This article considers the role of the basic cognitive unit, called the "story engram," in young children's learning to read, including children ranging in ability from severe mental retardation to giftedness. It illustrates how the "Ball-Stick-Bird" method of beginning reading can facilitate this process because of the method's simplification of the mechanics of letter recognition and immediate story immersion. The method's early lessons begin by telling a story primarily with nouns and verbs, then add adjectives and adverbs, and finally include articles and prepositions, thus mimicking the language learning process. Traditional measures of intelligence are contrasted with the ability of humans to impose cognitive structure by utilizing story engrams, a skill that can be taught. The resulting greater intellectual equality, in which knowledge and intelligence quotient need not be correlated, is thought to have potential for leading people out of the information age and into the knowledge and sharing age. (DB)
We got a tantalizing taste of the work of Dr. Renee Fuller in WER #64 (p. 126) and wanted more. As a practicing physiological psychologist, she discovered that people act as if their brains are built to organize information not in bits, but in terms of "stories"—someone or something acting or being acted upon. She calls the basic cognitive unit the "story engram." Story engrams incorporate and organize many bits, giving them a context that facilitates recall. Fuller has found that people learn to read, write, and organize their thoughts much more easily by means of engrams than by the usual methods of learning alphabet, words, and sounds without context. Because her methods are attuned to the way we naturally use our minds, just about anyone can learn to read. —J. Baldwin

Peter was only seven when he swaggered into my office like a pint-sized Texas billionaire. Even without asking I knew the reason for the swagger. His parents had told me—Peter had tested in the genius range on the IQ test his school had requested. And Peter had understood the meaning of his high IQ score. He was in possession of the ultimate property of our information age, a high IQ.

We humans have always liked to own things. Possessions give us importance, status and identity. During feudal times, land had become so defining a possession that even a person's name was frequently linked to it. Then, with industrialization, there occurred the first of three major shifts as capital, also known by the more mundane name of money, became the property that conferred importance, status and identity. Continued advances in industrialization were led, at the end of the last century, by knowledge-information applications; the definitive possession, which had shifted from land to money, shifted once again—this time from money to knowledge-information. Status, importance, and identity began to be defined by information expertise. The knowledge-information purveyors became the important people of this new society. But contrary to land and money—which, being tangible possessions, are easily quantified—how was knowledge-information to be quantified?

The answer was: test for it. Enter various mental tests, including the IQ test. But the IQ test developed into something more than a measure of how much a person knows. It became a predictive test, attempting to determine how much knowledge-information a person is capable of acquiring in the future. The test, with its intelligence quotient (IQ), created a concept new to this century, one that reflects the reality that knowledge-information has become the defining property. Now, during elementary school, many of our children are given some form of IQ test. And as Peter had understood, a high score implies that the owner is in potentially ample possession of the ultimate property. He/she is a potential purveyor of information. The admiration and envy with which we treat such people are similar to the treat-
ment accorded the moneyed rich of
the industrial age, and the land-
holders during feudal times.

There is, however, a major differ-
ence that makes intelligence the ul-
imate property. While the loss of
land during feudal times, or money
during the industrial age, meant
the loss of importance, status, and
identity, it did not mean you had
stopped being "you." But with the
loss of knowledge-information,
and/or the capacity to acquire it,
you cease to be the same person.
The capacity to think, and acquire
knowledge-information — being lo-
cated inside us — has an intimacy
that surpasses all other possessions.
Since IQ tests are the presumed
evaluators of this property, they
have a high emotional charge.
When there are questions about the
validity or reliability of IQ tests,
emotions run high.

During the fifteen years that my
research had required intellectual
evaluations of my fellow humans.
I had seen firsthand that the tests,
when properly administered, are
surprisingly good predictors of
what a person is able to learn, what
information can be acquired, even
the thoughts he/she is capable of
thinking. IQ tests predicted much
more than school performance.
They were truly the instruments to
measure the defining property, or
potential property, of the informa-
tion age. Was there some satisfac-
tion because I considered myself
the proud owner of considerable
knowledge-information property?
Of course. It's fun to be rich: to have
status, importance, and identity.

Which is why, when some of my
staff reported successes that should
have been impossible for low-IQ
students, I did not believe them.
How could I possibly believe that
they had succeeded in teaching
reading with comprehension to
severely retarded students? Such
results run counter to what the IQ
tests measure. Besides, the reading
program had been designed for
learning-disabled adolescents of
superior intelligence. Surely my
staff, in their eagerness to have
even the severely retarded succeed,
had seen things that weren't there.
But they were there. And they kept
being there, again and again.

It was not only that severely re-
tarded students, and normal four-
year-olds, easily learned to read
advanced text with comprehension
— their significantly increased ca-
pacity for knowledge acquisition
and their mature language content
did not fit modern concepts of in-
telligence and IQ. Abstract ideas
were supposed to be out of reach of
the severely retarded and the very
young. Such intellectual property
belongs to higher mental ages,
to higher IQ levels.

We spent the next five years ex-
panding the original study, trying
to understand what had happened
and why. Instead of providing an-
swers, the results became more and
more confounding. The IQ tests that
had been such useful tools in my
previous research had not only lost
their predictive value; they were
not even descriptive of what our
students were doing in the present.
As a good scientist, I turned the
question around and asked, "Is
there anyone who fails with this
program?" We eventually found
two. The two failures, however,
were not our lowest-IQ students
quite to the contrary. But they had
in common something that turned
out to be very rare even among the
severely retarded. They were un-
able to follow a story. Both of these
students had almost continuous
petit mal seizures. My suspicion
was that the repeated electrical
discharges prevented long-term
memory traces from being estab-
lished; hence their lack of story or-
ganization and story recall. Since
story context is an essential compo-
nent of the reading program, this
would explain the two failures.

In the Ball-Stick-Bird program,
story reading begins with the pre-
sentation of the fourth letter.* This
immediate story immersion makes
what I call "code approximation"
possible. In code approximation,
the inability to achieve fine sound
discriminations is used to the ad-
vantage of the learning process.
Instead of being taught multiple
phonic sounds for each letter,
which must then be discriminated,
the student is given the most usual
sound. And he/she is told the truth:

* Ball-Stick-Bird simplifies the me-
chanics of reading by showing how
each letter of the alphabet can be
made with three basic forms — a
circle (ball), a line (stick), and an
angle (bird). It also emphasizes the
abstract process of comprehension.
Word-building begins with the
presentation of the second letter. By
the time the student knows four
letters he is reading stories.
that the letters represent a sloppy code requiring a flexible approach.

This flexible approach to letter sounds is introduced with: "You are a detective. The letters are your clues. But like all clues you can't be sure of them — until they make a word that makes sense in the story." In the first lesson, the student already uses "code approximation" to decipher the story.

Immediate story immersion also makes possible the innovative use of developmental linguistics and story-engram layout [see sidebar]. The first two books begin by telling the story primarily with nouns and verbs, which form an elementary story engram. Adjectives, then adverbs, enrich the story engrams after the first few lessons. The later appearance of articles and prepositions continues the sequence; this resembles the progression through which children learn language (developmental linguistics). Each story engram (tabloid headlines or political sound bites are good examples of story engrams) appears on a separate line. In this way, the layout shows how the bigger story is built, line by story-engram line. The two innovations — developmental linguistics and story-engram layout — were introduced to make story comprehension easier, so that contextual cues could be used in code approximation. They were not supposed to actually teach language and thinking. But that is exactly what they did.

We had noticed that our students, even the severely retarded, started to write or type on their own by the end of Book 3. Using developmental linguistics, they assembled their thoughts by first searching for the noun, then the verb, gradually adding the adjectives and adverbs. That is how they built their story engrams — the same way the books had done it. Then they gave each story engram a separate line, mimicking the story-engram layout.

As for their IQ scores, these bore little relation either to their reading performance or their subsequent performance in the outside world. In retrospect, this should not have been a surprise. IQ tests, following the tradition of the original Binet test, measure neither story comprehension nor story building. Instead, they measure isolated skills frequently involved in drill learning, and isolated bits of information — very different from the context-oriented approach of the reading program. IQ tests measure only one component of the knowledge-inf
mation complex, a component that computers handle so well. Even a standard desktop machine, with a dictionary and encyclopedia, has an IQ that far surpasses its human creators. And yet our students with IQs as low as 20, once we had taught them to read with comprehension, exhibited a capacity for knowledge organization that far surpasses the capability of those high-IQ machines. Although it had not been intended to, the reading program teaches how to impose a cognitive structure on bits of chaotic information.

The cognitive structure that our students learned through developmental linguistics and story-gram layout has a long evolutionary history.

Vervet monkeys already have distinctive sounds for different predators (nouns) that require different responses (verbs). This noun-action-verb complex is not dissimilar to the simple story engrams used in the beginnings of Books 1 and 2 of the reading program. There is an inevitability about the way the human brain forms story engrams that explains not only the universality of grammar, but also the speed with which children normally learn language. It also explains why sound bites and tabloid headlines are so effective; they tap our fundamental unit of cognitive organization. Because this story-gram structure is fundamental to all humans, stories from one language can be translated into other languages. Story organization is so basic to our thought processes that it is difficult to imagine another way of organizing information. Even the aliens in science-fiction stories usually communicate in story form. There are other ways of organizing information, as insects and computers demonstrate; but for us humans, our stories, from creation to perdition, describe a cognitive similarity that makes us one species.

Developmental linguistics inadvertently resulted in implicit learning of how an idea is built. Our students became living examples that thinking can be taught.

VAD OF MARS
HAS ROCKETS FOR FEET.

A ROCKET IS HOT.
IT IS RED HOT.
Story engrams represent an extraordinary solution to information overload. By imposing a structure on millions, even billions, of bits of information, their rapid reintegration and retrieval becomes possible. As in the case of the vervet monkeys, there are evolutionary advantages to a cognitive structure with the capacity to draw rapid conclusions. In contrast, our high-IQ computers have dealt with information overload by indexing and categorizing, making encyclopedias of information storage possible. But the machines are incapable of the reintegration and organized retrieval of information that we inadvertently taught our lowest-IQ students.

The understanding of language, cause and effect, meaning, are human cognitive essentials that are out of reach of machines. Though they are the possessors of more information property than any mere human, because their evolutionary development did not take the story-gram form, they lack the most important component of knowledge-information property. Without stories, computers, unlike humans, cannot create meaning.

The difference between human cognition and machine cognition highlights what has happened in our time. A growing split has developed in knowledge-information property. The two components, knowledge and information, have drifted apart. The information component, once stored solely in the human brain, is now stored primarily in machines and books. The knowledge component, on the other hand — built with story engrams that structure the information from the books, the machines, the environment and the senses — continues to be the proud property of the human brain. Could we be experiencing a third major shift in what is considered the defining possession? Will status, importance and identity, rather than being defined by how much information we have stored in our brain, be determined by our ability to integrate and organize information?

Because of its evolutionary history, the human brain organizes input on the basis of context. When this organization occurs on the conscious level, and is therefore linked to language, it takes the story-gram form. Our data show that thinking with the story engram can be taught, and that knowledge and IQ need not be correlated. Since thinking can be taught, a more equal distribution of knowledge property becomes possible, and the capacity to organize information can be widely shared.

Something strange happened to those of us involved in the reading program. We had trouble accepting that it was now possible to communicate intellectually with those who had been labeled as severely retarded or culturally deprived. Of course, we wanted our students to succeed, but perhaps not quite that much. In retrospect, my reluctance to share philosophical musings with eager, disadvantaged students about the meaning of life, about how to create a better society, seems hard to comprehend. Nor were these reactions restricted to the severely retarded, the culturally deprived, or the very young. Most vehement was the reaction toward those who had been labeled "gifted." Some teachers took the program away from this group because "it puts an even greater distance between them and the rest of the kids." And yet at the suggestion that the rest of the kids could also have the program, there was hesitation. One teacher explained, "It makes them too smart."

Gradually I realized that accepting intellectual equality is not easy. Although we were terribly proud of our students, they weren't supposed to be that clever, perhaps even to become our superiors! Greater intellectual ability can be threatening. Teachers and parents, who would literally have given the shirts off their backs to a needy stranger, suddenly lacked emotional generosity. It is not that easy to share intellectual possessions, especially when these possessions are the defining property of the information age.

But we are no longer in the infor-
We have entered the knowledge age, leaving the information age to the computers. We have been liberated without realizing the full implications of this new freedom. When we built those machines with their high IQs, we liberated ourselves from having to demand that our brains absorb disconnected, boring bits of information. Our high-IQ machines do that for us. At a keystroke they can give us back any information in their arsenal. They are capable of storing so many more disconnected facts than we can in our knowledgeable brains. We have been freed to use our brains in ways we truly enjoy. Information, which yesterday was the defining property of our age, can now be purchased for a few hundred dollars. We are freed to use our minds to build story engrams with the disconnected facts that are stored in the machines, and to create fabulous edifices of the human mind. That is what it means to have entered the knowledge age.

Given our research findings that showed how easy it is to teach thinking with story engrams, our knowledge age could become the sharing age. It is in the nature of stories to be shared. For when we create stories it is not just to help us think, but to tell them to others. Stories bind us together as a species. Other possessions—land, money, or information—can be hoarded and used primarily to their owner's advantage. But the raison d'être of stories is communication. They belong to all of us.

We have the chance to enter a great age of intellectual bonding, an epoch of greater human equality. It could be an age where those ungenerous feelings we had toward our successful students would be woes from a bygone time. Instead of perceiving knowledge as property to be hoarded in order to achieve status, importance, and identity, this new era would see knowledge as the shared story of mankind.