

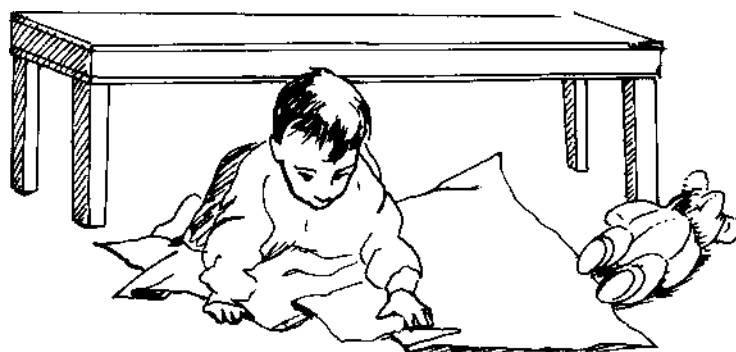
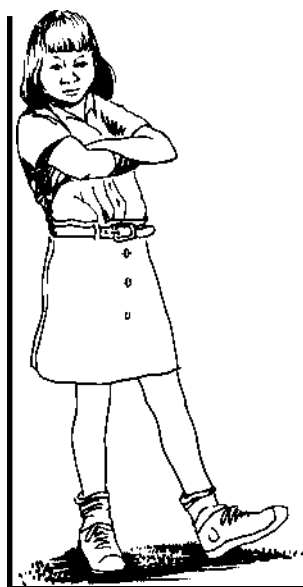
# SPATIAL RELATIONS AND LEARNING

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The connection between points in space or time can be simple or complex. It can be between oneself and the environment or between two or more objects outside of oneself. These associations are referred to as spatial relations.

Examples of spatial relationships are the location of one's seat in the classroom, the space between people in a line, the arrangement of items in a locker or a desk, and the layout of a publication or letter. It is also the order of letters in a word and of words in a sentence; it is the ordering of events in a schedule for a day or a week; it is the length of an hour; it is the pauses in a stream of language marked by punctuation; and it is dividing 25 by 5.

Spatial relations include qualities like size, distance, volume, order, and time.



## How Does Spatial Thinking Develop?

Spatial thinking develops in infancy. A baby first knows the world through direct physical contact by touching and tasting it.

One of the tasks of development is to understand how objects occupy space and to understand the size of objects in relation to the human body. The child becomes able to use his own body as a measurement device. How high is the cookie jar? Is the table narrow enough to reach across? Do I need to duck my head to go under the piano bench?

Much of the world is understood by relating sizes of objects to the most basic measuring stick, our own body. This is true not only for comprehending size, but for knowing location, shape, quantity, direction, interval, time and movement. Each of these qualities is understood by building a system of relationships. Each

system is grounded or tied to the human body and uses input from all of our senses. The child learns about shapes, quantities, volume, position, distance, movement, interval, and time by tying each concept to his own personal base.

As we measure the size of objects and their distance from us with our eyes, we form visual memories for our surroundings. We also note how much and what kind of effort our muscles need to make in order to move a ball or a pencil or even our bodies through space, thereby forming memories for the motor action of our muscles. Eventually we can walk across a room without bumping the furniture or reach for and turn a doorknob on the first try. We also can form letters and words with a pencil without stopping to recall each stroke. Eventually we learn this so well that we can write at the same time that we watch the teacher or chalkboard.



While a baby knows the world through direct physical interaction with it, the older child knows it through the symbolic representation of language. However, even after the acquisition of language, spatial relations continue to be fundamental to reasoning and to understanding the world. For example, one solves many kinds of problems by imagining relationships, such as cause and effect, scheduling, comparing and contrasting, anticipating needed items like groceries, organizing an essay or a letter, and understanding when it is one's turn to

talk in social conversation. People often map the solutions to such problems in space. For example, when they compare two items, they visualize the attributes of each item and note where the attributes intersect. A student may visualize his class schedule while deciding which books to take home to prepare homework for the next day. A worker may measure the amount of time before lunch against the duration of a television show. Understanding spatial relations is basic to carrying out many daily routines as well as specific academic tasks.

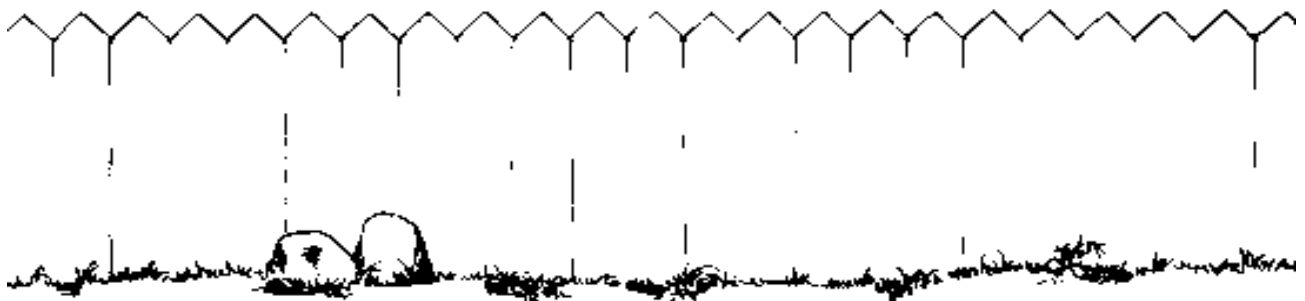
## How Do We Understand Spatial Elements Like Size, Distance and Order?

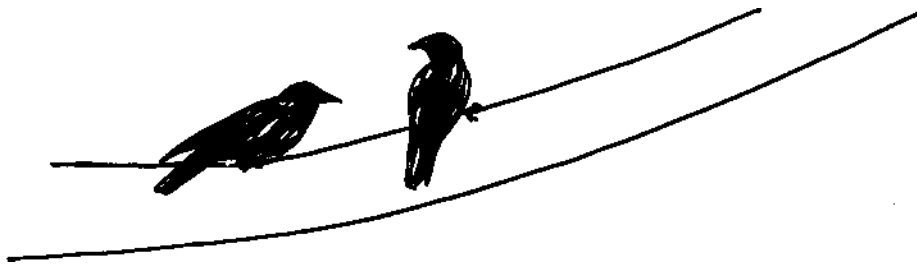
### Comparison to a Standard

Understanding size and distance relies upon comparison to a known standard. The comparison might be between objects: a man standing next to a fence in a picture provides a scale for judging the size of the fence. The size of the man is the known standard. Take the man out of the picture and a basis for judgment of the fence size disappears with him.

Distance is measured by comparison to a standard as well. If the man is taller than the house in the picture, we know that the house is far away.

Size and distance are shown as relationships by using comparison and contrast. Of course, this method only works if the size of one object is known. A picture of two rocks provides no basis for judgment unless a referent,





even a single blade of grass, is added. In the physical world and in pictures of that world, size and distance are measured against knowns. The standard which is most basic for all comparisons is the human body.

### **Position and Order**

We also gain meaning from position in a sequence. The order of letters and numbers makes meaning: “on” is not “no,” “saw” is not “was,” and “angel” is not “angle.”

The position of numbers tells their value. This relational quality is built into the system. “101” is different in value from “110.” Learning place value and internalizing the meaning of number is an important task for early elementary school students. Number position is meaningful in operations like addition, subtraction, multiplication and division. In fact, each operation has its own set of relational rules or demands. For instance, subtraction requires taking the

bottom number from the top number and recognizing place values when borrowing.

We describe the position of objects in space relative to other objects with words such as right, left, above, below, and beside.

### **Shape**

In the previous examples meaning is derived from position and order. Another spatial feature that builds meaning is shape. The shape of each symbol in written language is meaningful. Each letter and number has a specific

shape and often a specific direction in space. A “b” is not a “d,” “g,” or a “p.” A “2” is not a “5.” A “3” is not an “E.”

All human systems function at varying degrees of proficiency, including spatial skills. Some people are gifted spatially and others are learning disabled. Some people are gifted ballet dancers or gymnasts, while others stumble over the slightest obstacle. Some people cannot even write easily; in fact, they may be nearly unable to write.



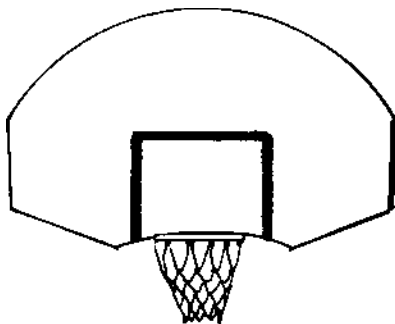
## Visual-Spatial and Motor-Spatial Categories

There are two types of spatial skills. Visual-spatial performance refers to using sight to discriminate differences. Motor-spatial performance refers to making the body move accurately and smoothly. Of course, many activities demand some combination of visual-spatial and motor-spatial skill. When someone has weak skills in one area, he usually compensates with another. The following illustrations contrast visual-spatial and motor-spatial skills.

Three young basketball players learning to shoot free throws demonstrated their adaptability and flexibility in learning this spatially demanding skill.

### Average Visual-Spatial and Motor-Spatial Skills

Max, the first of these 14-year-olds, tested out as having no measurable difficulty perceiving visual-spatial or motor-spatial relationships. He became an average free throw shooter after a reasonable amount of practice simply by following the coach's instructions.



### Weak Visual-Spatial Skills

Greg, out for the same team, had a substantial degree of visual-spatial dysfunction. His drawings looked immature, his handwriting missed the line, numbers in math problems did not line up. He could not judge the distance to the basket with his eye and thereby direct the ball. However, Greg did have excellent motor control. He easily learned all the early motor skills, rode his bike like the wind, learned to print with his first grade classmates, although reversals did persist. He switched in third grade to cursive handwriting without too much difficulty. He could even look up at the chalkboard and continue to write without much change in the look of his writing. He, too, learned to shoot free throws with relative accuracy. He learned to "feel" how much push his muscles had to supply to hit the hoop. This took a good deal of practice and

Greg tended to lose accuracy with fatigue. He looked "unconscious or automatic" as he shot. He was. His muscles rather than his eyes were in charge.

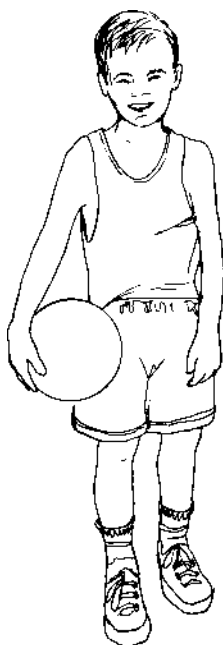
### Weak Motor-Spatial Skills

Then there was the third boy, Vince. Vince was a "klutz" from early on, but a determined one. Motor skills came only grudgingly and after much practice. He had more than his share of accidents during his toddler years. Later he became very very careful, a low risk taker who preferred the end of the line where he could watch other students perform before it was his turn. Handwriting was a disaster. He finally gave up on cursive and went to block printing although even these letters continued to look "loose and sloppy." Reversals persisted. Math was awful. The facts did not stick. Motor control remained



a problem. Despite these many problems, Vince had a strength. He could exert visual control. He watched his pencil intently and forced it to go where he directed. Writing while looking at the teacher was impossible. Vince wanted to go out for junior high basketball and, to everyone's surprise, became a rather accurate shooter. He had favorite spots on the floor to shoot from and he practiced endlessly. He almost willed the ball through the hoop with his eyes. He depended upon visual control to guide his shot. Vince was tall and the coach wanted him to learn to shoot from the center position with his back to the basket. This, he could not do.

Most skills can be developed through more than one route. Processing problems, like the difficulty Greg and Vince had in perceiving spatial relationships, narrow the routes available to the individual.



## Learning Problems Related to Spatial Understanding

Spatial understanding is important for achievement in many areas, including mathematics, spelling, punctuation and capitalization, mapping, understanding time, drawing, copying, ordering, changing point of view, and handwriting. These skills require spatial understanding of quantity, direction, interval, shape, location, size, direction of movement, sequence, and scale. For example, cursive requires understanding shape, sequence, and direction. Punctuation requires perception of interval and location. Thus school skills rely significantly on underlying spatial understanding.

Reading comprehension requires spatial skill. The reader must track meaning through complex syntactic structure. For example, the reader must link subject to verb even though the two may be separated by a dozen words. Flexible, meaningful reading requires turning statements around to make questions and asking questions of print. The successful reader wonders and asks questions of text while reading it and stops to ask questions when print does not make sense or takes an unexpected turn. The reader uses spatial skill to track the direction of an argument in print. Similarly, paraphrasing, an essential reading skill, requires combining, sorting, and rearranging print to restate

points in a different way. Finally, the good reader can understand different viewpoints, that is, the reader can understand how an event or argument would appear to another person. Shifting viewpoint requires seeing something from another perspective or position, which is essentially a spatial task.

Math also requires a great deal of spatial skill dealing with concepts like place value, signs (x and +), borrowing, and division.

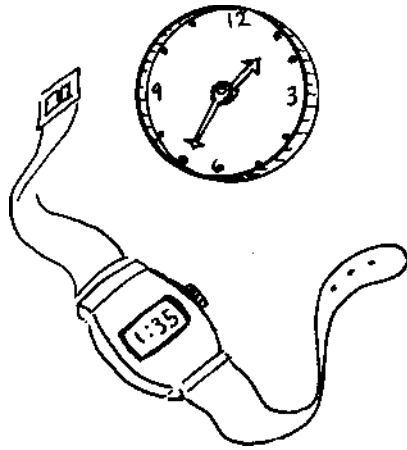
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Fractions are understood as a visual part of a whole. Algebra requires a tight adherence to sequential rules while working through multiple-step problems. The effective math student holds the spatial image of an equation like a balancing scale, carefully treating each side of the equation during problem solving. When working story problems, the student must translate events into images and the images into quantities to manipulate numbers and solve problems. Geometry requires spatial understanding of angles, degrees, diagrams, and the logical order of proofs.

Time is spatial: it requires understanding ordered sequences such as days of the week, months of the year, and seasons. A person



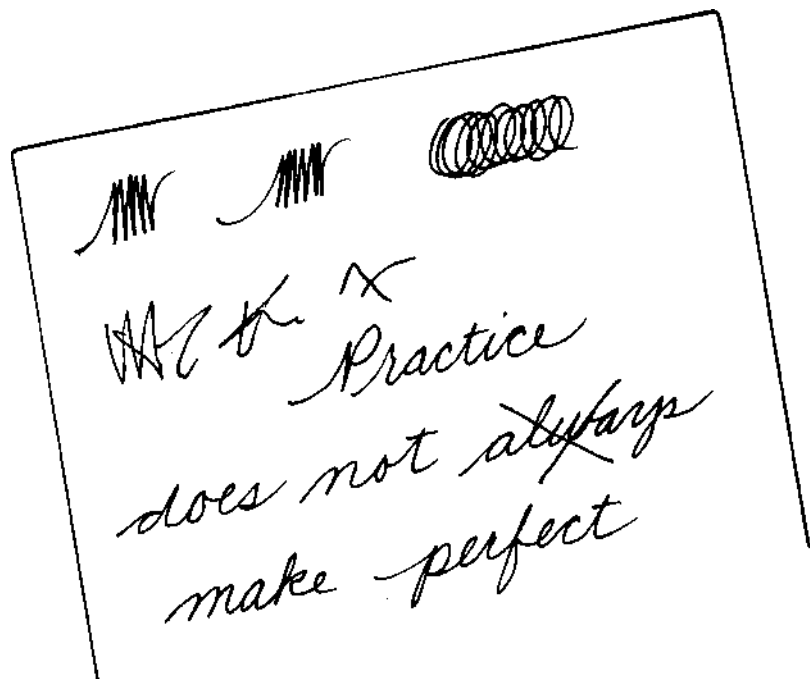
with spatial difficulties may have problems understanding “yesterday,” “last week,” and “next month”. Time expressed digitally is just as spatial as time expressed by moving clock hands, but digital clocks remove the need to translate the hand position into numbers. Full understanding of 7:15 p.m., however, requires understanding of ordered sequence no matter what type of clock is used.

Punctuation and, to a lesser extent, capitalization, may seem unnecessary to the student with spatial dysfunction. After all, punctuation is putting the spaces of oral language into written form. If the student does not perceive these pauses in oral language, he is unlikely to feel the need for commas and periods when writing. Apostrophes show relationship between owner and possession. The linking of owner and possession can be understood as a spatial image

just like the linking between car and trailer or hand and finger. A person who does not visualize the link of possession may leave out the apostrophe that represents that link. Grammatical understanding also requires perceiving the relationships between words, such as subject-verb, adjective-noun, and adverb-verb. Understanding complex clauses and prepositional phrases occurs in the analysis of the spatial relation between parts of sentences.



the pencil. Others lack motor-spatial control and cannot make the pencil obey. Many students have both types of spatial dysfunction resulting in serious difficulty with handwriting and drawing.



Handwriting is easy and effortless with accurate motor-spatial control and very difficult without it. Writing and drawing require two skills: knowing where to send the pencil (visual-spatial) and being able to make it go where you wish (motor-spatial). Some students do not perceive form accurately and thus do not know where to send

Many more tasks demand relational (spatial) understanding: reading maps, tying shoes or any other motor-sequence task, staying in step in marching band, making change for a five-dollar bill, and finding one’s way around an unfamiliar shopping center. Spatial understanding is a fundamental skill that affects various areas of functioning.

## **Social Problems Related to Spatial Understanding**

The spatially disordered person struggles with order in the environment. Creating and maintaining order in a desk, a locker, and a room and organizing the content of an essay are difficult tasks. Some people react by learning and imposing rigid, inflexible order on their world which they go to great lengths to maintain. Others react to the same problems by rejecting order and living in untidy surroundings and with chaotic performance.

Social relationships can be strained with spatial disorder. The person may be rigid and inflexible with game rules or expectations regarding other people's behavior. Manners may be poor. A person with spatial disorder may invade others' personal space, take grossly large bites of food, and fail to see the impact of statements or actions on other people. Relationships with teachers can be particularly difficult. The student may need a rigid adherence to the same schedule and may have difficulty understanding precisely what the teacher wants in an assignment, requiring very specific, modeled directions, such as 2.5 pages of writing.

### **Introducing Individuals Whose Lives Illustrate the Impact of Difficulty With Spatial Relations**

Each child or adult with spatial disability is unique. One person may have a narrow problem with gross motor performance and no other markers. Another person may only have visual-spatial difficulty. Others may have various combinations of spatial disorder coupled with other forms of disability. Some persons will have learned methods for avoiding the impact of the disorder while others have few adaptive skills.

The following stories introduce Dean, Dorie and Alice. Each reflects a different form and degree of spatial disorder. While their stories are typical, they represent only a tiny portion of this population.



# The Specialist

Coach Chuck Cenauchski slid his tray into the space between Dick Dillon and Ethel Spirone, eased the clipboard out from under his left arm, leaned it against the side of his chair, and dropped onto the groaning green plastic furniture. Ethel moved her chair back a few inches. Coach “CC” needed the room and she certainly didn’t. Dick and C.C. and Ethel had been friends since their years teaching at Meadow Middle School and had all moved to the high school level the same year.

Dick moved the other way without altering his usual boneless slouch. Now that soccer season was over, he was as relaxed as he looked. Eyeing Chuck’s tray which the cook had piled with extra lasagna (“saves time to give you seconds first,”) he asked, “How’s the baseball team coming?” Chuck finished buttering his French bread before he replied, “Good, good. At least I think so if I can fill a couple of holes. Why does every kid go out for the same position? And why do they think they can figure out who goes where better than I can?” He paused to drain his second milk carton into his glass, “Three kids signed up for catcher. Can you believe that? The dirtiest, most thankless spot on the team and three guys want it.” This information hung silently in the air as the two others watched C.C. reduce his plate of food to typical proportions.

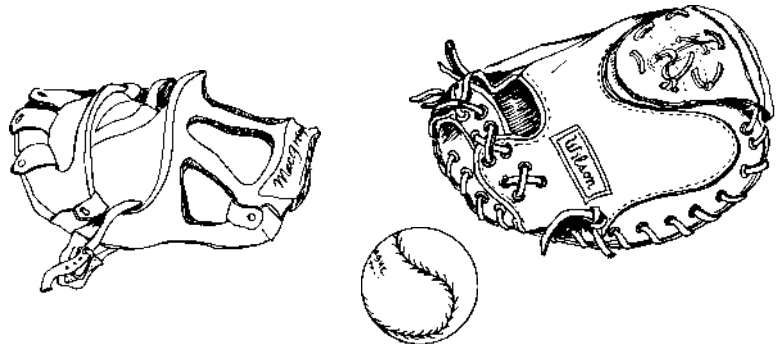
“Hey Dick, you had that Dean Delane kid in soccer. How’d he work out?” Dick straightened up enough to prop his elbow on the battered table and drop his chin onto his palm. “Well,” he said, “He was a great goalie. Quick. Focused. Tough. No one could intimidate him.” He paused to watch Chuck absorb the rest of his French bread and went on. “Funny thing, I tried to move him to forward after Rich Allison broke his ankle but that was one bad idea.” Swallowing lasagne, Chuck proclaimed, “Well, I want him at shortstop. He’s quick. Has a good arm.”

Dick returned to his slouch, now rocking back on the legs of his chair, “I dunno Chuck. There’s something with that kid. Something about shifting gears or moving around and doing something else at the same time. In soccer he couldn’t dribble and keep track of the guy next to him, much less the other team or anything else—. He paused, remembering, “He did the craziest things. In one game he dribbled right out-of-bounds three times. Three times! Never took his eye off the ball. Just forgot where

he was. Looked surprised as anything when the ref whistled. I took him out and told him, ‘See all those other guys with shirts like yours. They’re your team. Pass to them!’ Dick glanced at the clock. Six minutes until the fifth period bell. He went on, “So he did. Pass, I mean. Only usually it was to the other team. The guys really got down on him. I pulled him and decided he was never going to be a soccer player.”

Moving his empty tray aside to make room for his arm, Chuck pushed back from the table, “Geez, Dick, he sure didn’t look all that uncoordinated. I must be losing my touch.”

Dick stood up. He liked to be a few minutes early to his fifth period Social Studies. The kids were always eager to get at making their maps. He weighed his reply, “He’s coordinated—but it’s weird—only for one thing at a time. Dean tried to explain it to me although I’m not sure he really understands it himself. He cried a bucket of tears and begged for a try at goalie. Said he could dribble **or** he could keep track of the other players or he





could monitor his position on the field but only one thing. Something about space and moving around— Said goalie worked because he only had to keep track of the ball.”

Coach Cenauchski tapped his clipboard on the table, “I think you’re trying to tell me that I still have too many catchers.”

Dick stopped with his hand on the doorknob, “ All I know is that kid was the worst forward and the best goalie in the entire conference. If he says he can play catcher, he probably can. And I’ll bet a steak dinner that he can’t play anywhere else.”



### **Commentary:**

Soccer player Dean Delane has a narrow problem. He is well coordinated in that his body moves rhythmically, and the parts cooperate as they move. He is strong and has good balance. However, keeping track of his location is very difficult. He cannot monitor his position when he is moving. This is especially a problem when the “things” he is involved with, such as his teammates, are also moving. So he seeks positions such as goalie where he remains within a fixed area, tracks the ball and moves to it. He does not have to move with it down the field. He probably will be a successful catcher. This position demands that he stay put. He tracks a ball that comes at him from the same place each time. He may need extra practice to make the throws to the bases when he tries to cut down advancing runners. But he can learn this because he remains in one location. It remains to be seen whether he can catch foul balls because of their unpredictable trajectory.

Dean may well have other spatial difficulties such as punctuating written language or flexibly adapting to schedule changes. However Coach Cenauchski is not worried about those problems.

## No Shortcuts

Dorie swallowed, struggling to push back tears when she again passed the reader board outside the little white church. The words mocked her: “Sermon Sunday : Finding the WAY.” This was her third time to pass the church looking for the gaudy billboard which marked her turn onto the street where Kenneth waited for her. She jerked the wheel in surprise as the cell phone beside her clamored for her attention. Easing the car into a space marked for buses, she reached for the phone. Sighing deeply, she put it to her ear. Kenneth, of course.

“Thank God, you’re all right. You are, aren’t you? Why haven’t you answered before? Where are you? I’ve been calling for an hour—

maybe more than an hour.” His voice was precise as ever. Only the rush of words gave away his anger and concern.

Doris Diane Ryland, who was D.D. to her mother and Dorie to everyone else, dreaded the scene to come. How could she explain that a billboard had disappeared? Kenneth would make some utterly logical response like, “Well, you could simply have turned at Olive and got here.” She picked up the phone, “I forgot to turn the phone on until a little bit ago. Sorry.” This time anger was the only inflection she heard as he spluttered at her, “But where have you been And where are you now? You are 90 minutes late!”



Dorie looked beyond the streaming traffic for signs or something before responding, “Well, I’m in a bus stop so I can’t stay here. The signs on the corner behind me say Pine and 9<sup>th</sup>.” Kenneth’s voice slowed even further, “Ye Gods Doris, you’re only a block and a half away. Just turn right—no wait. I better come to you. There’s an IGA grocery store just ahead. Wait there.” After being assured that she saw the sign and would go nowhere else, Kenneth hung up. Dorie pulled out just as a huge bus marked “Crosstown” filled her rearview mirror. She ignored the glare from the beefy driver. At least the bus blocked other traffic so she could get into the lane and down to one of the IGA parking spaces. She parked. Eyes closed, forehead pressed against her hands which were still gripping the top of steering wheel, Dorie waited for her pulse to slow. She tried to push down the panic. Sometimes she could. She didn’t even hear the box boy collecting grocery carts until he rapped on the window beside her bent head. “You okay, lady?” he shouted. She turned a smile toward the gangly adolescent whose wide eyes mirrored concern. “Fine—resting,” she lied, holding the smile until he clattered toward the store pushing the long rank of carts in front of him. Dorie got out of the car. Kenneth would drive. After a few steps her trembling legs settled down. By the time she reached the passenger side, she at least looked calm. Now to

prepare herself to face Kenneth and what would probably be another scene. Were there any words that would make him understand?

Walking a block and a half had calmed Kenneth considerably by the time he slid into the driver's seat of Dorie's blue Honda. As she turned toward him, he silenced her words with a huge bear hug. "This time I really thought something had happened to you," he murmured against her hair. They held each other wordlessly for a few moments feeling how precious each was to the other. Neither of them was in the mood for the movie they had planned to attend. Instead they went to dinner.

The waiter had cleared the table, returning to set a cup in front of Kenneth. Dorie slowly rotated her half-filled water glass between her fingers as she watched the man pour the steaming coffee into Kenneth's cup. They were both carefully cheerful enjoying the late afternoon quiet at the restaurant. Kenneth smoothed his orange tie inside his jacket as he described a student in one of the business classes he taught at the community college. Dorie related concerns about hiring additional line workers in the high tech firm where she worked in the Human Relations

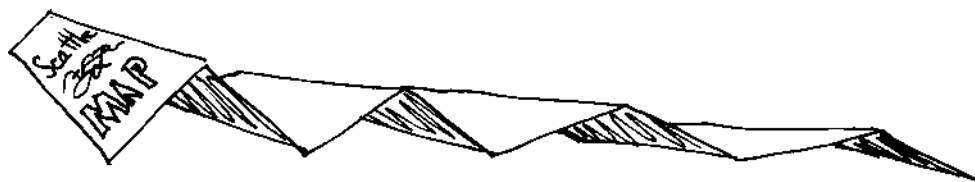
Department. Silence settled. Dorie straightened the lapel on Kenneth's maroon jacket. She twirled her water glass. Kenneth stared into his coffee cup. They looked at each other. Both knew the time had come to talk—really talk—about what had happened. This was the third time in a month that Kenneth had been left waiting.

Dorie sighed, "I'm sorry. I left work at three so I would be on time." "Three!" Kenneth exclaimed, "but its only a half hour drive. Forty minutes at the outside. Where did you go? You got here at 5:30."

Dorie knew this was one of the really bad times, like the sociology class she couldn't find in college. Heck, she never found Eslington Hall until her roommate took her. Or the job interview she never found. She thought back, awash in memories of sidewalks that led to strange buildings and empty playing fields, of streets with the wrong names and houses with the wrong numbers. She looked at Kenneth, her face pinched by painful memories, "I thought... I really thought that I could rely on this system. From work I turn at the Industrial Park sign and that takes me to the freeway. If I turn onto the ramp beside the green and



yellow real estate building, I go in the right direction. Then I get off at the first ramp after St. Margarets', you know that church with the round window. Then I go until the big billboard with a camel on it..." Her voice trailed away as she saw Kenneth staring at her with his mouth, usually so firm, gaping open. She tried to explain, "The real estate office was gone so I got a really bad start and I couldn't find the billboard..." Kenneth was still staring at her. Now the fingers of his left hand were tapping on the table. "Dorie," he said at last, "which way is Puget Sound from here?" Dorie frowned, "I, gee, I don't know. I never know unless I've gone back and forth a few times. Or, of course, if I can see it." She added in a soft voice, "But you know, don't you?" He nodded.



Further probing determined that Dorie did not know where the suburb her parents lived in was in relation to Seattle, nor where Kenneth's condo was in relation to the college where he taught. "I go by landmarks, not directions and certainly not streets," Dorie explained. The problems come when something happens to one of the landmarks or I miss it. I don't very often miss them though, but that is what happened today. With the real estate office gone, I got on the wrong ramp and went all the way to the Tanville television tower before I knew for sure and then I got off. So, of course, I had to ask advice although I was pretty sure I could just go the opposite direction on the freeway."



Kenneth started several sentences but kept interrupting himself as new ideas flashed across his mind. "But you've.. what about... you could just..." Finally he said, "Don't you read maps?" Now it was Dorie's turn to deliberately choose words, "Well, of course I can read them. It's just that they don't tell me anything." Kenneth took a pencil from the breast pocket of his shirt, carefully rotated the barrel until lead

appeared, and turned over the paper placemat. He moved the pencil swiftly over the surface. Soon a map of the main streets lay between them. He labeled Puget Sound and put a large X where Mt. Rainier stood. Dorie was glumly silent. She said, "I know. You have a map inside your head. I've known about that since third grade when I got lost on the way to the gym when I came late from the dentist. The other kids just knew where to go even when they were alone. So I figured out they had maps like that. In their heads, I mean. But I do not. I never have so I just depend on things I can see along the way." She added, "Usually it works. Of course I have to start in the same place all the

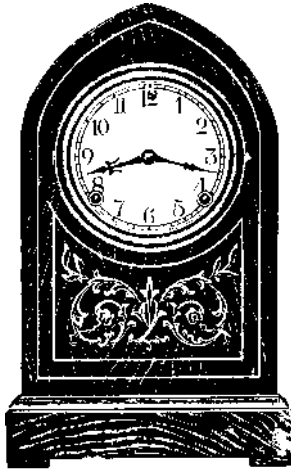


time. So if I want to go to the mall after work, I have to go home first. 'Cause I know the way from home but not from work. Oh, and I can never take shortcuts. But I get there." She added after a few moments, "Usually."

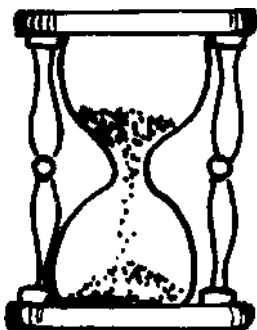
In the weeks that followed Kenneth learned about the dozens of landmarks Dorie used to guide herself. He methodically noted

each one on his large area map. Several times he tried to teach Dorie various methods of using a map. Color coding didn't work. Neither did eliminating all but the major roads. She patiently listened to his explanations, nodding thoughtfully at appropriate times. But when they got in the car and he asked her to direct him to his parents' home, she responded, "Drive just past the Taco Stand and turn..." Landmarks. The only thing that worked was landmarks.

Kenneth had forgotten to ask a question that had been bothering him for a long time. By now the intense frustration of the missed meeting in Seattle had faded. They were resting on a bench in the mall. With the wedding less than two months away, they had much to do. Like selecting china and silverware patterns. That had been fun. They agreed on most things. They were working hard at understanding each other. Really understanding. Kenneth probed an unpleasant memory when he asked, "How did you get lost that time just before Christmas when we were meeting here at the mall? Remember, you were over an hour late and the stores closed before we could do our Christmas shopping for the folks." Dorie clearly remembered the angry moments, "Oh, I didn't get lost then. I got all mixed up on the time and didn't leave soon enough. Remember, my watch was broken." An idea was dawning in Kenneth's mind, "What time is it, Dorie?" Glancing at her wrist, "3:37" she replied. "And how long have we been shopping?" Kenneth asked. He recognized the

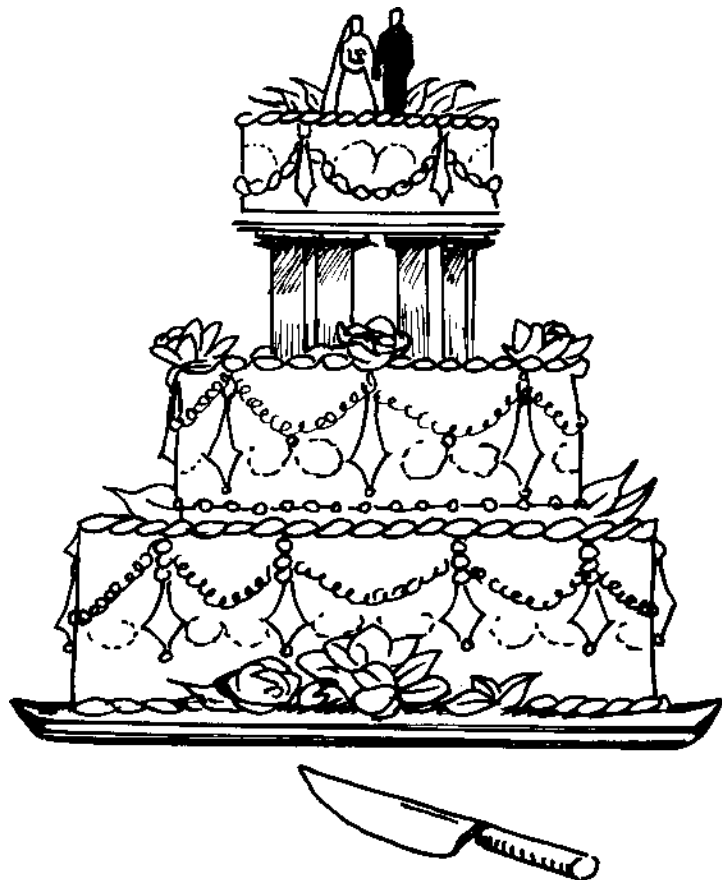


pained look that sometimes appeared when he pressed Dorie for answers. “An hour? Maybe,” she responded. Then, jumping to her feet and facing Kenneth, “Okay, okay! I can’t guess time. And if a clock isn’t digital, it takes me ages to figure out the time. And what happened at Christmas was that I was stuck with only regular clocks at work. So I didn’t know when to leave. I called Mom but she wasn’t home. No one else would understand. So I had to guess. Time is just like maps. I don’t have maps inside me and time’s not there either. So, of course, I can’t guess time!”



Kenneth smiled as he reached out to pull her close, “Well, its no big deal. Just something to reason through. There’s something I have been meaning to tell you about myself. I guess this is as good a time as any. It’s from when I was in the Air Force.” Dorie stared at him not knowing what to expect. Kenneth went on, “Remember, I told you about not getting into surveillance training. But I never told you why.” He paused, waiting for a couple who were arguing over whether they could afford new speakers to pass by. Kenneth confessed, “I’m colorblind.” Dorie was speechless. She sat back remembering orange ties with maroon jackets, the green sofa with twining red tulips that graced his blue carpeted living room. “Thank God!” she said at last. “Thank God!”

Everyone agreed that it was a beautiful wedding and that Dorie and Kenneth were a couple meant for each other. The other faculty members present discussed how much more professional Kenneth had looked in recent weeks—more in keeping with business school expectations. Modeling for the students and all that. And Dorie. She must have a great sense of humor. How else could you explain her delight in Kenneth’s wedding gift to her. Most brides wanted pearls but she seemed delighted with a sand timer. Of course it was hand carved of cherry wood. But still. You can see the hourglass shape in the pictures of them cutting the cake. Must be a private joke. I heard her tell him that when the sand ran out, the honeymoon would begin.



## Commentary

Dorie does not comprehend spatial relationships. She can manage adequately in familiar settings such as her home or office. After all, she arranged her own furniture at home and set up her own filing system at work. She just kept trying different alternatives until she found an arrangement that was adequate. These were very challenging tasks that took her a long time. Probably no one else can find anything in her files because her system is unlike anyone else's.

Maps are not the same as the real world. They only represent roads, towns, mountains and rivers by lines or other marks on paper. Maps are 2-dimensional. The world is 3-dimensional. Dorie cannot translate the world into a 2-dimensional map. She has the same problem interpreting house plans, assembling toys at Christmas from written directions or putting together a model airplane with her nephew.

Time is even more abstract because Dorie cannot see it or feel its weight. Moreover, time never stops so labels such as seconds, minutes and hours are hard for her to comprehend.

Both maps and clocks are reference systems. Maps have meaning only as they refer to places and the distances to other places. Clock time refers to the rotation of the planet arbitrarily marked into subdivisions called hours, minutes and seconds. The moving clock hands have meaning only as they are linked to the different subdivisions. Dorie could not grasp reference systems. Neither did she "feel" direction. She also did not "feel" distance. This is what she meant by not having a "map inside her head." Thus, she might turn right instead of left and head south instead of north on the highway and not recognize her error until a landmark jarred her into awareness. She might travel miles beyond her destination if she missed the landmark without noticing that she had traveled too far.

Dorie may live a successful personal and professional life without these spatial skills. Very likely she could acquire them if she had help building a reference system in the 3-dimensional world which would allow her to make the necessary comparisons. Kenneth will discover other areas in which she has found creative routes. For example, Dorie never could create an outline and use this as structure for writing a paper. She did, however, write very successful papers. She had to conceive them in their entirety before she put pen to paper. When her high school English teacher demanded the outline with the paper, she constructed one after completing the composition. She got an "A" grade on the essay.

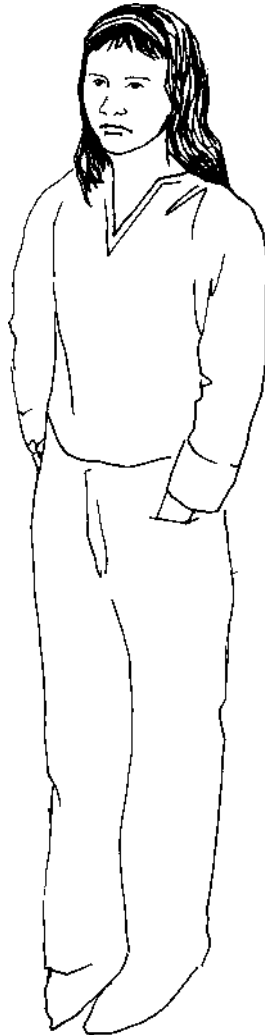
Geometry was an ordeal until she learned to do it backwards and to build the constructions from toothpicks. But that is another story.

## Another Alice:

“Two Alices this year.” Thirty-two papers stretched across Ms. Saundermann’s table. She reached over and set her cold coffee on the counter as her eye followed the ferns just outside the patio door whipping against the large stones of the wall. Rain slanted down, relieving her from watering and weeding for the day. Evonne Saundermann both anticipated and dreaded reading these first writings from Friday’s “Creative Constructions” time. Although it was only the second week of school, her students knew about her Friday Writing from the sixth graders who had been in her room last year. Most of them were simply resigned to get through it. Grading only on creative thinking, with no marks against spelling or verb tenses, Ms. Saundermann had brought the papers home to simply get to know her students. “Two Alices,” mused Ms. Saundermann again, as she separated the papers of Trent and James from the rest.

The years fell away; she reached for a tissue and dabbed at her eyes and the unexpected moisture. “Still so close after all this time.” Evonne recalled the day she went to the funeral home to say good-bye, planning to slip quietly in and sign the guest book, not expecting anyone to remember her as Alice’s teacher after nearly 5 years.

Lanky, disheveled brothers, the gin-smelling father, and the mother stooped until her neck seemed drawn into her shoulders did remember and were so pleased that she had come. They showed her Alice’s ‘permanent’ plastic license, an impudently grinning teenager, which arrived two days after the accident that took her life. “I wonder if she could tell where the edge of the road really was?” mused Evonne to herself. “Wish I had known then what I know now. Of course, without Alice I wouldn’t have been looking so desperately for answers.”



Absolute consensus around the lunch table in the faculty room had greeted Ms. Saundermann’s comment that she was late for lunch because she had been talking with Alice Welch. Eight years and over 200 children had progressed through her life since Alice but Evonne Saundermann still remembered the intensity of the teachers’ response. Three of them had taught Alice or at least had tried to teach her. They poured out,

“Just set up a desk in the hall and have done with it”

“Smart but she will not do her work”

“She trips over the lint on the rug”

“Stubborn”

“Just try and read her writing, in fact, try and get her to write at all!”

How she had tried and how Alice had tried. Evonne had not felt that Alice was out to get her as Don Mirabel expressed from his vantage point as teacher of last year’s

My name is Alice



fourth grade. “It was a daily battle, y’ know, and I lost more than I won,” he complained, and proceeded to describe some of Alice’s tactics. “She had the kids on her side. They would all swear she had turned in her math paper and I ‘must have lost it’. But even they got sick of her before the year was out.”

Evonne, teaching 5th grade then, had taken Alice home the first day of school when she missed her bus. The dark eyes pinched tight at the corners as she begged, “Please, please Ms. Saundermann, call Ma and tell her I couldn’t help it, that the bus driver left early or something.” The tense face relaxed when Evonne said she would drop Alice off on the way to pick up her son at his Pop Warner Football practice. They had talked. Before she ran into the clapboard fourplex which was home, Alice confided, “My teachers never like me,” and chin ducked deep in her chest, “Will you like me?” Shivering, she shrank from the touch of her teacher’s hand on her arm. In the aging Toyota on that fall day, they agreed to be a team that “liked each other”. And they did, but not without surly battles, and even one “I hate you,” as Alice made her door–slamming exit.

Alice did not know boundaries. She trespassed on space, on property, on feelings. She got too close or she retreated outside the circle of the discussion. Her paper was never in the right pile and she tipped 3 stacks of “to be correcteds” while looking for the place to deposit her contribution. Actually this was minor compared to her missing papers. Usually she simply did not do written work. Somehow too, she was never ready for the bell, any bell, even dismissal. Time did not exist. The clock was a mystery. Ms. Saundermann tried unsuccessfully to teach her how to tell time to the minute and settled finally for knowing the hours and before the hour or after the hour. Even that took color clues as well as arrows pasted on the clock face.

Nevertheless Alice knew a lot. Reading and talking were what she did best and most. She used an extensive vocabulary to describe the plot of every Nancy Drew mystery and every television sitcom and every play-ground episode, usually featuring herself. She knew the stories in her textbooks that year too.

Alice would not write. Eventually Evonne discovered that she could not write. Slowly and with enormous concentration, Alice could print. However, cursive script was quite impossible. She tried once, after considerable urging from Evonne, and the backward loops and stilted malformed letters were impossible to decipher. Most of the time she avoided written classwork. Some days she produced 5 or 6 lines in response to an assignment. Her handwriting reflected the painful process which writing was for her. Capital letters



and small lower case letters seemed randomly arranged, cramped, with no spaces to mark word endings and no punctuation.

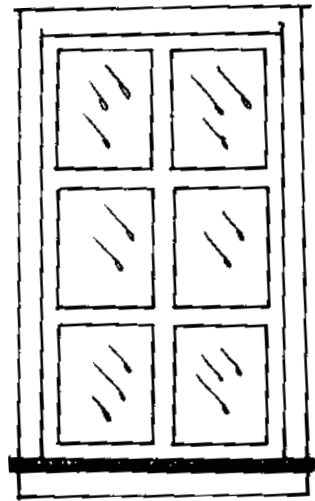
In Ms. Saundermann’s memory, Alice’s writing became a type, a category, a pure version of a problem she came to recognize in many students. “I didn’t even know that ‘dysgraphia’ existed back then,” mused Evonne but she had saved Alice’s papers. Most years someone was “a bit of an Alice.” This year, it surely seemed she had two.



Alice pushed her to find answers. Was it something wrong with her brain that sent her pencil skittering across the paper? Perhaps it was her eyesight. In a university class on current research in learning, Evonne learned labels and descriptions: minimal brain dysfunction, hyperactivity, alexia, dyslexia, dyscalculia, attention deficit disorder. The teachers, who also ran a learning clinic, were presenting a case study one wet winter evening. She listened to them describe Bryce. Click. Surely, they were describing Alice. Could there be two like her? Dysgraphia. Not curable but manageable. Visits to the clinic led to deeper understanding as Evonne teamed with the staff to help teach several children. By June and the end of her year with Alice, Evonne's files bulged with research articles which she read and reread. Part way through seventh grade, Alice moved away, burnt out by a fire in her ramshackle apartment building. She did not return to St. Pats Elemen-

tary School. No longer did she stop by to visit Evonne, grinning, papers spilling, intruding into conversations, lovable. Other "Alices" moved through the school. Gradually Evonne became the resource person to consult on students who didn't fit the system.

Evonne sipped her coffee as she shifted her focus back to the fresh stack of papers. James's few lines were squished up at the very top of the page: thick, dark, printed upper and lower case letters mixed together to form words. The pressure on his pencil had pushed his line in a deep uneven trench across the page, at times tearing the yellow paper. James had been eager to tell her about Triceratops but reluctant to write. "Do I hafta? Can't I tell you instead?" he had pleaded. She could see why. James looked so orderly in his short haircut, shorn so close to his head that Evonne was not certain if his hair was brown or blond. His cotton shirt was buttoned even at the neck



and was usually tucked into jeans so smooth she suspected they were ironed.

James chose as his seat the desk off to one side of the room in a notch for heating pipes. Ms. Saundermann did not want student desks arranged in rows. Most any other arrangement occurred at some point in the year. To start off, she asked each student to set up a desk as he or she preferred. James had hurried to the notch, where his desk was tucked against one wall with another against his back.

"I see what you are up against, James Andrew MacGinnis," she said, looking at the paper in her hand. Letters seemed to sit everywhere except on the lines, marching unevenly and without spaces between words across the page. You have some sort of glitch in how you perceive space. No wonder you feel so safe in that nook. Mrs. Saundermann aligned Trent's paper with James's and looked at them together. Trent's spidery script started part way down the page and angled obliquely across both light red margin lines until cut off by the paper's



edge. Line after line wavered across. "All the vowels look alike. The 'a' is open at the top, the 'e' is closed, and the 'o' is just like the 'a'. Amazing." She had already discovered that even Trent could not read his writing when it was "cold." "Alice" declared Ms. Saundermann to no one, as the rain beat against the glass, "Alice, all over again! I wonder if they can tell time?"

How could she help these Alices? First she had to open their eyes to other ways of sharing knowledge besides writing. She would give the whole class the challenge. Ten points for every idea. Nothing silly. No robots. No pet Martians. No magic. Tell the teacher, tell a friend, tell the tape recorder, borrow a classmate to be secretary, xerox part of the book and highlight answers, draw your answer, make a display... The students eventually

developed a list which included 26 options, practical and impractical. Everyone used several of the options. James and Trent did so every day. Evonne set the expectation, "You do not have the choice of skipping the work, but you can choose how to show what you know." She wrote a grant for a lap computer, and it was funded in January. They set a schedule. Daily practice instead of penmanship. Slow and steady with no comparisons to anyone else. By May both boys could use the machines well enough to do classwork.

James lingered behind as his classmates scrambled into their summer vacation on the last day of school. "My Mom...um...she wants to talk to you...okay?," he said ducking outside without waiting for Evonne's reply. A locker door

slammed as the last footsteps faded. Red geraniums spilling over wicker trailed into the room, gripped firmly by Mrs. McGinnis, who plunked them on the corner of Evonne's desk. His mother waited for a lagging James and eased him in front of her. On cue he mumbled his "Thanks a lot" speech. James then slipped out the door electing to wait in the car hoping that, for once, his mother would hurry so he could begin his summer vacation. After describing years of frustration and concern for James, Mrs. McGinnis spoke her appreciation, and asked, "How did you know my James had this problem; how did you know what to do?" Evonne looked out the window and back into the years, sighed, and spoke softly, "Mrs. McGinnis, let me tell you about a student I had many years ago. Her name was Alice..."



## Commentary:

Alice had severe, broad-range spatial problems along with dyslexia and Attention Deficit Hyperactivity Disorder (ADHD). In addition, her troubled family was unable to provide her with compensatory skills or consistent modeling of social interactions.

Alice's most visible problem was dysgraphia. This writing difficulty stems from fine motor disability along with inaccurate memory for letters and words. How could she write when she could not form reliable memories for letters, when she could not make the pencil go where she chose, and when direction of pencil movement was erratic? She could never remember whether the loop on the "g" swung to the right or to the left. Half of the time her pencil was so far above the line that the loop ended up barely reaching it. Her "o" went around twice and the pencil came out going the wrong way which really messed up the next letter.

Alice also had gross motor planning problems coupled with orientation difficulty. She was not good at sports, got in the wrong line, and tended to be accident prone. Her foot in the aisle tripped her classmates. And sometimes this was accidental. No wonder driving was such a hazardous process. She probably did not have a clear idea of her location in relation to other cars and to the center line.

The fact that her family was unable to model normal social interaction was especially damaging for Alice. Boundaries are lines in space. Most social boundaries are not visible. She trespassed on other students' space. Alice did learn to monitor her behavior in the classroom. Learning this was challenging and took all of Ms. Saundermann's skill to guide her. Whether she ever was socially successful outside the classroom is doubtful.

Alice's other problems were compounded by Attention Deficit Hyperactivity Disorder. She was inattentive, impulsive, and restless. She was often fatigued because it took more effort for her to listen, to be on the correct page, and to sit still than it did other students. Her chaotic home life meant that she often did not get enough sleep. Alice faced a great many obstacles. Despite this, her year with Ms. Saundermann was a success and succeeding students benefited. James Andrew McGinnis was "only dysgraphic." He became a successful student with compensatory skills that carried him all the way through college.