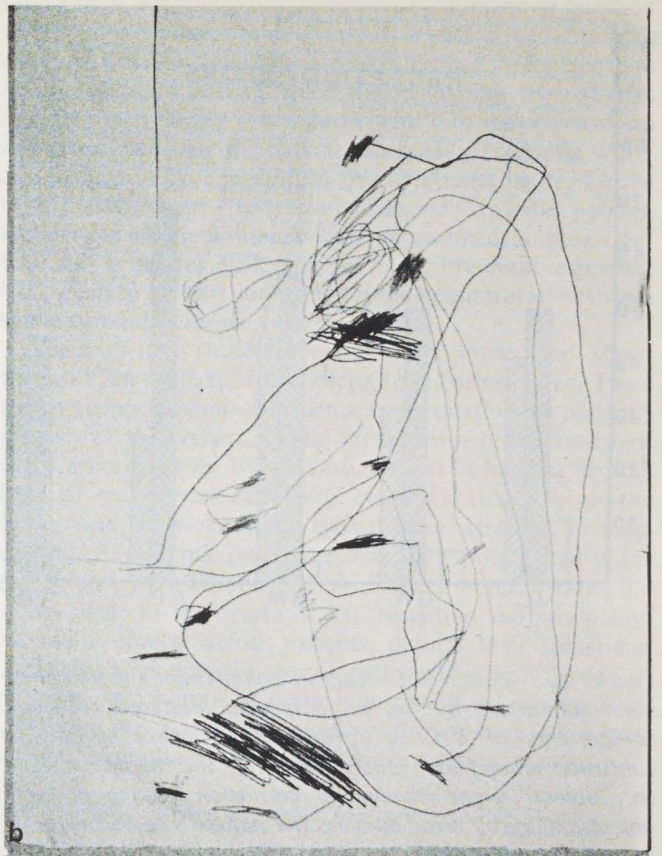
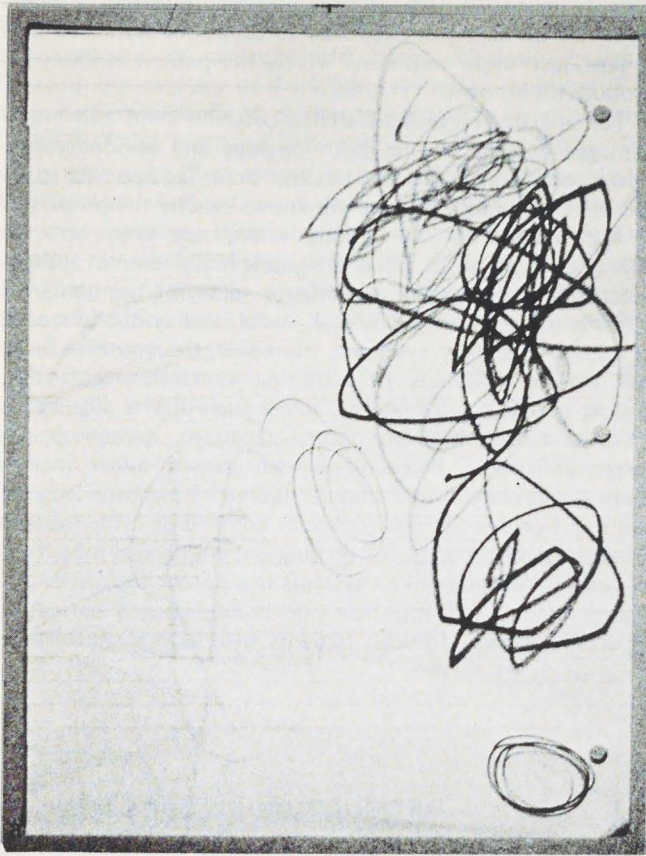


Figure 6 —drawings made by children at five stages in the development of representational skills: (a) scribble stage; (b) shape stage; (c) tadpole stage; (d) simple composition stage, (e) stylization stage.



one site might, in theory, be able to master new symbol systems not dependent upon that area, in practice a selective sparing of symbolic fluency is exceedingly rare. Perhaps the injured brain must attend primarily to its (and the patient's) own well-being; there is a resultant turning-in toward more conservative functionings, a lessening of interest in the novel events of the external world.

Assuming that the young child can enter at all into a symbol-learning system, he is likely to acquire the system more readily than the brain-damaged patient. The brain-damaged patient stands out primarily in his potential for using general knowledge about the world and deploying certain well-established schemes. Only if the particular system in question is consonant with the adult's earlier schemes and strategies can this capacity be turned to advantage.

It should be noted that studies thus far undertaken involve only a limited amount of immersion by brain-damaged patients in the symbol system. A total immersion over many months in the use and practice of the symbol system might yield more dramatic results.

Parallels in Stages of Symbolization

Over and above the differences detailed, suggestive regularities can be found in the particular stages through which children and brain-damaged persons pass. Indeed, one can discern some dozen steps shared by child and brain-damaged symbol users.

As an example, we will consider the phases through which the child and the adult brain-damaged patient pass as they encounter visual symbols. We have deliberately chosen tasks of some distinctiveness, so that emerging parallels may prove revealing rather than trivial. In the case of the child, we will focus on his progress as he learns pictorial representation (cf. Figures 6a-e); in the case of the aphasic patient, we consider a specimen sequence in the mastery of VIC. Some of the

steps attained can be expected to occur with other populations and other symbol systems, but others are clearly restricted to the examples at hand.

(1) *Use of Primitive Bodily Schemes.* In new symbol users, potential symbols are first mapped onto the area of greatest familiarity and knowledge. And in the case where there exists no extant symbol system, the mediator for new symbols becomes the body. The brain-damaged patient will place the card in his mouth or clutch it with his hand; the young child will take the marker and place it in its mouth, even as he may eat clay.

(2) *Use of Old, but more Neutral and Less Oral Schemes.* The brain-damaged patient is likely to clutch the VIC cards, then move them back and forth on the table. The child will move a pencil back and forth in the air, or touch it alternatively on and off the paper.

(3) *Detection of Potentially Symbolic Elements.* The VIC patient notes lines and ideographs on the cards and begins to realize that they bear significance in the use of VIC. The child commences attending to the strokes made by the marker, begins to make characteristic shapes, and becomes disturbed if the marks fail to appear when he wields the pen.

(4) *Referential Relations Appreciated: The Birth of Symbolization.* The VIC patient is able to match an ideographic representation with an object in the world (often this step is accomplished immediately, in which case earlier experience has short-circuited the first few stages). The child can now regularly produce certain forms, such as a circle or square; more crucially, he becomes able to relate these forms to objects in the world. Eventually, his own marks—such as the "tadpole" in Figure 6c—also come to stand for persons, animals, natural and man-made objects.

Naturally, these realizations represent crucial stages in the evolution of symbolization. Before, there was neither symbolic reference nor the possibility for symbolic communication. Now, the whole world of reference becomes accessible to the symbol user. Yet at this point, in the absence of an ancillary symbol system, it is often difficult to assess whether the symbol user is conscious of the relations between symbol and signified, whether he appreciates the distance and distinction between them. A challenge for succeeding periods is the emergence of increasing distance of the vehicle or symbol from the element or object which it signifies. To the extent that the child or patient confuses the referent and its vehicle (patting the depicted cat; talking to a drawing), the relation of symbolization has not been fully achieved. Yet, even advanced adults seem to maintain a lingering trace of the early link between symbol and object—and in the arts, this surviving primitive tinge may offer exciting allusive possibilities (see Gardner 1970).

(5) *More Elaborate Referential Relationships.* Now an array of symbols comes to stand for an array of objects in the world. The VIC patient can himself combine or can appreciate the concatenation of a series of nouns; the child can also handle references to more than one element.

(6) *Appreciation of Syntactic Relations.* No longer restricted just to object names, the patient can appreciate utterances in which an actor acts out an action, or an object receives an action. He has proceeded from mere naming to the propounding of propositions. The young child can now map a series of objects arranged in a configuration onto some sort of visually depicted situation—the picture can “tell a story.”

(7) *Incipient Sense of Composition.* The brain-damaged patient has now attained familiarity with a set of sentence frames by which utterances can be constructed; that is, he possesses the *mold* for basic linguistic structures (e.g., actor-action-object) into which appropriate aliments can be supplied. The child no longer draws on elements in a haphazard fashion; rather, as can be seen in Figure 6d, he so arranges them that their relationship with one another becomes comprehensible to others.

(8) *Use of the Medium with Reference to the Other Individuals.* Until referential aspects of the symbol system have been mastered, the symbol system is used by the individual in a relatively self-centered manner. Once some distance has been achieved, however, the individual increasingly takes into account the state of knowledge of other individuals; he begins using the symbol system in such a way that their knowledge can be increased. Egocentrism declines; communicative use of the symbol system has been enhanced.

(9) *Generative Use of the Medium.* A gradual explosion occurs in the number of elements and relations which can be encoded within the symbol system. No longer restricted to a few spare substantives and actions, the individual becomes able to express a whole variety of propositions. The VIC communicator assimilates new nouns, and begins to utilize those morphemes which modulate meaning. As is evident in Max's “busy” drawing (Figure 1), the drawing child now

possesses “basic schemes” which can be combined to represent new elements and new relationships; both his drawings and his perception of displays may achieve an increasingly narrative tone.

(10) *Interest in the Properties of the Medium.* With greater mastery comes increased understanding of and distance from the medium. Once it was used in a reactive and unconscious fashion; now the individual becomes aware of the elements—what they can and cannot express—and assumes a more active role in experimenting with media possibilities. The VIC communicator tries to express new ideas and relations, including ones never before modeled in VIC. Experimentation occurs with word play, word meaning, word order. By the same token, the child begins to explore the design properties of the medium: what can and cannot be accomplished in drawing. He is no longer limited by the uses he has seen or by his knowledge of the world; the limitations of the medium itself constrain his performance.

(11) *Achieving Effects, Stylization.* The individual now uses the symbol system in a way which reflects his own ideas, preferences, and feelings. Previously he tended to resemble other individuals; he was passing through a universal set of stages, a progression reflecting the demands of the medium, the physical limitations of his body, the cognitive predilections of his nervous system. Now he begins to place his own mark on the medium, not only in the subjects treated but also in the manner in which he treats them (cf. Figure 6e). He experiments with those effects which prove especially meaningful to him. The VIC patient too evolves his own method of aligning the cards and his own characteristic style of “speaking.”

(12) *Use of a Medium to Express One's Feelings and Ideas to Others.* While stylization may seem a self-centered activity, use of the medium to express to others one's favored ideas and feelings is a more public matter. These need to be conveyed in such a way that the distinctive elements, as well as the more common properties of the language, can be grasped by an audience. In the case of VIC the patient now achieves precision in the use of cards for communication of his own wants and feelings; in the case of the painting child, the capturing of emotions, feelings, and concepts now becomes possible in the language of pictorial depiction. Such effective communication of one's own thoughts can never be autistic of course; the communication must remain ever sensitive to the rules of the symbol system, the conventions of the culture, the context of the utterance, the knowledge possessed by the audience. Like the effective artist he must wed his personal vision to a publicity-interpretable symbolic vehicle.

I must stress that the foregoing has been, in at least two ways, an idealized list. First and most important, only the opening stages, perhaps through the eighth, have proved accessible to the VIC communicators and drawing children in our studies. At most, slight glimmerings of the later stages can be discerned in the symbol use of the most precocious communicators. The list therefore includes what is likely to happen in future symbol use, in addition to what has already

been observed with our subjects. (And, given our small population, these speculations must rightly be viewed with suspicion; perhaps, for instance, the later stages of the series may prove impossible for most severely aphasic adults to achieve.) Second, to the extent that it possesses validity, the scheme of symbolization outlined pertains especially to two symbol systems in two populations that have rarely been contrasted: VIC with brain-damaged patients, drawing with normal children. In all probability, a different sequence would characterize other populations and alternative symbol systems.

Nonetheless, the clear parallels found in the use of symbol systems among decidedly diverse populations are encouraging. Either in the nature of early symbolization, or in the nature of novice symbolizer, a certain logical progression obtains: from manipulating, to making, to matching, to medium sensitivity, and, ultimately, to mastery. Perhaps, with certain subjects or certain symbol systems, some of these stages can be eliminated or collapsed; however, it seems unlikely that the overall order would be fundamentally different. And if mastery of *any* new material were regarded as, in a certain sense, a task in constructing a new symbol system, this check list might suggest the optimal (or necessary) course through which any learner must pass.

Depending on the task administered, different aspects of this progression, and distinctive profiles of achievement, will be attained. For example, the patient's competence and apparent symbolic mastery of VIC will appear greater if he is simply executing a command than if he has to describe an action or answer a question. By the same token, the varying tasks and media used in our developmental studies also highlight different capacities. "Spontaneous" tasks, for instance, induce anxiety in some subjects but superior performances among "self-starters." Copying and assembling tasks elicit a relatively higher level of symbolic mastery. Certain media also tend to evoke a characteristic symbolic performance. A child working with clay is likely from the start to produce little "balls" and "snakes"; the toddler at the easel is likely to persist longer in "pure marking" or "pure makings," before moving on to depictions of the world.

Different tasks also can highlight the extent to which a particular subject favors one over another symbolic medium. In tasks of symbolic play, those children with a verbalizing disposition are likely to accentuate the "story" part of the drama; those with a visualizing flair are correspondingly likely to enact gestures with the figures, while restricting their verbal output. In one sense, these considerations only underline the obvious lesson that the analyst's assessment of symbolic competence is a function of the kind of tasks imposed on the subject. However, the deeper point is that one's assessment of symbolization is likely to attain accuracy only to the extent that diverse tasks are sampled under disparate contexts.

OUR ISSUES REVISITED

We have searched for insights about symbolic competence by focusing on the asymbolic individual bent upon mastering a symbol system. We have designated two populations which

lend themselves to study; we have discerned instructive parallels and differences among them.

We also sought evidence which might modulate among various tensions in the literature on symbolization. And we have confirmed the important role played by cultural setting in symbolic mastery, while indicating as well the effect of age of the individual and the condition of his brain. We have encountered parallels in macrogenetic processes, such as those governing the stages of a child's drawing, and microgenetic processes, such as those involved in acquiring a new symbol system over a few weeks in adulthood. We have witnessed a logic in the unfolding of symbol systems, while considering as well the influence of biological factors. And while confirming the human proclivity to engage in symbolic activity, we have challenged the notion that any normal human can master any symbol system with equal ease or proficiency, let alone that individual beset by brain disease. Finally, we have discerned both the continuities in acquisition of symbolization, as the individual passes gradually through a dozen stages of mastery, as well as the leap-like steps entailed in the first referential use of the symbol, the awareness that the symbol system has communicative as well as game-like properties, and the ultimate ability to attain distance from a symbolic medium and to deploy it as a means of expressing one's most treasured feelings and thoughts.

What, then, of the principal issues toward which our discussion has been directed? Let us, one by one, revisit each.

(A) *The Question of Simultaneity*

There seems to be scant justification for the assumption of a single symbolic capacity which, having emerged, extends equally and readily to all manner of symbol systems. Some individuals will acquire one symbol system with great ease, while experiencing extraordinary difficulties with a second; precisely the opposite picture obtains with other persons. The most that can be said is that certain cognitive prerequisites underlie any kind of symbol use; only in this sense is talk of a central symbolic capacity justified. The literature on brain damage supports this finding, for a substantial percentage of brain-damaged patients have one symbolic system vitiated while others remain substantially intact (Gardner, Howard, and Perkins 1974).

(B) *Order of Emergence*

On the question of whether symbol systems are mastered in a fixed order, the evidence remains less conclusive. Still, it is our impression that there exists, at best, only a rough metric; those symbol systems which require little "real-world" knowledge and rely heavily upon bodily schemes, emerge relatively early; those which rely upon considerable knowledge and high-level cognitive operations, and which require the use of tools and mediating objects removed from the individual are somewhat more tardy. The strong differences between left- and right-hemisphere patients, and between child verbalizers and visualizers, suggest that differential neural organization may account for possible differences in the order in which symbol systems emerge, and the richness with which each is realized within a given individual.

(C) *Universality of Stages*

There may be certain steps through which everyone utilizing a symbol system must pass. However, it makes a critical difference whether a symbolizer, or an individual devoid of symbolic experience, is learning the symbol system. One's previous history in the world, the schemes at one's disposal, the strategies employed also are relevant. Finally, the age of the individual and the health of his brain affect the manner in which and the ultimate extent to which symbolic mastery is attained.

(D) *Individual Differences and Creativity*

Creations of great individuality and power are more likely among children than among brain-damaged adults. In addition to the factors already cited, this difference in creativity seems to reflect levels of motivation and the extent to which old habits are firmly entrenched. In order to achieve individuality, one must have some mastery of a symbol system but also some new meanings to express. The freshness with which one conceives the world is a critical factor here; however, in the last analysis, sensitivity to the conventions of the culture is an equally important ingredient in effective symbolization.

A personal style seemingly results less from a single factor, such as tempo or cognitive skill, than from the combined effect of the individual's specific location on a score of measures: verbalizing versus visualizing, self-starting versus completion, object-centered versus person-centered, planner versus player, and so on. Differences among persons guarantee some individuality in all products, but the ultimate quality and interest of individual products probably reflects the uniqueness of an individual's position, the variety of messages eligible for communication, the overall level of motivation, and the amount of energy which can be mobilized for expressive purposes. The brain-damaged individual is particularly deficient in these latter respects.

(E) *Methodological Issues*

In the absence of the subjects' own testimony, no foolproof method exists for determining the extent to which symbolization has been mastered, or the degree to which the communicative and symbolic aspects of a medium are appreciated by its users. And in the absence of an alternative symbol system for communication, the only possibilities for inference open to the scientific observer are incisive observation and imaginative devising of tasks. A judicious combination of these methods should factor out those persons sensitive to the symbolic power of the system from those who are using it largely in an imitative, ritualistic, or game-like manner. However, attaining distance from one's symbolic activity is a gradual and lengthy process, and so it is unlikely that a specific point in time can be isolated at which "symbolic understanding" first occurs.

(F) *Factors Yielding Symbolic Mastery*

We have suggested throughout that symbolization requires a raft of factors, which in various ways interact with one another. We are not yet prepared to issue a formula for this mastery, although Table 2 indicates our preliminary guesses as to the relative importance across specimen symbol systems of such factors as motor mastery, syntactic understanding, semantic understanding, meaningfulness of single elements, extensive "real world" experience, specific brain regions. This list represents a kind of initial assessment of the respective challenges which assorted symbol systems might pose for various populations. And, in addition to the factors cited in the table, there is a further trade-off in our particular populations between rich experience in the world, and well-established habits, on the one hand, as against potential for discerning syntactic patterns, high personal motivation, and freshness of outlook on the other.

In pondering the differences between the normal child

TABLE 2
FACTORS INFLUENCING THE MASTERY OF SYMBOL SYSTEMS

Factors	Symbol System				
	Music	Language/Literature	2-Dimensional Depiction (e.g., drawing)	3-Dimensional Depiction (e.g., clay)	Gestural and Bodily Representation
Motor mastery, limb control	-	-	++	+	++
Syntactic factors (organization of units over time)	+	+	-	-	+
Semantic factors (representation of specific objects, events)	-	++	+	+	+
Meaning inhering in single elements	-	++	-	-	+
Extensive "real world" experience	-	++	+	+	+
Highly specified brain regions	+(?)	++	-	-(?)	-
Potential role in communicating meanings	-	++	+	+	++

Key: - = not important + = important ++ = very important

and the brain-damaged adult, one encounters clues regarding the optimal mastery by the individual of any new area of knowledge, whether or not such knowledge is purely symbolic in nature. While both experience and freshness, motivation and knowledge are to be desired, what is clearly optimal is a workable ratio between the two. Without experience, freshness is likely to lead to vapidness or incomprehensibility; without freshness, experience is likely to lead to repetition, stereotypes, and rutted behavior. It is not enough to know how to use a symbol system; one must want to be able to communicate with it and one must have something worth communicating. Finally, one needs the capacity to look critically at the created product and determine whether, indeed, its intent has been effectively framed within symbolic conventions so that the other individual can attain it. If one could wed the freshness, computational power, and the desire for rich exploration of the child, with the strategies and experience of the older person, and if these could be housed inside the skin of a motivated individual with ideas to express, and with a healthy brain in which to express them, one would construct the ideal communicator, be he or she an artist, scientist, politician, or saint. Perhaps by "framing" this individual on either side, the child and the aphasic patient make their special contributions to the elucidation of communicative efforts of all varieties.

NOTES

Acknowledgments. Preparation of this paper as well as the execution of the research described herein was supported in part by the Spencer Foundation, the National Institute of Education (G-00-3-0169) and the National Institute of Neurological Diseases and Stroke (NS-11408-03). I wish to express my appreciation to Thomasin Berry, Larry Gross, and Dennie Wolf for their helpful comments on an earlier draft.

¹Musical symbols, which are apparently non-referential, appear to pose problems for this formulation. If, however, music is considered in its broader symbolic aspects, the general point of view is supported. For music is as capable of expressing meanings (e.g., the aspects of the world captured in program music, or the expression of emotional forms), and of referring to aspects of itself, as other, more obviously representational systems (cf. Howard 1973a, 1973b).

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