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Investigating spelling through generative instruction

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Investigating Spelling through Generative Instruction

Linda Ross

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at
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in partial fulfillment of the requirements for
the degree of

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in
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ABSTRACT

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The present study examined the components of generative instruction through the teaching of spelling rules. In Experiment 1, the effects of direct versus passive instruction and rate building versus equal-time practice were examined. Forty undergraduate students with below average spelling skills participated. Although there were better performances under passive instruction on some aspects of the posttests, and improved performance with rate-building practice on others, these results were not systematic and were contradicted by other results. The effects of rate building versus an equal amount of practice on the training and posttest application of spelling rules were examined in Experiment 2. Four undergraduate students with relatively high transcription rates participated in this experiment. Three of the four subjects had higher rates of correct letter sequences on an endurance test. These differences were correlated with differences in transcription rates from the beginning of the experiment, therefore, the differences in test performance are not conclusive.

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Investigating Spelling through Generative Instruction

In many countries, college-bound students must pass a demanding set of examinations to qualify for university study. Subsequently, the courses taken in secondary schools are strongly tied to these exams. In the United States, a high school diploma is normally conferred on the basis of taking a certain number of courses. There are no national exams that students must pass in order to be eligible for university study. Admission standards vary from university to university. Some permit almost anyone with a high school diploma to attend, whereas others require competitive scores on admissions exams. The two exams that most commonly serve as a gateway to college in the U.S., the SAT and the ACT, however, are not based on the curriculum students study in school (Gandal & Hokanson, 1994). These tests, which focus on critical thinking or analytical skills, are based on skills that are taught either incidentally, implicitly, or not at all in high school classrooms (Linden & Whimbey, 1990.) In addition, there has been a dramatic decline in SAT scores over the past 30 years. American high school students reached an all-time low on their verbal test on the SAT in 1991. Subsequently, the SAT was renamed SAT II, the norm table for comparative data changed, and the reported scores are not equivalent or comparable to scores reported prior to 1991.

Many excuses have been formulated to explain the poor results. A favored variation is that American colleges are now providing "access" to so many "disadvantaged" students that the average scores of those applying to college are lower. Test scores, however, have been declining at the top. In 1971, more than 116,000 students scored above 600 (out of 800) on the verbal subtest of the SAT. In 1991, with slightly more students taking the test, fewer than 75,000 score that high (Sowell, 1991). Others have argued that these declines show a need for more federal funding for public education. The United States, however, spends more money per pupil than most other nations, including nations whose youngsters consistently outperform American students on international tests. Others have argued that the growth in class size affects performance; however, American classrooms have fewer pupils

per class than Japanese classrooms, yet American students routinely score lower than Japanese students on international math tests. A final defense of the American education system argues that the typical student in an American classroom is exposed to much more material than students from other countries, suggesting that Americans are required to learn more about each of the given subject areas. The Third International Mathematics and Science Study (TIMSS) compared math and science curricula in roughly 50 countries. Preliminary results suggest that American school typically cover more topics than those of other countries, but in much less depth (Olson, 1994).

The above studies provide two clear facts. First, the educational system of the United States has not mandated a national curriculum. Second, even when subject areas are agreed upon, such as math and language arts, educators have failed to provide effective instruction. Rather than focus on effective instructional methods, educators in this country have increasingly favored academic fads. While Japanese students are studying comprehensive math, science, and foreign language curricula, American students are instead improving their collective self-worth through "affective education" (Sowell, 1991). Competitions between American children and those from 5 other countries show that American children score at the bottom in math and science performance, but score high on how well they felt they scored. Data such as these suggest a false sense of security in American children, allowing them to feel good but, at the same time, possess fewer academic skills than children of other countries.

Educational technologies exist that could greatly increase the performance of our children (Binder, 1988; Watkins, 1988). These technologies assume that complex performance can be established and maintained through instruction focused on carefully selected, simpler elements of the more complex task.

These technologies rely on the findings that prior experience with basic, elemental tasks is often required before composite skills can emerge. Once the component, elemental skills are in place, complex behaviors often occur simply by presenting an occasion for their

occurrence. In behavioral terms, when specific elemental behaviors have been established by one set of contingencies, they may recur in the presence of new stimuli should new contingencies reinforce their occurrences (stimulus generalization) or recombine to form a novel behavior when reinforcement contingencies change (response generalization).

Research examining complex behavior has supported this reorganization of experience. Birch (1945) studied the behavior of six chimpanzees to determine the relation of previous experience with stick handling to solve Kohler's (1925) "insight" task. Of the six subjects, all had been exposed to string-pulling experiments, and one had used sticks to perform such tasks as turning light switches on and off. Under initial test conditions, all subjects initially reached toward the food directly, and discontinued this behavior when it did not result in food retrieval. Following the initial conditions, only two subjects retrieved food that had been placed out of their reach when given access to a hoe-shaped stick. Each subject, however, retrieved the food in a topographically dissimilar manner. The subject that had experience playing with sticks retrieved the food by moving the stick in a sweeping motion. The other subject used a technique similar to the string pulling used in a previous problem-solving task. The test condition was followed by a 3-day exposure to an environment in which straight sticks were made readily available. During this time, all subjects learned to integrate the sticks into existing reaching patterns such that contact with an object could be established from a distance. After this exposure to the sticks, all subjects were tested again with the hoe-shaped sticks and all drew food toward them. This experiment suggested that experience with stick handling was a necessary prerequisite for the "insightful" behavior described by Kohler (1925). More recent experiments with pigeons have produced similar results (Epstein, 1991a, 1991b). This appearance of skills in new contexts and combinations without the need for subsequent training is a result or outcome that has been described as generativity (Alessi, 1987; Epstein, 1991a).

The purpose of this dissertation was to evaluate the instructional and practice components of a generative model of instruction. The literature review includes both theory

and research that led to the development of instructional models based on a selectionism. First, a survey of Direct Instruction procedures and research is presented, which will include empirical evidence of their effectiveness. Another model of instruction, Precision Teaching, is then discussed, including empirical demonstrations and claims of its utility. Finally, a detailed discussion of Generative Instruction is presented. The second part of the literature review deals with theories of, procedures used, and research on spelling, the instructional content pertinent to this dissertation. The review of spelling theory and research is followed by 2 experiments designed to elucidate the relative contributions of different types of instructional and practice procedures in establishing a rule-following spelling repertoire.

Direct Instruction

Many investigators allegedly have shown how the principle of selectionism can result in complex generative classroom behaviors, like those involved in problem solving, productivity, concept formation, abstraction, and emergent performances (Alessi, 1987; Birch, 1945; Chase & Bjarnadottir, 1992; Epstein, 1991a, 1991b). Instructional programs that explicitly teach generative performance focus on the simple elements that comprise complex behavior. These programs can be called generative because they produce a maximum novel repertoire after teaching only a minimum number of discrete relations. One of the best-known instructional models that use these strategies is called Direct Instruction (Becker, Dixon, & Anderson-Inman, 1980; Dixon & Engelmann, 1979; Engelmann & Bruner, 1974; Engelmann et al., 1975; Hutchings, 1976; Miller & Engelmann, 1980; Silbert, Carnine, & Stein, 1981).

Like other behavioral models, Direct Instruction (DI) makes use of reinforcement and mastery-learning principles, frequent assessment, and component-composite task analyses for both analyzing instructional content and teaching prerequisite skills (Engelmann & Carnine, 1982). The largest distinction between DI and other educational approaches is the degree of emphasis on the antecedent stimuli. Commercially available DI curricular programs contain scripted presentations with precise, empirically tested, and unambiguous instructional

wording, examples, and prescribed sequences of presenting material to students. These scripted presentations allow for control over many environmental variables and, because of extensive empirical testing prior to commercial release, "faultless communication" (Engelmann & Carnine, 1982, p. 3). Faultless communication refers to the replicable, effective instruction sequences that consistently produce the same, or similar, behavioral outcomes. It is a result of carefully selected and tested wording, choice of examples and nonexamples of concepts, and fading of instructional prompts. After a thorough component/composite analysis of the subject matter, an explicit set of teaching rules is formulated and subsequently taught in the initial stages of instruction through a precise sequence of examples and nonexamples. Rule application occurs by systematically reducing and fading the number of leading questions in successive instruction.

In order to effectively teach a commercially available DI program, teachers must be familiar not only with the instructional design aspects of the model described above, but also with the specific delivery features of the model. The correct delivery of the specific aspects of DI must be in place for faultless communication to take place. The delivery principles include brisk pacing of questions, which results in frequent responding and allows for more material to be covered in a fixed amount of time (Carnine, 1976), and specific correction procedures, which provide feedback determined by the type of error. For example, different corrections are used if the error was caused by lack of information or misapplication of a general-case strategy. Other features of the delivery include small group instruction, an emphasis on oral communication, and choral responding, where the DI teacher signals students to respond in unison. Choral responding is an important element of the DI model, because it allows for frequent responses from all students in the class, which in turn provides the teacher with immediate feedback about the performance of each student in her class (which students answer correctly and quickly compared to those who answer incorrectly and or more slowly). Extensive research has been conducted to examine the relative contributions of each features of the DI model (see Kinder & Carnine, 1991, for a review).

Research on the DI model has taken many forms. Some researchers focus on specific features of the model—such as choral responding, group size, and type of correction procedure (Brophy & Good, 1986; Carnine, 1980; Gersten, Carnine, & Williams, 1982; Greenwood, Delquadri, & Hall, 1984; Horner & Albin, 1988), whereas others compare DI with other instructional models, practices, and procedures. The earliest demonstration of the superiority of the DI model over other instructional models was Project Follow Through.

Project Follow Through was a large-scale, national, longitudinal-evaluation study of over 20 different approaches to teaching economically disadvantaged students in kindergarten through third grade (Becker & Carnine, 1980). At the project's peak in the 1970's, 7500 low-income children from 170 communities participated, including those from rural areas such as Flippin, Arkansas to inner-city districts in New York City and East St. Louis. Each school district aligned itself with a sponsor representing a specific educational philosophy or model, which included DI, Piagetian approaches, open classroom models, parent-education approaches, discovery learning, and another, more consequence-based, behavioral model. It was one of the largest and most extensive social experiments in American history (McDaniels, 1975). The Abt reports (1976, 1977) provided median grade equivalent scores by site and sponsor for 4 Metropolitan Achievement Test (MAT) measures: Total reading, total math, spelling, and language. The means of these data were then converted to percentile ranks, which allowed for comparisons of academic gains with the national median. The DI, Behavior Analysis, Bank Street College, and Responsive Education models all produced performance close to the national average in reading by the end of third grade. However, the DI model was at least one-half of a standard deviation ahead of all others in producing normative performance in math. For spelling, the Behavior Analysis and DI models were the

only programs that approached national norms. For language (usage, punctuation, and sentence types), the DI model was three-fourths of a standard deviation ahead of all other programs.

Additional data also supported the use of DI. Comparisons of the performance of students at the DI-sponsored schools showed greater measurable and educationally significant benefit at the end of third grade for those who began DI in kindergarten than those who began in first grade (Becker & Engelmann, 1978; Gersten, Darch, & Gleason, 1988). Follow-up studies of fifth and sixth graders who received DI in primary grades were compared with students who had not received DI. Of the 180 comparisons made using the results on the MAT and Wide Range Achievement Test (WRAT), none favored the comparison group and 56 favored the former DI group, with the strongest effects seen on the WRAT reading subtest and the MAT spelling and math problem-solving subtests (Becker & Gersten, 1982). Comparisons based on math and reading achievement test results, graduation rates, college applications, and college acceptances indicated that junior high and high school students who received DI in primary grades maintained their advantage compared to students who did not receive DI (Gersten & Keating, 1987).

Other investigations examined the effectiveness of DI within special education settings. Maggs and Morath (1976) examined the effects of a commercially available DI program, Distar Language, (Engelmann & Osborn, 1976) on students with moderate to severe retardation (IQs between 20 and 45). This instructional program was designed to teach young children many concepts of spoken language, such as specific prepositional relations (before and after, above and below), rule formation, and causation. After 24 months of instruction, the DI group scored significantly higher than a control group receiving more typical

classroom instruction on the Stanford-Binet Intelligence Test, and produced gains that approximated normal growth (22.5 months in 24 months). Lloyd, Cullinan, Heins, & Epstein, (1980) and Lloyd, Epstein, & Cullinan (1981) examined the effects of commercially available DI decoding (phonics) and reading comprehension programs (Engelmann, Becker, Haner, & Johnson, 1979) on the reading ability of elementary school students with learning disabilities. After 8 months of instruction, students were assessed using the WRAT, Gilmore Oral Reading Test, and the Slossen Intelligence test. The results demonstrated statistically significant differences on all three tests, favoring the DI groups over control groups that received typical classroom reading instruction. Stein & Goldman (1980) compared commercially available DI reading and Palo Alto reading programs with students with minimal brain dysfunction. Scores from the reading recognition, reading comprehension, and total intelligence subtests from the Peabody Individual Achievement Test demonstrated a significant difference between the 2 groups, with the DI group gaining over 15 months of academic growth compared to approximately 7 months for the Palo Alto group.

In summary, the effectiveness of DI as a means of establishing new or changing disfluent skills has been demonstrated with a variety of human populations, including developmentally or academically delayed children. Although the gains achieved by DI are impressive, other educators claim that DI's reliance on accuracy-only as a criterion for mastery does not assure true mastery of the material. Other behavioral educators (e.g., Lindsley, 1983, 1993) claim that true learning can only occur when rate is added to the accuracy criterion. Perhaps even greater gains could be achieved if rate of performance was used to create the benchmarks for component skills. This notion of "rate-plus-accuracy"

constitutes fluency, which is the cornerstone of another model of behavioral education, Precision Teaching.

Precision teaching and fluency research

Skinner (1976) suggested that his most significant contribution to the field of psychology may have been the use of response rate as the basic measure of behavior. When he built his first teaching machine, however, Skinner dropped rate measures in favor of percentage correct or accuracy only assessment. Other behavioral educators also ignored rate of responding while making contributions to the design of instruction (Keller, 1968; Markle, 1969; Tiemann & Markle, 1982).

One of Skinner's students, Ogden Lindsley, took exception to the "accuracy only" approach and suggested that frequency measures are the most important basic data for analysis in examining applied human learning. His research on frequency measurement of academic skills led to the development of Precision Teaching (Lindsley, 1972, 1990).

Precision Teaching (PT) is an instructional method rather than a model, and refers to specific philosophical ideas and a set of procedures rather than common and explicit instructional design features. All practitioners of PT subscribe to the following seven philosophical tenets and procedures (West, Young, & Spooner, 1990). First and foremost is the commitment Precision Teachers have that students know best—it is the student's behavior that tells the teacher whether or not instruction is effective. Second, emphasis is placed on the direct measurement of behavior and continuous monitoring (daily performance assessment). Third, rate of response (both correct and incorrect responses) is used to measure behavior. Fourth, a standard chart or visual display is used to study the performance patterns. Fifth, behavior is always described functionally. Sixth, Precision Teachers conduct ongoing

analytical investigations of the impact of their teaching on students' learning (Eaton, 1978; Liberty, Haring, White, & Billingsley, 1988). Finally, an emphasis is placed on increasing appropriate and useful behavior, rather than on eliminating undesired or inappropriate behavior.

The most widely cited study of PT was conducted in Great Falls, Montana, from 1972 to 1975 (Beck, 1977, 1979). During this period, elementary and secondary school students engaged in 20-30 min per day of PT, using curriculum and instruction that were otherwise similar to that presented throughout the school district. The PT procedures in this study included daily 1-min assessments of basic academic skills, such as math facts; high frequency criteria or aims; daily charting of basic skill practice; data-based instructional decision-making; and the use of 10,000 practice sheets designed to practice several basic component skills in reading, written expression, and mathematics (Beck & Clement, 1991).

Performance on various subtests of the Iowa Test of Basic Skills demonstrated that students exposed to the PT procedures amassed an average increase of 19 to 40 percentile points more than other students in the school district (Beck, 1977). These results were confirmed by the Joint Dissemination Review Panel of the U.S. Office of Education, through the analysis of 19 PT-control group comparisons (Beck, 1979). Fifteen of these comparisons resulted in PT groups posttesting at higher achievement levels. The remaining 4 comparisons showed no difference in performance between the PT group and the control group who did not receive PT (Beck & Clement, 1991). The PT subjects were reevaluated 3 years after the project terminated. All measures (standardized achievement tests, daily and direct classroom performance measurements, and teacher judgments) indicated that the academic growth produced from the early exposure to PT was maintained.

While the Great Falls project was being conducted, other discoveries were being made about PT. By encouraging teachers to use brief daily samples of correct and incorrect academic response rates to make decisions about students' progress, Haughton (1972) discovered the relation between criterion performance rates (aims) and subsequent progress through the curriculum. Aims were based on empirical evidence that illustrated that attaining a certain minimum rate of correct responding on prerequisite skills was necessary in order to progress smoothly through subsequent applications of those skills.

Some of the best examples of using rate and accuracy as measures of proficiency are in sports. In many Olympic sports, rate is used as the measure of excellence. However, rate is clearly more important for some component behaviors and less important for other component behaviors. Sports involving a wide range of skills illustrate this point. For example, the sport of hockey contains many component skills, including skating, shooting, and puck handling. Rates of particular skills stand out when describing exemplary hockey players. Wayne Gretsky, arguably the best hockey player of all time, illustrated the importance of rate for some component hockey skills over others. Gretsky was never considered a particularly fast skater. The reason he was considered "The Great One" pertained more to his puck-handling rate and shooting speed, which lead to several scoring records, league championships, MVP awards, and team leadership positions.

Like sports, many academic performances can be broken down and analyzed according to component skills. In solving an algebra problem, component skills include reading numbers, writing numbers, and computing math facts. The importance of each component's rate may not be clear during the course of solving the algebra problem. However, if a student is having difficulty solving the more complex task and answers

problems incorrectly, examination of the components' rates may suggest an appropriate remediation procedure so that the student may become able to solve future algebra problems correctly. Therefore, rates of specific component behaviors may be more or less important when considering the given tasks or component behaviors that combine to form composite behaviors (for further discussion of this point, see Johnson & Layng, 1996).

Some studies have been conducted to determine the effects of adding rate criteria to independent practice. Using an ABAB design, Van Houten and Thompson (1976) examined the effects of announcing a timing procedure versus covertly timing practice in 1-min intervals during in-class independent math facts practice. During the baseline phases, 20 second-graders were covertly timed during 30 min math facts practice blocks, and the rate of completed problems was recorded without the students' knowledge. In the experimental phases, the teacher announced that students would be timed during this practice block. The teacher announced each 1-min trial and did not allow students to work between timing intervals. During the first baseline phase, students were correctly completing 3.5 problems per min. Rates increase to 10.5 correctly completed problems per min when they were being timed (experimental phase). Upon return to baseline conditions, students' rates dropped to 5.5 correct responses per min, and increased to 11.5 correct responses per min during the second experimental condition. It appears that the announced timing contingency resulted in increased response rates during the experimental conditions. The authors also noted, anecdotally, that students were no longer using "math aids," such as number lines, tally marks, or counting on fingers, after exposure to the timed conditions.

The results of the Van Houten and Thompson (1976) study must be cautiously interpreted. The accuracy levels of the students remained constant throughout the study (i.e.,

at about 90 to 95% accurate during practices). Thus, the study did not demonstrate that a rate criterion produced more accurate performance. Although the teacher visibly timed the students during practices, the increased number of problems attempted may be an artifact of simply telling the children that they were being timed. No condition was tested in which students were told they were being timed when in fact no timing procedure occurred. Finally, although anecdotal reports suggest that the timed practice decreased students' reliance on math aids (e.g., counting on fingers), no data are presented to support this claim. One fact that the authors can conclude, however, is that during the timing procedure students completed more work or attempted more problems in the 30 min intervals.

Howell and Lorson-Howell (1990) reported that there were several reasons why teachers should be interested in high-rate behavior. The first of these is that rate, like accuracy, indicates how well a student knows or can do a task. If two students work a set of multiplication problems and one misses 20% while the other does not miss any, most people agree that the first student has less skill at multiplication than the second. Now imagine that 2 other students work the same problems and neither of them makes an error, but one student completes more problems per unit time than the other. PT advocates, and many other educators, would say that the student who can do more problems in less time, while maintaining accuracy, is better at multiplication.

By adding an explicit time component to the definition of mastery, PT formulated a technical definition of fluency as accuracy plus speed, or quality plus pace. The outcome associated with fluency became known as "REAPS" (Haughton, 1972), that is, retention of skills and knowledge; endurance on the given task; and application on performance standards. More recently, Johnson and Ross (1997) have described the outcomes of fluency

using the acronym "RESAL," to include retention, endurance, stability (the ability to perform the skill under distracting circumstances), application and leaps (acceleration through the curriculum due to skill acquisition without direct training). Because fluency is functionally defined, it is important to acknowledge that, much like reinforcement, the acquisition of fluent behavior must be determined post hoc, and the process of increasing the speed of responding can only be described as rate building until RESAL has been demonstrated. It is possible that the fastest behavior may not be the behavior that results in RESAL. Thus, the particular rate that produces RESAL has to be determined empirically.

Some studies seem to support the notion that high rates facilitate retention. In one study, students learned to correctly associate three-letter nonsense syllables with numbers (Berquam, 1981). Those who could respond correctly at rates between 50 and 70 per min retained this rate of accurate performance when tested three weeks later. Those students whose initial response rate was below 50 per min had their retention rate fall to as low as 20 percent of their original rate. In a similar association task (Ivarie, 1986), students with response rates of 70 per min maintained this same level of correct responding in posttests conducted three months later. Although these studies confound subject variables with rate, the correlation between higher rates and higher retention are suggestive.

Still other studies have attempted to demonstrate the effects of rate building on other aspects of RESAL. Binder (1995) examined the stability aspect of fluency through the use of distraction procedures, and suggested that lower rate performance is less stable and more subject to distraction than higher rate performance. Two students were taught to correctly say numbers paired with printed random Hebrew characters and then to perform addition problems using the Hebrew characters in place of numbers. The subject with the higher rate

on the latter of these skills showed less interruption in performance when exposed to a distraction task than the subject with the lower rate. Problems with this study, however, also cloud the relation between rate and distractibility. First, it was unclear whether subjects' performances were accurate or not. The apparatus used (a voice-operated relay) was unlikely to be sensitive enough to adequately distinguish among vocalizations. Additionally, only 2 subjects participated in the study, so the generalizability of the results is suspect. Finally, the experimenter did not systematically manipulate variables to alter subjects' rate of performance, resulting in a simple correlation between rate and distractibility that was confounded by intersubject differences.

Much of the research in support of PT is similarly flawed. Binder, Haughton, and Van Eyk (1990) claimed that students in grades K-8 who could write more than 70 digits per min for 15 s were very close to that rate during performance durations that exceeded 15 min. The performance of students who wrote more slowly for 15 s fell off rapidly as they worked for longer periods. Students who wrote approximately 20 digits per min for 15 s did not continue writing for the entire 16 min duration. Again these differences, though compelling, may be due to other differences between the subjects that were not controlled.

One critical variable that has not been controlled in the evaluation of fluency research is practice. It is possible that many students would perform equally well if they were given the same time or amount of practice on given tasks without the imposition of a rate criterion. It may be that repeated interaction with material, and not repeated interaction at some criterion rate, accounts for the difference between subjects exposed to rate-building procedures and those who are not. Perhaps one of the reasons that DI is such an effective method of instruction is due to repeated practice of previously learned skills over subsequent

lessons. It may be that rate-building procedures lead to more efficient practice time, but are not necessary for the production of fluent behaviors.

In spite of this oversight, the literature from PT has led many to claim that rate criteria are necessary if learners are expected to remember and apply information. This claim has led to the development of many learning centers throughout North America that continue to document academic achievement with varying degrees of empiricism. These centers include the Center for Individualized Instruction, Jacksonville State University (McDade & Goggans, 1992); Haughton Learning Center (Haughton, Freeman, & Binder, 1992); Malcolm X College (Johnson & Layng, 1992); Morningside Academy (Snyder, 1992b); Precision Learning Systems (Snyder, 1992a); Precision Teaching and Management Systems Inc.(Snyder, 1992c); and The Learning Center (Maloney & Humphrey, 1982). These programs are more or less representative of PT; however, two of these, Morningside Academy and Malcolm X College, use principles from various behavioral approaches, and hence, call their instructional model "Generative Instruction" (GI).

Generative instruction

As mentioned above, the GI model includes aspects of many behavioral approaches to education, including the contributions of DI and PT. For example, analyses of complex skills into more basic component skills are as paramount to effective GI as to DI programs. In both DI and GI, the most basic units of a particular task are identified. There are, however, important differences between the models. DI lessons are composed of tracks of skills that develop over the course of the program. Repeated practice occurs across lessons in a DI program. In contrast, once a given component skill is presented in a GI lesson, the behavior is exposed to procedures that increase the frequency of that component behavior, thus

incorporating PT procedures into the GI model. After the behavior has met the rate criteria for the component behaviors, the next track or skill is introduced. In DI, composite skills are introduced through the DI delivery method that includes a range of positive and negative instances of the component skills. In contrast, because the GI model includes rate-building practice for component and composite skills, DI delivery may not be necessary for each composite skill.

Of specific importance to this dissertation, and a key distinguishing feature between the two models, is the rate-building aspect of GI borrowed from PT. Commercially available DI programs rely on repeated, distributed practice of skills across subsequent lessons in which instructional prompts are faded. In contrast, GI modifies the use of these commercially available DI programs with supplemental practice sheets that are completed using PT procedures, allowing for both massed and distributed practice. Because of the supplemental rate-building practice, the GI model advocates for the use of fewer DI lessons than the number included in the commercially available programs.

In conclusion, because research supports the effectiveness of both DI and PT, the question of whether or not the combination of certain features of DI and PT leads to an even more powerful model of behavioral instruction needs to be elucidated. An investigation of the GI model through manipulation of a few key features may clarify the relative contributions of some features of DI and PT. In this dissertation two features, one from DI and one from PT, were the focus of investigation. First, one feature of PT, rate building, may be compared to practice without rate building. This would assess the contribution of a rate criterion in addition to an accuracy criterion. Second, because DI methodology relies heavily on choral

responding, choral responding may be compared to a more passive form of instruction that does not require overt responding prior to independent practice.

These variables may be examined using a variety of subject matter. For this dissertation, the subject matter used to investigate these variables was spelling. Both DI and GI approaches to teaching spelling differ from more traditional methods, relying more heavily on the use of spelling rules. To illustrate how this approach differs from more traditional spelling instruction, the following section of this literature review focuses on research and approaches to teaching spelling.

Research on Spelling Instruction

Like other academic skills, spelling has generated much attention from educators. Some have even questioned the utility of correct spelling (Beers & Beers, 1981; Gentry, 1982). Being a poor speller has been attributed to the availability of spell checkers on word processing programs (Jinkerson & Baggett, 1993), learning disabilities (dyslexia, poor motivation, minimal brain dysfunction, hyperactivity, perceptual-motor disabilities), lack of intelligence, abundance of creativity, having had or having not had phonics in school, poor memorization skills, and the lack of consistency in the English spelling system (Dixon, 1993). The most probable explanation for poor spelling skills is the lack of adequate spelling instruction (Lee & Sanderson, 1987).

Most spelling programs are organized around weekly word lists. Lists are typically presented at the beginning of the week and testing occurs at the end of the week. Words studied one week disappear from the program, either forever, or until the program provides a review test on all words taught over a several week period. The appropriateness of teaching students to spell using the assign-and-test strategy has been debated since the turn of the

century (Peters, 1970). Dixon (1993) suggested that this strategy does not work because it requires students to directly memorize the correct spelling of the words. The number of words in the English language makes this task arduous and presents a high probability for failure (Kearney & Drabman, 1993; Lennox & Siegel, 1993). Others (e.g., Freyberg, 1964) refuted the utility of this strategy because it does not carry over to writing prose. When tactics used to teach spelling divorce spelling from writing, the function of spelling in writing may become obscured (Lee & Sanderson, 1987).

Effective instructional programs begin by conducting a component-composite analysis of the subject matter. Many educators believe that the underlying component skill of spelling is "phonetic awareness." Exactly how phonetic awareness, or knowledge of sound-symbol correspondence, contributes to the ability to spell is highly controversial (Dixon, 1993). In the English language, there are two different kinds of phonics: "reading phonics" and "spelling phonics." Reading phonics is a useful and reliable approach to learning how to read, in which learners say particular sounds for the letters or combinations of letters they see in words. Spelling phonics works in the opposite direction. Learners write a given letter or combination of letters when they hear a particular sound. In some languages, such as Spanish, the two types of phonics overlap. In English, the sound-symbol relations are not as well correlated—a number of letter combinations produce similar sounds that can be represented by other letter combinations. Because English does not have perfect sound-letter overlap, phonetic awareness may or may not be a component skill of spelling.

The paucity of phonetic overlap between the written and spoken sounds of letters and words does not preclude effective spelling instruction beyond sheer memorization. A more systematic approach than sheer memorization is required, however. Currently, the most

common approach to teaching spelling is called the process writing approach, which is correlated with the developmental interpretation of spelling as a class of behavior that emerges through a series of approximations over time (Beers & Beers, 1981; Gentry, 1982). The nonstandard variants are frequently called "spontaneous spellings," "invented spellings," or "spelling approximations" (Bolton & Snowball, 1985; Snow, 1983). The approach requires teachers to maintain high frequencies of writing while gradually increasing the demand for clarity, completeness, and precision in the written product.

The process writing approach can be contrasted with behavior analytic research on spelling. Most behavior analytic research focuses on consequent events and not changes in the presentation of antecedent stimuli, and emphasizes performance on daily or weekly spelling tests. Specific procedures for establishing spelling repertoires are not routinely investigated. Variables typically include the effects of contingent free time (Rapport & Bostow, 1976); the Good Behavior Game (Axelrod & Paluska, 1975); parent tutoring (Harris, Sherman, Henderson, & Harris, 1972); interspersed training (Neef, Iwata, & Page, 1980); teacher modeling (Gettinger, 1985; Kauffman, Hallahan, Hass, Brame, & Boren, 1978; Nulman & Gerber, 1984), and delayed matching (Gettinger, 1985) on performance on spelling tests. The dependent variable in all of these studies was the number of words spelled correctly on spelling tests. Unlike the process writing approach, these studies provide little information about how spelling performance improves apart from changes in the percentage of words spelled correctly (Kerr & Lambert, 1982; Nulman & Gerber, 1984).

Other behavior analysts have been more concerned with antecedent stimuli, and have concentrated their research on specific strategies of spelling. The most commonly investigated of these strategies are various forms of the read-write cycle (Cuvo, Ashely,

Marso, Bingju, & Fry, 1995). Lee and Pelger (1982) used a 10-word, read-write cycle (read 10 words then write them in succession) to determine the effectiveness of this strategy. No consequences were scheduled for accurate spelling. An interesting result from this study was the appearance of nonstandard forms for each word before standard words occurred (i.e., "invented spellings"). The study indicated that using the read-write cycle can bring these variants to standard form.

The problem with the behavior analytic approaches to teaching spelling is that they have not examined the generalization of spelling skills to new settings, that is, generativity has not been assessed. Another method of teaching spelling, one that would not require the memorization of several stimulus-response relations, would be to teach the application of spelling rules. Spelling rules have been formulated that pertain to many words, with a minimum of exceptions. These rules are developed around spelling units, or "morphographs," which either keep the same spelling or change in predictable ways when used in different words, or spelling classes. The morphographic approach to spelling instruction focuses on the structure of words: prefixes, suffixes, and bases. Teaching spelling using morphographic rules provides students with strategies for analyzing words, so that these words are less likely to be misspelled in the future.

Some DI programs exist that use the morphographic approach to spelling. Dixon (1976) taught children 12 basic morphographs (ABLE, RE, ARM, CLAIM, ER, ING, COVER, ED, DIS, ORDER, UN, NESS) and reported that they learned to spell over 75 different words by combining these morphographs in various ways. Dixon and Engelmann (1979) selected over 20,000 words considered important in high school graduates' education, then removed the proper names and foreign words, and analyzed the remaining set into a

minimal recombinative set. The set contained some 640 elements, most of which were morphographs. Using 13 spelling rules, the 640 elements could be recombined to correctly spell some 12,600 words. This yielded a generative power of 20:1 over the option of establishing the 12,600 words as separate stimulus-response or "rote memorization" items.

Morphographic rules will not lead to the correct spelling of all words in the English language. There are exceptions and irregular words that will require learning through some other medium, such as rote memorization. The research cited above, however, as well as the general support for the DI model from Project Follow Through, which used a morphographic approach to spelling instruction (Abt Reports 1976, 1977) suggest that using morphographic rules to teach corrective spelling has promising results. The morphographic rules used in this project are based on the rules presented in the Dixon and Engelmann (1979) study, and those used in Project Follow Through.

Statement of the Problem

Generative instruction includes many elements that may be important in teaching new or changing disfluent skills. Two features of the GI model are the use of choral responding and rate-building procedures. Choral responding involves the students responding actively to an explicitly determined sequence of training steps that produce accurate performance, resulting in higher normative test scores on spelling subtests when compared with other methods of instruction (Abt reports, 1976, 1977). These studies, however, have not separated the choral responding component from the sequence of training steps. Rate-building procedures have been derived from PT practices (Lindsley, 1993, 1983; Haughton, 1972). Investigators have claimed that rate building is a method of producing fluency; that is, increasing retention, endurance, and generalization of the newly learned skill (Binder, 1987).

These investigators, however, have not controlled for the effects of practice nor other differences between subjects that might have affected performance. The current practice of GI relies on the assumption that these rate-building procedures contribute effects above and beyond those gained through DI. The purpose of this dissertation, therefore, is to determine the relative contributions of rate-building procedures and the choral responding, while controlling for both practice and accuracy of performance prior to the introduction of rate-building procedures.

Spelling is a skill that has been analyzed with direct instruction procedures and is amenable to rate-building procedures. Therefore, spelling was used as the subject matter learned by the participants. Experiment 1 examined the effects of practice that included rate building versus spending the same amount of time practicing the spelling skills (equal-time practice) following either direct or passive instruction. Experiment 1 had 6 goals: (1) to establish training procedures that produce highly accurate responding, but at different rates; (2) to determine if direct instruction produced different results than passive instruction; (3) to determine whether rate-building procedures produced different results than procedures matched on the amount of time subjects spent practicing the spelling skills; (4) to determine whether there are differences across pretest, posttest, and retention tests; (5) to determine whether there is an interaction between rate-building procedures and type of instruction; and (6) to determine whether there is an interaction among rate-building procedures, type of instruction, and time of test. Experiment 2 examined the effects of rate building compared to an equal amount of practice. The goal of this experiment was to determine whether rate-building procedures produces different results than procedures that are matched on the number of items subjects completed when practicing the spelling skills.

Experiment 1: The relative contribution of rate-building and direct instruction to a generative spelling program

The purpose of this experiment was to determine whether rate-building procedures following either direct or passive instruction produced better performance compared to direct or passive instruction followed by equal time for independent practice (i.e., with a low rate criterion).

Method

Subjects

Forty undergraduate students (28 females, 12 males) with below-average spelling proficiency were recruited. To examine existing spelling repertoires, potential subjects were screened using the Test of Written Spelling (Larsen & Hammill, 1994), the spelling subtest of the Metropolitan Achievement Tests (MAT7)- Advanced 2 (Balow et al., 1992), and the spelling subtest from the Woodcock-Johnson Psycho-Educational Battery (Woodcock & Johnson, 1977). Subjects recruited for this study scored above the 8th grade equivalent on the Test of Written Spelling test but below the 12th grade equivalent on both the MAT and the Woodcock-Johnson spelling tests. These tests demonstrated relative spelling skill grade equivalents, normed for the appropriate age group (i.e., post high school).

The 40 subjects who participated in this study were selected because they all erred on the same twelve spelling rules (see Materials section) during pretesting using the experimenter-designed tests (described below). Performance on these tests determined the rules the subjects would be taught. Prior to any instruction, subjects were assigned to one of four experimental groups. Subjects in each group were matched on performance on the standardized tests, rate of transcribing their own names, and performance on the experimenter-designed tests. Subjects were paid \$1 each time they met a performance criteria of either 100% accuracy plus a minimum criterion rate or 100% accuracy plus the designated rate criterion, for a maximum of \$2 per session. Subjects also earned \$2 each time they attended a posttest or retention test session. Additionally, each subject who was

present for all sessions earned a chance to win \$200. Because each subject learned twelve rules of spelling and attended two posttest sessions, each could earn up to \$216.

Materials

Spelling instruction based on Engelmann & Dixon (1979) and Dixon's (1993) spelling programs were used to teach spelling rules to the subjects (see Rules in Appendix A and the scripts in Appendix B and C). In this experiment, Rules 3, 4, 5, 7, 8, and 10 constituted the first set of rules, and Rules 11, 14, 16, 19, 20, and 21 constituted the second set of rules. Instructional procedures are described below. Up/down dual timers (Radio Shack #63-884) were used to provide timings.

Procedures

Pretesting. Pretesting consisted of exposing subjects to three experimenter-designed tests, based on the content of the instructional program, and calculating an average transcription rate for each subject. The Rate Test was one of the three experimenter-designed tests. It was designed to probe for morphographic rule knowledge of 21 different rules, consisting of 1050 items on 21 separate practice sheets (50 opportunities to follow each rule by combining morphographs correctly on each practice sheet). Subjects were timed for 1 min on each of these sheets (see Appendix D for one version of this test). Accurate performance (100% correct) on these test items determined that subjects would not receive instruction on the rule reflective of the items. For example, if a subject did not make any errors on the Rule 6 practice sheet, then Rule 6 would not be taught to that subject. Subjects making one or more errors on any rule were assumed to have disfluent rule-application skills and instruction was provided for that rule.

The Endurance Test was the second of the three experimenter-designed tests and was designed to test rule discrimination and application for a longer period of time. It consisted of 5 practice sheets with each sheet presenting 50 items. Unlike the Rate Tests, each practice sheet on the Endurance Tests contained items reflecting all 21 rules, including 9 rules that would not be directly taught (see Appendix E for one version of this test). Items reflecting

each rule were presented a minimum of 2 times on each practice sheet. This test required subjects to discriminate which rule to apply and therefore may have functioned as a cumulative review of all 21 rules. Subjects were timed for 5 min on this test.

The Application Test was the third experimenter-designed test and was designed to determine if subjects would apply spelling rules in a “real-life” task. It consisted of 126 words; 6 words for each of the 21 rules used in this study (see Appendix F for one version of this test). On this test, each word was read to the subjects and they were asked to write a sentence using the word within 10 sec.

Transcription rates were assessed by asking each subject to write the phrase "My name is [subject's name]" as quickly and as neatly as possible during a one min timing. This process was repeated three times, and an average was taken of the three timings.

Training. Each group received different combinations of instruction (2 groups received Direct Instruction, 2 groups received Passive Instruction) and type of practice (2 groups began the experiment by practicing using rate-building procedures, 2 groups began by practicing using equal-time practice procedures). The procedures for each type of instruction and practice is described below.

Direct Instruction (DI). Spelling instruction was provided using the scripts described in Appendix B. The experimenter presented scripts and continued teaching until each subject made 10 to 15 consecutive oral responses at 100% accuracy ("firm" performance). Reliability of following the scripts was assessed by a master DI teacher/trainer with over 10 years of experience in teaching and training through DI. Each instructional session was taped, and the DI teacher observed 85% of randomly selected DI sessions. Reliability was calculated by the number of 10 s intervals of the instructor following the scripted presentations (following scripts), and by the decision to stop instruction for each subject on each videotaped presentation due to the subject being "firm" (establishing firmness). Every 10 s, the videotape was stopped and the DI teacher answered "yes" or "no" for following scripts and establishing firmness (applicable only at the end of lessons). Reliability was

determined by comparing the DI teacher's rankings and the decisions made by the experimenter, and calculated by the number of agreements divided by the number of agreements and disagreements. Reliability was 95% for following scripts and 98% for determining when subjects were firm. Completion of the lessons took approximately 10 min.

Passive Instruction (PI). Spelling instruction was provided without oral, choral responding (see scripts in Appendix C). No attempt was made to monitor subjects' "understanding" of rule application during the instructional lesson. Thus, the primary distinction between the two types of instruction was the inclusion of active responding in the DI scripts. Completion of these lessons took approximately 7 to 10 min.

Rate-building (RB) procedures. Two groups (one PI group, one DI group) participated in rate-building procedures immediately following instruction for the first set of rules (Rules 3, 4, 5, 7, 8, and 10). After the script for the first rule was presented, the following instructions were read to the subjects during the rate-building condition:

You are now going to engage in exercises that will help you apply this spelling rule at a high rate. You will be expected to be 100% accurate and correctly write at least 130 but no more than 150 letters during a 1 minute interval. This rate is called your aim. You will complete the work during 1 minute timed intervals. I will tell you when to begin by saying 'Ready, please begin.' After the end of the minute, I will say, 'Please stop.' At that time, I would like you to use the answer key that I will provide to check your work. You will have two minutes to do this. After you have written down how many corrects and incorrects you had during that timing, we will begin another timing. You will continue practicing until you reach your aim. Any questions?

Subjects were given exercises depicting examples and nonexamples of the rules taught on that day (see Appendix D for one version of the practice sheets). Subjects practiced the application of the rules during 1-min timings. After a timing had elapsed, subjects had 2

min to count the letters and check for errors in their work. Answer keys were distributed to each of the subjects to self-assess correct rule application. The number of frequencies of correct and incorrect responses was recorded on a chart labeled with the subject's ID number (see Appendix G for an example). If the subject met his or her aim, the experimenter provided one more timing. This final timing represented the subject's performance on the given task for that day. No final timings were given if the subject continued to make errors or failed to meet the aim. Instead, the subject's best practice was noted in the final box. If the frequency aim was not met, however, that subject did not earn \$1 for mastering the rule. Each session consisted of instruction and rate building on 2 rules. Most subjects met their aims for each rule.

When the second set of rules (Rules 11, 14, 16, 19, 20, and 21) were taught, the 2 groups that initially received rate-building procedures received equal-time practice for these rules. The procedure for equal-time practice is described below.

Equal-time (ET) practice. The other 2 groups began the experiment learning the first set of rules through equal-time practice. Equal-time practice consisted of exposure to the same exercises as during the rate-building procedures, but a lower rate criterion was in place during this condition. The following instructions were read to subjects following instruction in the equal-time practice condition:

You are now going to engage in exercises that will help you apply this spelling rule. You will be expected to be 100% accurate. You will be expected to correctly write at least 50 but no more than 70 letters during that 1 minute interval. I will tell you when to begin by saying 'Ready, please begin.' After the end of the minute, I will say, 'Please stop.' At that time, I would like you to use the answer key that I will provide to check your work. You will have two minutes to do this. After you have written down how many corrects and incorrects you had during that timing, we will begin another timing.

You will continue practicing until you are 100% accurate, and you have written at least 50 letters. Any questions?

Subjects had 2 min to check their work following 1-min intervals of practice, in the same manner described in the rate-building condition. If subjects wrote more than 70 letters or less than 50 letters during a timing, they were told that they would not earn their money for mastering the rule and were advised to either slow down or speed up. Subjects continued working until the session time has elapsed (i.e., for approximately 50 min). If subjects finished both equal-time exercises before the end of the session, they remained in the room until 50 min had elapsed. During this time, activities such as reading, studying, or doodling, were not permitted.

When the second set of rules (Rules 11, 14, 16, 19, 20, and 21) were taught, groups that initially received equal-time practice received rate-building procedures for the final six rules. Thus, the four groups were: DIRB/DIET (Direct Instruction, rate-building procedures on the first set of rules; Direct Instruction, equal-time practice on the second set of rules), DIET/DIRB (Direct Instruction, equal-time practice on the first set of rules, Direct Instruction, rate-building procedures on the second set of rules), PIRB/PIET (Passive Instruction, rate-building procedures on the first set of rules; Passive Instruction, equal-time practice on the second set of rules), and PIET/PIRB (Passive Instruction, equal-time practice on the first set of rules; Passive Instruction, rate-building procedures on the second set of rules).

Interventions. When subjects made errors or rate dropped during rate building, the experimenter intervened by having subjects repeat the rule or part of the rule before practicing.

Posttesting.

Initial posttesting occurred one day after practice of the last rule (Rule 21). Retention posttesting occurred after six weeks of no scheduled practice. Posttests consisted of different versions of the three experimenter-designed tests (Rate Test, Endurance Test, and

Application Test) used in the pretesting conditions. However, on the Rate Test, subjects completed 1-min timings only on each of the 12 rules instructed during the training sessions.

Experimental Design

A 2(Direct versus Passive Instruction) x 2(type of rate-building practice) x 3(time of test) repeated measures factorial design was used. Type of instruction and practice were analyzed as between-subject variables, and time of test was analyzed as a within-subject variable. Ten subjects were assigned to each of the 4 groups. Assignment to groups was based on balancing for transcription rate and pretest scores, but also was partially determined by subject availability, as attendance at multiple sessions was required. Univariate analyses of variance were used to analyze differences between groups on the pretest and training data (scores of standardized tests as well as the data collected on the three experimenter-designed pretests) and repeated measures analyses of variance were used to analyze to the data on the experimenter-designed pre, post and retention tests.

Depending on the experimental phase and tests examined, the dependent variables included scores on the three standardized spelling tests, rate of correct letter sequences per min, rate of errors per min, and percent words spelled correctly. The rate of correct letter sequences per min and the rate of errors made during final timings were examined for the training data. The mean rate of correct letter sequences per min and mean rate of errors per min also were examined on the experimenter-designed Rate Tests and Endurance Tests on pre-, post- and retention tests. A letter sequence was considered correct if the letter before and the letter after it matched the letter sequence written on the answer key. A letter was considered incorrect if it did not match the letter sequence on the answer key. Therefore, transcription errors, the omission of one or more letters, and the inclusion of an inappropriate letter all constituted errors. The final dependent variable examined was percent correct words written on the experimenter-designed Application Test.

Results

Pretest Data.

Tables 1 and 2 present the pretest data used to allocate subjects to groups. These data demonstrate that the groups were similar in performance prior to instruction. Table 1 shows the mean pretest scores from each of the standardized tests: The Test of Written Spelling (TWS), the spelling subtest from the Metropolitan Achievement Tests (MAT), and the spelling subtest from the Woodcock-Johnson Psycho-Educational Battery (W/J). Although the groups differed slightly on scores across each of these tests, there were no significant differences among them [Test of Written Spelling $F(3,39) = .678, p > .05$; Metropolitan Achievement Test $F(3,39) = .935, p > .05$; Woodcock Johnson $F(3,39) = .855, p > .05$]. Additionally, groups that scored higher on one standardized measure often scored lower on one of the other standardized measures.

Table 1
Mean pretest scores from standardized tests

Group	<u>Standardized Tests</u>		
	TWS	MAT	W/J
DIRB/DIET	56.2	9.95	8.22
DIET/DIRB	55.2	10.19	8.12
PIRB/PIET	54.6	10.01	8.10
PIET/PIRB	55.2	9.99	8.17

Table 2 shows the mean transcription rates for each group. On average, subjects wrote between 150.4 and 151.8 letters per min. Again, there were no significant differences between groups on this measure, $F(3,39) = .169, p > .05$. These transcription rates also

assured that all subjects could potentially meet their aims (see instructions to subjects) during both the rate-building and equal-time practice phases.

Table 2
Mean transcription rates for each group (letters written per min)

Group	Rate
DIRB/DIET	151.2
DIET/DIRB	150.4
PIRB/PIET	151.8
PIET/PIRB	151.3

Training Data.

Table 3 shows the mean rate of correct letter sequences per min on final timings for the first and second set of rules. Groups that experienced rate-building practice conditions (DIRB and PIRB) met their frequency goals of 130-150 correct letter sequences per min for both sets of rules. Similarly, groups that experienced equal-time practice conditions (DIET and PIET) met their frequency goals of 50-70 correct letter sequences per min for both sets of rules. The univariate analysis of variance on the first set of rules revealed a significant interaction between instruction and practice, $F(1,36) = 9.694, p < .05$. Follow-up tests of the interaction showed that the rates of the DIRB group were significantly higher than the rates of the DIET group, $F(1, 36) = 1310.788, p < .05$, and the rates of the PIRB group were significantly greater than the rates of the PIET group, $F(1, 36) = 1649.012, p < .05$, with the combination of passive instruction and rate building resulting in the highest rate (137.7 correct letter sequences per min). For the second set of rules, the main effect of rate building was the only significant result, $F(1,36) = 3564.58, p < .05$.

Table 3
Mean rate of correct letter sequences per min on final timings

Group	Set 1 Rules		Set 2 Rules	
	Type of Instruction			
	DI	PI	DI	PI
RB	133.7	137.7	138.9	140.2
ET	67.1	63.0	67.8	65.3

The number of errors on final timings for the first and second sets of rules is not presented because, in every case, subjects made no or 1 errors during final timings. These data demonstrate that, at the time of training, every subject mastered the spelling rules taught in each session. Because there was no variation between groups, there were no statistically significant differences in accuracy between groups.

Experimenter-designed tests.

Tables 4 through 11 present the data collected at three different times during the study. Data labeled “pretest” refer to scores collected prior to training, whereas data labeled "posttest" refer to those scores collected immediately following training. Data labeled "retention" refer to those scores collected after six weeks of no scheduled practice. Analyses of variance tests were conducted with testing time as a within-subject factor and type of instruction and type of practice as between-subject factors with two dependent measures (mean number of correct letter sequences and mean number of errors) on the Rate and Endurance Tests, and one dependent measure (mean percent correct) on the Application Tests.

Mean rate of correct letter sequences per min on the experimented-designed Rate Test for each set of rules are presented in Table 4. For the first set of rules, there was a significant interaction between time of test and instruction, $F(1,36) = 41.046$, $p < .05$. Follow-up tests of the simple effects of test at each type of practice indicated that the rates of both PI groups (marginal mean = 117.7) were significantly higher than the rates of both DI groups (marginal mean = 102.45) both at posttest, $F(1, 36) = 105.034$, $p < .05$, and at retention test (PI marginal mean = 105.35, DI marginal mean = 99.35), $F(1, 36) = 23.973$, $p < .05$. Additionally, there was a significant interaction between instruction and practice, $F(1,36) = 13.532$, $p < .05$. Follow-up tests of the simple effects of instruction at each type of practice indicate that overall rates of the DIET group (marginal mean = 101.667) were significantly greater than the rates of the DIRB group (marginal mean = 99.6), $F(1, 36) = 66.833$, $p < .05$, and the overall rates of the PIRB group (marginal mean = 109.5) were significantly greater than the rates of the PIET group (marginal mean = 105.267), $F(1, 36) = 8.837$, $p < .05$, with the best performance being the PIRB group. The three-way interaction between instruction, practice, and test was not significant, $F(1,36) = 1.256$, $p > .05$.

The results for the second set of rules were similar. There were significant interactions between time of test and instruction, $F(1,36) = 5.011$, $p < .05$, time of test and practice, $F(1,36) = 31.662$, $p < .05$, and instruction and practice, $F(1,36) = 18.966$, $p < .05$. Follow-up pairwise comparison tests of instruction at each time of test indicates that both the DI and PI groups had significantly increased rates from pretest (marginal means = 98.9 and 99.15, respectively) to posttest (marginal means = 125.6 and 127.750, respectively), but significantly decreased rates from posttest to retention test (marginal means = 115.5 and 112.5, respectively), $F(2, 35) = 260.326$, $p < .05$ (DI groups), $F(2, 35) = 267.585$, $p < .05$ (PI groups). The follow-up tests regarding time of test and practice indicate that, although rates were higher at pretest for the groups that would learn these rules through equal-time practice, $F(1, 36) = 5.053$, $p < .05$, groups that learned these rules through rate-building practice had higher rates both at posttest, $F(1, 36) = 26.444$, $p < .05$, and at retention test, $F(1, 36) =$

112.001, $p < .05$. The follow-up tests of practice at each level of instruction indicated that the DIRB group (marginal mean = 116.833) outperformed the DIET group (marginal mean = 109.833), $F(1, 36) = 80.671$, $p < .05$, and the PIRB group (marginal mean = 114.233) outperformed the PIET group (marginal mean = 112.033), $F(1, 36) = 7.968$, $p < .05$. The three-way interaction between instruction, practice, and test was not significant, $F(1,36) = .279$, $p > .05$.

Table 4

Mean number of correct letter sequences per min on the experimenter-designed Rate Test, at pretest, immediately following training (posttest) and six weeks later (retention) for each set of rules.

		Set 1 Rules					Set 2 Rules						
		Time of Test											
		Pre	Post	Retention	Pre	Post	Retention	Pre	Post	Retention	Pre	Post	Retention
		Type of Instruction											
Practice		DI	PI	DI	PI	DI	PI	DI	PI	DI	PI	DI	PI
	RB	98	100	101	121	100	107	99	97	130	130	122	116
	ET	102	98	104	115	99	103	99	101	122	126	109	109

Table 5 shows the mean rate of errors per min on the experimenter-designed Rate Test for the first set of rules. There was a significant interaction between time of test and instruction, $F(1,36) = 12.137$, $p < .05$. Differences between groups were due to PI groups having significantly more errors at pretest, $F(1, 36) = 12.888$, $p < .05$, and at posttest, $F(1, 36)$

= 13.828, $p < .05$, but also due to the DI groups having significantly more errors at retention test, $F(1, 36) = 21.540$, $p < .05$.

For the second set of rules, there was a significant three-way interaction between time of test, instruction, and practice, $F(1, 36) = 16.520$, $p < .05$. Differences between groups were due to differences at the time of pretest: DIET group (mean = 14.7) having significantly more errors than the PIET group (mean = 11.3), $F(1, 36) = 12.924$, $p < .05$, as well as the PIRB group (11.4) having significantly more errors than the DIRB group (mean = 7.6), $F(1, 36) = 16.144$, $p < .05$.

Table 5
Mean number of errors on the experimenter-designed Rate Test, at pretest, immediately following training (posttest) and six weeks later (retention) for each set of rules.

		Set 1 Rules				Set 2 Rules							
		Time of Test											
		Pre	Post	Retention	Pre	Post	Retention						
		Type of Instruction											
Practice		DI	PI	DI	PI	DI	PI	DI	PI	DI	PI		
RB		8.7	11.8	.9	2.3	3	1.5	7.6	11.4	1.4	.7	1.6	.7
ET		10.6	12.1	1.2	3.5	2	1.5	14.7	11.3	.9	.6	2.5	1.4

Table 6 shows the rate of correct letter sequences per min on the 5 min Endurance Test. There was a significant interaction between time of test and instruction, $F(1, 36) = 14.054$, $p < .05$. Differences between groups were due to PI groups having significantly

higher rates at pretest, $F(1, 36) = 20.107$, $p < .05$, and again at retention test, $F(1, 36) = 21.540$, $p < .05$.

Table 6
Mean rate of correct letter sequences on the experimenter-designed Endurance Test, at pretest, immediately following training (posttest) and six weeks later (retention)

Group	Pretest	Posttest	Retention
DIRB/DIET	64.5	108.3	93.8
DIET/DIRB	64.1	107.2	90.8
PIRB/PIET	77.2	104.6	99.6
PIET/PIRB	75	103.1	99.8

Table 7 shows the rate of errors per min on the 5 min Endurance Test. There was a significant main effect of time of test, $F(1, 36) = 57.066$, $p < .05$. Follow-up comparisons at each time of test indicated that errors significantly decreased across groups from pretest (marginal mean = 4.8) to posttest (marginal mean = 2.9), as well as from posttest to retention test (marginal mean = 2.1), $F(2, 35) = 45.356$, $p < .05$.

Table 7
Mean rate of errors on the experimenter-designed Endurance Test, at pretest, immediately following training (posttest) and six weeks later (retention)

Group	Pretest	Posttest	Retention
DIRB/DIET	5.1	3.2	2.2
DIET/DIRB	4.1	3	2.6
PIRB/PIET	4.8	2.5	1.9
PIET/PIRB	5.2	2.9	1.7

Table 8 shows the performance on the Application Test for both sets of rules. There was a significant three-way interaction between time of test, instruction, and practice, $F(1, 36) = 7.439, p < .05$, for the first set of rules. Differences between groups were due to the significantly greater percent correct of the PIET group (mean = 84.5 %) compared to the DIET group (mean = 75.6%) on the posttest, $F(1, 36) = 17.190, p < .05$, and at retention test (PIET mean = 84.3%, DIET mean = 77.2%), $F(1, 36) = 18.916, p < .05$ as well as the significantly greater percent correct of the PIRB group (mean = 82.4%) over the DIRB group (mean = 76.2%) at retention test, $F(1, 36) = 14.424, p < .05$.

For the second set of rules, there was a significant interaction between time of test and practice, $F(1, 36) = 8.598, p < .05$. Differences between groups were due to rate building producing significantly higher percent correct at posttest (RB marginal mean = 75.350%, ET marginal mean = 65.25%), $F(1, 36) = 35.661, p < .05$, and at retention test (RB marginal mean = 74.6%, ET marginal mean = 66.45%), $F(1, 36) = 19.833, p < .05$.

Table 8
Mean percent correct on the experimenter-designed Application Test, at pretest, immediately following training (posttest) and six weeks later (retention) for each set of rules

		Set 1 Rules					Set 2 Rules						
		Time of Test											
		Pre	Post	Retention	Pre	Post	Retention	Pre	Post	Retention	Pre	Post	Retention
		Type of Instruction											
Practice		DI	PI	DI	PI	DI	PI	DI	PI	DI	PI	DI	PI
RB		66.8	70.6	79.6	79.3	76.2	82.4	71.3	70.5	73.5	77.2	71.8	77.1
ET		73.7	71.1	75.6	84.5	77.2	84.3	71	70.1	64.3	66.2	67.2	65.7

Discussion

This experiment was designed to examine the relative contributions of Direct Instruction and rate-building practice to the effectiveness of the generative model of instruction, in comparison to Passive Instruction and equal-time practice. One goal of this experiment goal was to establish conditions that would produce a difference in rate, while still maintaining accuracy. Another goal was to determine if one form of instruction (DI versus PI) led to improved performance. A third goal was to compare rate building during training to practice without rate building controlled for practice. A final goal was to look at interactions of types of instruction and levels of practice.

To assess these effects, subjects in each group needed to be similar on a number of variables, including their spelling skills as determined by standardized spelling tests and their

transcriptions rates. The pretest data collectively showed that the groups were similar, as defined by these variables, prior to any form of instruction. Therefore, it can be concluded that any later differences in performance were due to the form of instruction administered.

The training data demonstrated that all subjects learned the spelling rules accurately, making 1 or fewer errors on final timings. These data also indicated that rate building resulted in higher rates on both sets of rules and, and that the interaction of rate building and PI produce the highest rates on the first set of rules. Although the PIRB group had the fastest performance, it cannot be concluded that type of instruction was a critical variable when combined with rate-building procedures. The differences in the rate of correct letter sequences during training across the different practice conditions suggested that the experimental conditions for controlling for higher and lower rates were successful. Therefore, subjects learned these rules with similar levels of accuracy, but at different rates. This finding suggests that the present procedures separated the effects of rate and accuracy without producing accelerating rates in the equal-time practice condition. This effect occurred regardless of whether a group experienced rate-building practice prior to or after equal-time practice.

Conclusions based on the experimenter-designed test data are not as clear-cut. When examining the Rate Test data, the rates of correct letter sequences increased across groups from pretest to posttest, but also dropped at retention test. This effect of testing, however, was not clear because of the different interactions across the two sets of rules. For the first set of rules PI produced higher rates on the posttest and the retention test as well as interacting favorably with rate building. On Set 1, the interaction between practice and test was not significant. On Set 2, however, rate building and testing interacted to produce higher rates on the posttest and retention test for the subjects who received rate building. Examining error rates reveals that they dropped from pretest to posttest across all groups, but then slightly increased again at retention test. There was no systematic relation between error rates and type of instruction or type of practice on the rate test.

The same overall pattern of correct letter sequences increasing from pretest to posttest, and then decreasing from posttest to retention test, also occurred on the experimenter-designed Endurance Test. There was no clear superior combination of instruction and practice. There was a statistically significant decrease in errors across all groups from pretest to posttest, and from posttest to retention test, supporting the notion that none of the four combinations resulted in a better endurance test performance.

Finally, the experimenter-designed Application Test also revealed the pattern of increasing percent correct from pretest to posttest, and a drop in percent correct from posttest to retention test. Of the four groups, the PIET/PIRB groups showed the strongest performance across time of test. However, when taken together, the small differences between groups and across time of test suggest that the experimental conditions did not result in consistent changes in percent of words spelled correctly on the Application Test.

Overall, the data from Experiment 1 do not suggest that a specific form of instruction or practice leads to improved performance on the three experimenter-designed tests. The only systematic finding was that rate building led to higher rates by the end of training and even this finding is clouded by the interaction between rate building and instruction. These findings led to a simplification of factors investigated in experiment 2; subjects were instructed using one instructional format, PI, and rate-building practice was compared to amount of practice rather than equal amount of time practicing.

Experiment 2: A comparison of rate-building versus equal practice using morphographic rules of spelling

The purpose of this experiment was to determine if the effects of rate-building procedures were superior to an equal amount of practice without a rate criterion. An equal amount of practice, in this case, was exposure to the same number of items completed by a subject in the rate-building condition.

Method

Subjects

Four female undergraduate students with no prior knowledge of morphographic spelling rules were recruited to participate. The Rate Test, Endurance Test, and Application Test from Experiment 1 were used as pretests. Subjects had to err on at least 1 of the items presented on the rate test in order to be selected. Additionally, subjects were required to write letters at a rate of at least 160 per min on a transcription pretest (the same procedure used in Experiment 1) to qualify for participation. The faster of the 2 pairs of subjects (A1 and B1) started in the rate-building condition, while their yoked controls started in the equal-practice condition. This allocation was intentional to maximize the likelihood of attaining the higher frequency criterion with fewer timings.

Upon examination of the standardized test items, the experimenter concluded that the 21 rules taught in this experiment would not affect standardized test performance because, when testing beyond the eighth grade level, word stimuli were based on irregular word spelling knowledge as opposed to rule application. Therefore, the standardized tests were not used in this experiment. Instead, subjects were matched on transcription rate and on their performance on the experimenter-designed tests.

Materials

The same transcription pretest and program-based materials from Experiment 1 were used, however, all subjects were exposed to 20 rules (Rule 1 was omitted due to overlap with Rule 2).

Procedures

Pretesting. As described above, pretesting of these subjects consisted of three experimenter-designed tests used in Experiment 1: the Rate Test, the Endurance Test, and the Application Test.

Training conditions. Subjects were taught 20 spelling rules and practiced applying them under 2 experimental conditions: rate-building or equal practice. All rules were presented to each subject individually, using the PI scripted presentations from Experiment 1. PI was used for two reasons. First, PI groups had slightly better performances than DI groups in Experiment 1. Second, subjects in Experiment 2 were instructed individually, not in a group because the subjects' schedules made it difficult to have them come to the lab at the same time. The primary distinction between PI and DI in this study was the inclusion of active, choral responding—a technique used to assure correct responding from many students simultaneously—in the DI scripts. Therefore, since subjects were being instructed individually, it was not necessary to include choral responding.

Subjects A1 and B1 began the experiment in the rate-building condition. Rate-building practice procedures were essentially the same as in Experiment 1. The main distinction was that the experimenter, rather than the subject, checked the accuracy of each practice. These subjects were taught Rules 2 through 6 (first set of rules) and practiced following the rule until their correct rate was at 160-180 letters per min with 1 or fewer errors. Each of the other two subjects was yoked to one of the rate-building subjects on the basis of the same number of items completed during training. No rate criterion was in place for these subjects, however, performance was interrupted after 1 min of practice so that the investigator could note the rate and accuracy of the practice. After corrective feedback on these dimensions had been provided, the subject began practicing again, until 1 min had elapsed, after which the investigator again provided feedback. This process continued until the subject completed the same number of items as determined by her rate-building partner.

When both pairs of subjects completed their practice exercises for the first set of rules, the conditions were switched. In the second condition, the subjects who originally served as the yoked controls learned Rules 7, 8, 14, 15, and 16 (second set of rules) using the rate-building technique. The two subjects who began the experiment in the rate-building condition now served as equal-practice controls. For Rules 9, 10, 11, 17, and 18 (third set of

rules), conditions were reversed again such that the former rate-building subjects returned to the rate-building condition, and the former controls served as controls for these rules. A final reversal of conditions occurred for the type of practice experienced by each subject for Rules 12, 13, 19, 20, and 21 (fourth set of rules).

Posttesting and retention testing. Posttests and retention tests consisted of different versions of the three tests administered as pretests. All tests were presented using the same procedures described in the pretest. Initial posttesting occurred the day after all training had been completed. Retention testing occurred 6 weeks after training was completed, during which time subjects had no further exposure to the rule application practice sheets.

Research Design

Because there were no apparent order effects present in Experiment 1, an ABAB reversal design with yoked controls was used to assess the relative importance of rate building compared to an equal amount of practice.

Data Analysis

In this study, the independent variable of interest was type of practice. The dependent variables were the mean rate of correct letter sequences per min and the rate of errors per min on the rate tests; the rate of correct letter sequences per min and the total number of errors on the endurance tests; and the percent correct words on the application tests. These variables were collapsed across rules and averaged in each condition for easier comparison across conditions.

Results

Pretest Data

Tables 9 through 13 show the pretest data used to assign subjects to conditions. These data show the similarity in performance between subjects yoked to each other (A1 - A2 and B1 - B2).

Both A subjects and B subjects had similar rates on the transcription pretest. Subjects A1 and A2 wrote 185 and 180 letters per min respectively, and subjects B1 and B2 wrote 162

and 158 letters per min. The A subjects were selected because their rates represented the upper end of the transcription fluency range, while the rates of B subjects represented the lower end of the transcription fluency range (160 to 180 letters written per min).

Table 9 shows the mean rate of correct letter sequences per set of the Rate Test at pretest. Subject A1 wrote faster than the other subjects, but none of the subjects wrote at rates approaching their transcription rates, the primary criterion for yoking the four subjects. Again, A1 and B1 wrote faster than their yoked partners on this pretest.

Table 9
Mean number of correct letter sequences per min per set on the experimenter-designed Rate Test (pretest)

Set	Subjects			
	A1	A2	B1	B2
1	125	77.2	74.8	59.2
2	129	96.2	84.4	55.4
3	119	78.4	72	60.4
4	117	78.2	75.2	53

Table 10 shows the mean number of errors per set on the Rate Test at pretest. Three of the four subjects made similar amounts of errors. Subject B2 made fewer errors on this test, which was probably due to her slower writing rate providing her with fewer opportunities to make errors.

Table 10
Mean number of errors per set on the experimenter-designed Rate Test (pretest)

Set	Subjects			
	A1	A2	B1	B2
1	5.8	5.8	4.6	3
2	7.4	10.4	6.8	4
3	6.2	12.2	8	2.2
4	8.4	7.2	5.4	5.4

Table 11 shows each subject's performance on the Endurance Test at pretest. Subject A1 had the fastest rate of all, and both A1 and B1 had faster rates than their yoked 2 controls. Subjects A1 and B1 also made more errors on this test than their controls.

Table 11
Performance on the experimenter-designed Endurance Test (pretest)

	Subjects			
	A1	A2	B1	B2
correct letter sequences per min	141.6	61	99.6	70.6
errors per min	39	11	40	16

Table 12 shows each subject's performance on the Application Test at pretest. On this test, Subject A1 had the highest percent correct and the fewest total errors. Subject A2 scored second highest, while B1 and B2 subjects scored identically and lower than their yoked controls.

Table 12
Performance on the experimenter-designed Application Test (pretest)

	Subjects			
	A1	A2	B1	B2
percent correct	88	85	74	74
total errors	15	19	31	31

Table 13 shows the assignment of subjects to the experimental conditions.

Table 13
Allocation of subjects to experimental conditions

Set	Subjects			
	A1	A2	B1	B2
1	rate building	equal practice	rate building	equal practice
2	equal practice	rate building	equal practice	rate building
3	rate building	equal practice	rate building	equal practice
4	equal practice	rate building	equal practice	rate building

Training data

Table 14 shows the mean rate of correct letter sequences per min on the final timings averaged across rules in each set. Subjects wrote faster under rate-building conditions than under equal-practice conditions in all four of the phases of the experiment. Rates were more similar, however, in the fourth phase of the experiment. No errors were made during final timings.

Table 14
Mean correct letter sequences per min per set on final timings (rate building in bold)

Set	Subjects			
	A1	A2	B1	B2
1	168.4	119	171.2	103.4
2	137.8	170.6	128	164.6
3	180.8	134.4	182.6	115.6
4	155.8	174.4	159.4	162.2

Testing data

Tables 15 through 18 show the results of the posttest data. Initial posttesting refers to testing that occurred the day after training had finished. Retention posttesting refers to testing that occurred after 6 weeks of no practice.

Table 15 shows the mean correct letter sequences per min per set on the Rate Test. Rates were higher during initial posttesting compared to retention posttesting for all 4 subjects. Rates also were similar across sets of rules, suggesting no difference between rate building or equal practice at the time of posttesting. Subject A1 was the only subject to

maintain rates in the frequency criterion range (over 160 letters written per min) at the time of initial posttesting; however, these rates dropped slightly during retention testing.

Table 15
Mean correct letter sequences per min per set on the Rate Test (rate building in bold)

Subjects								
Set	A1		A2		B1		B2	
	initial	retention	initial	retention	initial	retention	initial	retention
1	163.2	150.2	150.6	143.6	139	123	147.8	99
2	164.6	142.4	153	113.2	125.2	102	131	95.2
3	166.4	156.8	152.6	134.6	136.6	135.4	147.6	113.2
4	179.8	155.8	140.6	122.8	154.8	108.8	145	89.6

Table 16 shows the mean errors per min per set on the Rate Tests. The fastest subject, Subject A1, had the fewest errors at both times of posttesting, although error rates were relatively low across conditions and across subjects. There was no systematic variation in error rates due to rate-building or equal practice training.

Table 16
Mean errors per set on the Rate Test (rate building in bold)

Set	Subjects							
	A1		A2		B1		B2	
	initial	retention	initial	retention	initial	retention	initial	retention
1	2	2	2.2	2.8	.4	2.2	1.4	1
2	.6	.8	4.8	4.6	4	2.8	1.8	2.2
3	0	1.6	2.2	.8	.6	2.2	.4	.8
4	.4	2.8	.8	.8	3.2	3.6	0	3.2

Table 17 shows each subject's performance on the Endurance Tests. For Subjects A1 and A2, rates of correct letter sequences per min were similar at both times of posttesting; however, only subject A1 was within the frequency range criterion. Subject B1's rates increased from initial posttest to retention posttest, and Subject B2's rates decreased from initial posttest to retention posttest. Three of four subjects increased the total number of errors from initial posttest to retention posttest, and in most instances, errors on the Endurance Test were made on rules trained under equal-practice conditions. Subject A1 made no errors on either posttest on rules trained under rate-building conditions, but 1 error and 10 errors were made, on the initial and retention posttests, respectively, on rules were trained under the equal-practice conditions. Subject B1 made 3 errors and 0 errors on the initial and retention posttest, respectively, on rules trained under rate-building conditions, and 8 errors and 14 errors on the initial and retention posttests, respectively, on rules trained under equal-practice conditions. Subject B2 had no errors on the initial posttest on rules trained under rate-building conditions, but this increased to 12 errors on the retention test.

Two errors were made on each of this subject's posttests on rules trained under equal-practice conditions. Only Subject A2 had more errors on both posttests for rules trained under rate-building conditions, with 4 and 15 on the initial and retention posttests, respectively. Three errors were made on each of the posttests on rules learned under equal-practice conditions.

Table 17
Performance on the Endurance Tests

	Subjects							
	A1		A2		B1		B2	
	initial	retention	initial	retention	initial	retention	initial	retention
correct letter sequence per min	164	163	156	156	111.6	152	136.4	125
total errors	1	10	7	18	11	14	2	14
rate-building errors	0	0	4	15	3	0	0	12
equal-practice errors	1	10	3	3	8	14	2	2

Table 18 shows each subject's performance on the Application Tests. The two fastest writers, subjects A1 and A2, had the highest percent correct on this test, and maintained it at both times of posttesting. Subject B1 increased her percent correct from initial to retention posttesting from 80 to 86%, and Subject B2 decreased from 86 to 84% correct. Two subjects increased their total number of errors from initial posttesting to retention posttesting, and two

subjects decreased. Of the errors made on this test, two subjects made fewer errors on rules trained under rate-building conditions. Subject A1 made 1 and 2 errors on the initial and retention posttests, respectively, on rules taught under rate-building conditions. Five errors were made on each posttest on rules taught under equal-practice conditions. Subject B1 made 5 and 4 errors on the initial and retention posttests, respectively, on rules taught under rate-building conditions. Nineteen and eleven errors were made on the initial and retention posttests, respectively, on rules trained under equal-practice conditions. Subject A2 made slightly more errors on rules taught under rate-building conditions (5 and 3 on the initial and retention posttests, respectively). Two and 3 errors were made on the initial and retention posttests on rules taught under equal-practice conditions. Subject B2 made similar amounts of errors on the initial posttest (8 on rules trained under rate-building conditions, 9 on rules trained under equal-practice conditions), but made more errors on rules trained under rate-building conditions on the retention posttest (14, compared to 5 errors made on rules trained under equal-practice conditions).

Table 18
Performance on the Application Tests

	Subjects							
	A1		A2		B1		B2	
	initial	retention	initial	retention	initial	retention	initial	retention
percent correct	95	94	94	95	80	86	86	84
total errors	6	7	7	6	24	15	17	19
rate-building errors	1	2	5	3	5	4	8	14
equal-practice errors	5	5	2	3	19	11	9	5

Discussion

The pretest data demonstrated that subjects yoked to each other had similar transcription rates prior to training. Pairs were selected to represent both ends of the transcription fluency range. In general, yoked subjects shared similar rates of correct letter sequences and errors on the rate and endurance pretests, and similar percent correct and number of errors on the application pretest. Thus, any differences in performance on the posttests could be attributed to the differences in training.

The training data showed that the rate contingencies were effective. In general, subjects wrote faster under rate-building conditions than under equal-practice conditions. This finding is particularly interesting, as no contingency was in place to slow performance

during the equal-practice conditions. Another interesting finding was that no errors occurred on final timings under equal-practice conditions when, again, there were no contingencies in place to assure that outcome. It is likely that the corrective feedback offered in 1-min intervals led to the errorless final performance. The test data also revealed that the subjects' performance was fluent in that both Endurance and Application Test performances were high and did not decrease from the initial posttest to the retention test.

The posttest data revealed some interesting outcomes of the different forms of practice. It was not surprising that rates of correct letter sequences were higher immediately following training relative to the later retention testing. These higher rates can be attributed to the recency of the training. Because of the nature of the Rate Test (one 1-min timing on each practice sheet), it is unknown whether rates would have increased with more than one timing. The finding of similar rates of correct letter sequences across sets of rules for each subject suggested no differences between rate building and equal practice for producing differences in rates on this test. Additionally, the lack of systematic variation in error rates on this test also suggests that there were not different effects of rate building and equal practice. It could be argued, however, that, because the error rates were relatively low; all the subjects appeared to have learned the rules well enough to retain the task after having had no practice.

The Endurance Tests provided compelling data. Three of four subjects—A1, B1, and B2—had fewer errors on the initial posttest on rules trained under rate-building conditions. However, at the time of retention testing, only A1 and B1 maintained fewer errors on rules trained under rate-building conditions. When combining errors across the initial and retention posttests, subjects who began the experiment in the rate-building condition made fewer errors on rules trained under rate-building conditions compared to errors on rules trained under equal-practice conditions (0 rate-building errors and 11 equal-practice errors for Subject A1, and 3 rate-building errors and 22 equal-practice errors for Subject B1). In contrast, subjects who began the experiment in the equal-practice condition made fewer errors on rules trained under the equal-practice conditions (19 rate-building errors and 6 equal-practice errors for

Subject A2, and 12 rate-building errors and 4 equal-practice errors for Subject B1). These finding is particularly relevant, as more errors were made on this test than on the rate test. Because the Endurance Test was longer than each rate test (5-min timing on all the rules vs. 1 min on each rule), it may be more sensitive to the differences between rate building and equal practice than the rate test. In addition, subjects had fewer opportunities to err on each rule on the endurance test, yet the error rate was still higher. There was no significant variation in rates of correct letter sequences as a result of type of training, and only one subject, A1, maintained rates in the criterion range. This finding may suggest that rate-building training criteria need to be very high (at least 180 letters per min) in order to effect change in performance.

The Application Tests also provided compelling data. The two fastest writers, subjects A1 and A2, maintained the highest percent correct on this test, both immediately following the training and six weeks later. This finding suggests a possible correlation between transcription rate and accuracy on this application task, but more data need to be collected to support this hypothesis. Whether the rate-building practice led to improved application performance is not clear. Subjects A1 and B1 made fewer errors on rules trained under rate-building conditions on both the initial posttest and the retention test. Subject A2 made fewer errors on rules trained under rate-building conditions only on the retention test. Subject B2 made fewer errors on rules trained under rate-building conditions on the initial posttest, but made many more errors on rules trained under rate-building conditions on the retention posttest.

Taken together, these data provide a little support that rate affects performance on these tasks. Subjects with faster transcription rates performed better on all the tasks, producing more correct letter sequences and fewer errors. Additionally, the high rates across tasks of subject A1 suggests that very high transcription rates (above 160 letters written per min) may be necessary to maintain performance when several (20) tasks are trained in sequence.

General Discussion

This study attempted to examine a specific instance of generative instruction—the training of spelling rules. The first experiment focused on both type of instruction—passive versus DI, with emphasis on choral responding—and practice—rate building versus equal amount of time to practice. It demonstrated that no combination of instruction and practice procedures tested systematically led to statistically significant differences in retention and application of spelling rules. Overall, all 4 groups responded as though no differential training occurred. In fact, performance on the retention tests (those administered after 6 weeks of no practice) suggested that the training was ineffective based on both the rate and accuracy of all 4 groups. Only the training data demonstrated a clear distinction between groups due to the imposed contingency. Subjects would not receive payment during training unless rates on final timings fell within a specified range (50 to 70 letters per minute in the equal-time condition and 130 to 150 letters in the rate-building condition). When this contingency was no longer imposed, as in the testing situations, rates were never as low as 70 letters per minute, suggesting that rates during the equal-time training condition were suppressed.

The second experiment did not include a contingency that would artificially suppress rates during training. In this experiment, higher rate criteria were imposed in the rate-building condition (160 to 180 letters per minute), while no rate criteria were associated with the equal-practice (here, meaning equal number of practice opportunities) condition. That rates were lower in equal-practice conditions relative to rates in rate-building conditions—during training—is significant. This experiment demonstrated that explicitly imposed contingencies

to suppress rates are not necessary. However, even though there were differences in rates during training, this experiment demonstrated no support for rate building as a superior form of practice, as not all subjects in this experiment performed better on the posttests and retention tests on rules taught in rate-building conditions.

Previous research on DI suggested that subjects who learned the rules through DI should have outperformed subjects who learned the rules passively. Project Follow Through demonstrated that the DI model—in spelling and other subject areas—lead to higher scores on standardized tests when compared to 8 other instructional models, including more passive forms of instruction. There are several differences to consider between Project Follow Through and this study. First, Project Follow Through was conducted for a significantly longer period of time (3 years) compared to the first experiment in this study (8 weeks). This factor alone could have helped overcome the effects of one hypothesis—that the lack of systematic variability between instructional groups was due to less experience with DI and more experience with passive forms of instruction. Most of the DI studies, including Project Follow Through, involved grade-school aged and developmentally delayed subjects. Apart from the present study, no studies of DI with undergraduate students have been reported. Additionally, Project Follow Through showed differential performance through the standardized test scores. The first experiment in this study was not conducted for a long enough duration to allow the use of standardized tests. Also, standardized spelling tests appropriate for this age group were not sensitive to changes in spelling rule performance, as the age-appropriate versions of these tests focus more on irregular word spellings rather than rule application. Had the study been conducted for a longer period of time, as most of

the DI studies are conducted, there may have been a statistically significant difference between groups.

Although PT research has a tendency to be flawed relative to DI research, the results of this study do not support the philosophical approach of PT. PT advocates suggest that building the rates of basic, component skills leads to outcomes of retention of skills; the ability to perform the skill for extended periods of time; the ability to perform the skill under distracting conditions; the ability to apply the skill in new situations; and the ability to adduce new repertoires without further training. In both experiments, retention, endurance, and application were investigated. Higher rate performance did not lead to these outcomes in Experiment 1, and had only weak support in Experiment 2. It is possible, as mentioned earlier, that, in Experiment 1, all rates had the potential to be relatively high during training, but were artificially suppressed in order to earn money. Rates were clearly higher in testing than in training conditions when the lower rate criterion was imposed. In Experiment 2, almost all rates were higher across conditions relative to rates in Experiment 1, and subjects in the second experiment did have higher retention, endurance, and application rates and accuracy measures. Other studies (Carlin, Wirth, & Chase, 1998; Wirth & Chase, 1996) suggested that, although you can slow down the subjects with contingencies such as payment criteria and inter-trial delays, rate is highly correlated with amount of practice when these contingencies are relaxed. There has yet to be an empirical study that strongly supports the claims of PT.

In both experiments, all subjects learned the spelling rules sufficiently enough to demonstrate their application at the end of a training session. Subjects in the first experiment had fewer rules to learn, yet they did not appear to have learned them with the same degree of

accuracy or rate as the subjects in the second experiment. There are at least four explanations for this outcome. First, the frequency criterion for the subjects in Experiment 1 was significantly lower (130 to 150 letter sequences per min) than the criterion for subjects in Experiment 2 (160 to 180 letter sequences per min). Johnson and Layng (1992) describe the importance of building component skills to rates higher than necessary to be useful in day-to-day activities. They describe how increasing the rate of computing basic multiplication facts (“5 x 6” or “7 x 8”) from 70 answers per minute to 100 answers per minute improved the performance on a complex task—double digit multiplication computation—from 15 correct answer digits per min to 50 correct digits per min. Similarly, in this study, increasing the rate criteria from 130 to 150 letter sequences to 160 to 180 letter sequences resulted in improved performance on all three tasks tested in the experimenter-designed tests.

In addition to increasing the rate criteria, some data have suggested that announcing an increase in criteria (that is, a perceived increase in criteria) may lead to higher rate performance. Van Houten and Thompson (1976) found that students’ rates of math facts computation increased from 3.5 problems per min up to 11.5 correctly completed problems per min when the teacher announced that students were being timed. It appears that the announced timing contingency resulted in increased response rates during the experimental conditions. Thus, it may not be high rate per se, but the announced criterion of high rate that leads to better performance.

Second, the size of the instructional groups varied across experiments. In the first experiment, subjects were instructed in groups of ten, whereas subjects were individually instructed in the second experiment. Larger effects are frequently seen with class sizes of seven or less (Johnson, 1990). The class size controversy has been the impetus for several

studies, with the two largest and most recent, Tennessee's Project STAR (Student-Teacher Achievement Ratio), (Mosteller, 1995) and the California Classroom Reduction Initiative (McRobbie, Finn, & Harman, 1998), receiving the most attention from both the media and researchers.

For example, beginning in 1985, Tennessee's Project STAR, a 4-year longitudinal study of kindergarten, first-, second-, and third-grade classrooms, compared classes of 13-17 students with classes of 22-26 students both with and without an additional instructional aide in the larger classes. The study included 79 schools, more than 300 classrooms and 7,000 students, with students being followed through 4 years of experience in the given class size. Teachers and students were randomly assigned to the different kinds of classes, and participating teachers did not receive any professional training focusing on teaching in reduced size classes. The results of student testing showed that the students in the smaller classes outperformed the students in the larger classes, whether or not the larger class teachers had an aide helping them. Smaller class students substantially outperformed larger class students on both standardized achievement tests and curriculum-based tests. The positive achievement effect of smaller classes on minority students was double that for majority students initially, and then was about the same. A smaller proportion of students in the smaller classes was retained in-grade, and there was more early identification of students' special educational needs. There were no significant differences in academic achievement for students in the larger classes with or without an additional instructional aide.

A third difference between the experiments in this dissertation was subjects' baseline transcription rates. Faster transcription rates translate into more practice on the tasks examined in this study—the faster a subject writes, the more opportunity she has to practice

the spelling rule. Faster transcribers were recruited in the second experiment, and their performance on the posttests was better than the performance of the subjects in experiment 1. By examining individual rates of the subjects in Experiment 2, the two fastest writers had the best performances on the posttests, regardless of the training procedure used. accuracy and rate of the underlying tool skill, in this case transcription, may be more of a predictor of success in performing a composite task than building rate on the specific composite task. Haughton's (1972) original definition of the outcomes of fluency, REAPS, rely on the premise that increasing component skill rates results in improved performance on other tasks. Other data support this premise, including the example cited above in Johnson and Layng (1992) and the work of Barrett (1979). Barrett found that even a skill as basic as number writing has underlying component skills that will either facilitate or exacerbate the likelihood of acquiring the skill of writing particular numbers. Examining rates of number writing among both nonretarded and developmentally delayed adults, she found that rate with which the number 1 is written affects how quickly the numbers 7, 4, and 9 are written.

Basic research with animals also suggests that requiring prior experience with component skills is necessary before composite skills can emerge. Birch (1945) was one of the first to empirically demonstrate this reorganization of component skills into composite behavior. More recently, similar results were found in Epstein's (1991a, 1991b) experiments with pigeons. When examined carefully, many instances of both stimulus and response generalization may rely on these component-composite relations.

The instructional design of the sequencing of tasks in commercially available DI programs also suggest the effectiveness of analyzing behavior as components and composites. The sequencing and scripting of these programs have undergone extensive

empirical testing and consistently result in improved student performance relative to other methods, as evidenced in Project Follow Through. Several studies of DI programs have found similar results (see Kinder & Carnine, 1991, for a review of these studies). Thus, support for component-composite analyses of behavior are present not only in basic research and theory, but in applied research as well.

Finally, the manner in which corrective feedback was provided varied across experiments in this study. In the first experiment, subjects checked the accuracy of their own practices using an answer key. In the second experiment, corrective feedback was administered by the experimenter. Because of the payment criteria, it may be hypothesized that subjects in the first experiment were not accurate on all practices, but reported that they were in order to escape the task of repeated practice. Because the experimenter only verified the accuracy of performance on the final timings, it is possible that subjects were not accurate on practices leading up to the final timed practice. It is important to note, however, that the experimenter did verify that final timing practices were accurate.

Although there are not many published studies examining the variables investigated in this dissertation, the findings of this study are similar to, although not as robust as, those in some studies of automaticity. Studies of both automaticity and overlearning emphasize learning that results in fast and accurate responding (Bloom, 1986; Ebbinghaus, 1964). Some studies of automaticity suggest that high rates facilitate retention, however, these studies have focused on paired-association tasks (Berquam, 1981; Ivarie, 1986). The training and testing stimuli are identical, such that subjects retain stimulus-response relations across time. For example, in both Berquam's and Ivarie's studies, subjects were not presented with new

stimuli, nor were they required to apply the trained stimulus-response relations to a new situation or arrangement of contingencies.

Bloom suggested that automaticity is an important component in the learning of “higher order” or composite skills, referring to automaticity of task-specific component skills. In this dissertation, performance extended beyond retention of simple stimulus-response relations described in Berquam’s and Ivarie’s studies. At least two different forms of rule application were required: applying the rule in the presence of nonsense stimuli and applying the rule to spell real words in grammatically correct sentences. Additionally, the training and testing stimuli differed, such that performance was assessed on rule application rather than paired association. According to Tiemman and Markle (1990), rule application is a complex cognitive skill, whereas pair association is a simple cognitive skill. It may be that rate building is more useful for establishing relatively simple or component skills, such as number writing and sound-symbol identification, and less useful when instructing more complex or composite skills, such as rule application. At least one other unpublished study (Wirth & Chase, 1996) supports this hypothesis.

To summarize, this dissertation provided very weak support for building the rate of correct letters sequences when training spelling rules, and no support for the effectiveness of DI over a more passive form of instruction when using undergraduate students as subjects. However, this dissertation adds at least two meaningful contributions to the area of fluency research. First, both experiments demonstrated procedures that could be used to produce different rates during training conditions. In particular, the second experiment demonstrated that rates were not artificially suppressed, as there was no contingency in place to do so. Second, the rate of a component skill, in this case transcription rate, may be significant in

terms of rate building. In the case of teaching spelling rules, it appears that a high frequency transcription rate is correlated with meaningful application of the rule. Thus, rate-building practice may be best utilized with tool skill rates that are developed to the high end of the frequency criterion.

This study also suggests areas for further research. One area of research would be examining other tool skill rates, such as typing or speaking speed, and their effect on other composite tasks. These other tool skills require higher or lower rates than transcription to produce change on a composite task. Another interesting area includes studying subjects with who there are mitigating factors that make high rate performance unlikely. For example, examining how compromised populations, such as those with visual-motor coordination dysfunction, perform on fluency-based tasks and tests may provide more insight into the relative necessity of high rate. Class size during generative instruction may be another important variable to examine. Finally, how corrective feedback is delivered during generative instruction may also affect the outcomes commonly associated with fluent performance. This study should be taken as an initial investigation into the young field of fluency research, and certainly not the final word.

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Appendix A: Rules of Spelling [with script author accreditation]

1. **Final e Rule:** "When a word ends in e and you add a morphograph that begins with a vowel letter, drop the e." [Dixon & Engelmann, 1979]
2. **Final Vowel Rule:** "The final e rule applies to any vowel, not just e. Vowels include the letters a, e, i, o, u, and the morphograph y, so you drop the e when adding a morphograph that begins with a vowel letter." [Ross, adapted from Dixon, 1993]
3. **Keep Final e Rule:** "When a soft c or soft g appears right before the e, keep the final e to avoid turning the c or g into hard sounds." [Ross, adapted from Dixon, 1993]
4. **Doubling Rule: Single-syllable words:** "When a short word ends cvc and the next morphograph begins with a vowel, double the final consonant." [Dixon & Engelmann, 1979]
5. **Doubling Rule: Multi-syllable words:** "Double the final consonant only if the primary stress is on the cvc after the parts are added together." [Ross, adapted from Dixon, 1993]
6. **Doubling Rule: Compound words:** "If the word is a compound, don't pay attention to the stress. Double the final consonant when adding a morphograph that begins with a vowel." [Ross, adapted from Dixon, 1993]
7. **y to i Rule:** "y at the end of a morphograph is a vowel letter. Change the y to i when a word ends with a consonant-and-y, and the next morphograph begins with anything, except i." [Dixon & Engelmann, 1979]
8. **y to i Rule: Plurals and verbs:** "Change y to i and add s to words that end with a vowel + y, and add es to words that end with a consonant + y." [Ross, adapted from Dixon, 1993]
9. **Plural variation:** "If a word ends in s, z, sh, ch, or x, add es to make the plural word." [Ross, adapted from Dixon & Engelmann, 1979]
10. **Plural Variation ves:** "Some words that end if the sound fff have the letters ves in the plural." [Ross, adapted from Dixon & Engelmann, 1979]
11. **Contractions:** "A contraction is made from two words, and the contraction has a part missing. The part that is missing is shown with an apostrophe." [Dixon & Engelmann, 1979]

12. **en Variation:** "When the word ends in the letter w and en is added, drop the e." [Dixon & Engelmann, 1979]
13. **al Insertion:** "When the word ends in the letters ic, the morphograph al is added before adding ly." [Dixon & Engelmann, 1979]
14. **Add k Rule:** "When the word ends in ic, add k if the suffix begins with e, i, or y, and the letter c remains hard." [Ross, adapted from Dixon, 1993]
15. **or/er Rule:** "Use o-r a form of the word could take i- o-n in its place." [Dixon & Engelmann, 1979]
16. **Related able vs. ible Rule:** "If the base morphograph can take a morphograph that begins with i, like ion, ive, ite, or ify, then it also takes ible." [Ross, adapted from Dixon, 1993]
17. **al vs. le Rule:** "al is a morphograph that is added to words, whereas le is part of other morphographs." [Ross, adapted from Dixon, 1993]
18. **Related ize vs. ise rule:** "ize is a morphograph, but ise is part of other morphographs." [Ross, adapted from Dixon, 1993]
19. **ious vs. ous Rule:** "Use ious to words that have an "ee-us" or /sh/-us sound at the end." [Ross, adapted from Dixon, 1993]
20. **ion vs. ian Rule:** "Use ian when the word refers to a person. Otherwise, use ion." [Ross, adapted from Dixon, 1993]
21. **x drops s Rule:** "When ex is followed by a morphograph that begins with s, the s drops." [Ross, adapted from Dixon, 1993]

Appendix B: Direct Instruction Scripts

Introduction to Morphographs

Today you are going to learn a method of spelling that is based on morphography, which is the study of the structure of words. Morphographs are the smallest units of meaning that combine to form words. Prefixes, suffixes, and bases are all morphographs.

(Write **happy** on the board.)

This is a base. What word? (signal) "*happy*"

Yes, happy. I can add other morphographs to create other words.

(Write **un** + in front of **happy: un + happy**)

Now I have a new word. What word? (signal) "*unhappy*"

(Write + **ness** after **un + happy: un + happy + ness**)

I've added another morphograph to make a new word. What word? "*unhappiness*"

(Erase **un + happy + ness**. Write **faith + ful**)

How many morphographs are presented here? (signal) "2"

What are they? (signal) "*faith and ful*"

(Erase + **ful**. Write + **less: faith + less**)

What are the morphographs in this word? (signal) "*faith and less*"

(Erase **faith + less**. Write **tain** on the board)

A morphograph isn't always a word. This base is a morphograph because you get words that have meaning when you add other morphographs.

(Write **con** + before **tain: con + tain**)

Now we have a word with how many morphographs? (signal) "2"

(Write + **er** after **con + tain: con + tain + er**)

How many morphographs now? (signal) "3"

Yes, three.

(Write **ject** on the board)

Is this a morphograph. Think. (signal) "*yes*"

Yes, it is. What other morphographs could I add to this word.

(Accept answers such as reject, project, projection, etc.)

All of the rules of spelling that you will learn are based on the morphographs, or bits of meaning, contained in the words.

Script # 1: Final E Rule [From: Dixon and Engelmann, 1979]

Here is the rule. When a word ends in an **e** and you add a morphograph that begins with a vowel letter, you must drop the **e**.

(Repeat the rule).

My turn. When do you drop the **e** from a word?
When the next morphograph begins with a vowel letter.

Your turn. When do you drop the **e** from a word?
"When the next morphograph begins with a vowel letter."
(Repeat until firm)

(Write **like** on the board. Point to **like**.)
Does this word end with **e**? (signal) *"Yes."*

(Write + **ing** after like: **like + ing**).
The next morphograph is **ing**.
Does **ing** begin with a vowel or consonant letter? (signal)
"A vowel letter."

Do we drop the **e** from the word? (signal) *"Yes."*
To correct:
a. You drop the **e** from the word when the next morphograph begins with a vowel letter.
b. (Repeat last instruction).

So **liking** is spelled: **l-i-k-i-n-g**.
Everybody, spell **liking**. Get ready. (signal).

(Replace **ing** with **ness**: **like + ness**).
The next morphograph is **ness**.
Does it begin with a vowel letter or a consonant letter? (signal).
"A consonant letter."

Do we drop the **e** from the word? (signal) *"No."*

So how do we spell the word **likeness**? Get ready. (signal)

(Replace **ness** with **able**: **like + able**)

Do we drop the **e** from the word? (signal) *"Yes."*

So how do we spell **likable**? Get ready. (signal)

(Erase **like** + **able**. Write **name** on the board. Point to **name**).

Does this word end with **e**? (signal). *"Yes."*

(Write + **less** after **name**: **name** + **less**).

The next morphograph is **less**.

Does it begin with a vowel letter or a consonant letter? (signal)

"A consonant letter."

Do we drop the **e** from the word? (signal) *"No."*

Everybody, spell **nameless**. Get ready. (signal).

(Replace **less** with **able**: **name** + **able**).

The next morphograph is **able**.

Does it begin with a vowel letter or a consonant letter? (signal). *"A vowel letter."*

Do we drop the **e** from the word? (signal) *"Yes."*

(Replace **able** with **ing**: **name** + **ing**).

The next morphograph is **ing**.

Does it begin with a vowel letter or a consonant letter? (signal)

"A vowel letter."

Do we drop the **e** from the word? (signal). *"Yes."*

So how do we spell the word **naming**? Get ready? (signal)

(If firm, go on to fluency).

Script #2: Final Vowel Rule [By Linda Ross, adapted from Dixon, 1993]

In the last lesson we learned the final **e** rule. The final **e** rule applies to any vowel, not just **e**. Vowels include the letters **a, e, i, o, u**, and the morphograph **y**, so you drop the vowel when adding a morphograph that begins with a vowel letter.

Here is the rule. When a word or morphograph ends in a vowel and you add a morphograph that begins with a vowel letter, you must drop the vowel from the first morphograph.

My turn. When do you drop the vowel from a word?
When the next morphograph begins with a vowel letter.

Your turn. When do you drop the vowel from a word?
"When the next morphograph begins with a vowel letter."
(Repeat until firm)

(Write **cyclo** on the board. Point to **cyclo**.)

Does this word end with vowel? (signal) *"Yes."*

What vowel? (signal) *"o."*

(Write + **ic** after cyclo: **cyclo + ic**).

The next morphograph is **ic**.

Does **ic** begin with a vowel or consonant letter? (signal)

"A vowel letter."

Do we drop the **o** from the word? (signal) *"Yes."*

To correct:

a. You drop the vowel from the word when the next morphograph begins with a vowel letter.

b. (Repeat last instruction).

So **cyclic** is spelled: **c-y-c-l-i-c**.

Everybody, spell **cyclic**. Get ready. (signal).

(Replace **ic** with **scope**: **cyclo + scope**).

The next morphograph is **scope**.

Does it begin with a vowel letter or a consonant letter? (signal).

"A consonant letter."

Do we drop the vowel from the word? (signal) *"No."*

So how do we spell the word **cycloscope**? Get ready. (signal)

(Replace **scope** with **ize**: **cyclo + ize**)

Do we drop the vowel from the word? (signal) *"Yes."*

So how do we spell **cyclize**? Get ready. (signal)

(Erase **cyclo + ize**. Write **manu** on the board. Point to **manu**).

Does this word end with vowel? (signal). *"Yes."*

Which vowel? (signal) *"u."*

(Write + **script** after **manu**: **manu + script**).

The next morphograph is **script**.

Does it begin with a vowel letter or a consonant letter? (signal)

"A consonant letter."

Do we drop the vowel from the word? (signal) *"No."*

Everybody, spell **manuscript**. Get ready. (signal).

(Replace **script** with **age**: **manu + age**).

The next morphograph is **age**.

Does it begin with a vowel letter or a consonant letter? (signal). *"A vowel letter."*

Do we drop the vowel from the word? (signal) *"Yes."*

(Replace **age** with **facture**: **manu + facture**).

The next morphograph is **facture**.

Does it begin with a vowel letter or a consonant letter? (signal)

"A consonant letter."

Do we drop the vowel from the word? (signal). *"No."*

So how do we spell the word **manufacture**? Get ready? (signal)

(If firm, go on to fluency).

Script #3: Keep Final E Rule [By Linda Ross, adapted from Dixon, 1993]

In the last two lessons we learnt that when a word or morphograph ends in a vowel and you add a morphograph that begins with a vowel letter, you must drop the vowel from the first morphograph. Sometimes, you do not drop an **e** when adding a morphograph that begins with a vowel letter. We may keep the final **e** when the word or morphograph contains a **c** or a **g**.

What two letters may keep the final **e**? (signal) "*C or g.*"

Right, **c** or **g**. That's because both of these letters make hard and soft sounds. The hard sound for **c** is /k/. The soft sound for **c** is /s/.

What's the hard sound for **c**? (signal) "/k/."

What's the soft sound for **c**? (signal) "/s/."

(Repeat until firm.)

The hard sound for **g** is /g/. The soft sound for **g** is /j/.

What's the hard sound for **g**? (signal) "/g/."

What's the soft sound for **g**? (signal) "/j/."

(Repeat until firm.)

Here's the rule. When a soft **c** or soft **g** appears right before the **e**, keep the final **e** to avoid turning the **c** or **g** into hard sounds."

My turn. When do you keep the final **e** from a word?

When a soft **c** or soft **g** appears right before the **e**.

Your turn. When do you keep the final **e** from a word? (signal)

"When a soft c or soft g appears right before the e."

(Repeat until firm)

(Write **trace** on the board. Point to **trace**.)

Does this word contain a **c** or a **g**? (signal) "*Yes.*"

What one? (signal) "*A c.*"

Is it a hard **c** or a soft **c**? (signal) "*A soft c.*"

(Write + **able** after **trace**: **trace** + **able**).

The next morphograph is **able**.

Does **able** begin with a vowel or consonant letter? (signal)

"A vowel letter."

Do we drop the **e** from the word? (signal) "*No.*"

To correct:

a. You keep the final **e** when a soft **c** or soft **g** appears right before the **e**.

b. (Repeat last instruction).

So **traceable** is spelled: **t-r-a-c-e-a-b-l-e**.

Everybody, spell **traceable**. Get ready. (signal).

(Replace **trace** with **mate**. Point to **mate**.)

Does this word contain a **c** or a **g**? (signal) *"No."*

(Write + **ing** after **mate**: **mate** + **ing**.)

The next morphograph is **ing**.

Do we drop the **e** from the word? (signal) *"Yes."*

So how do we spell this word? Get ready. (signal).

(Replace **mate** with **courage**. Point to **courage**.)

Does this word contain a soft **c** or a soft **g**? (signal) *"Yes."*

Which one? (signal) *"Soft g."*

(Write + **ous** after **courage**: **courage** + **ous**.)

The next morphograph is **ous**.

Do we drop the **e** from the word? (signal) *"No."*

So how do we spell **courageous**? Get ready. (signal)

(Erase **courage** + **ous**. Write **grade** on the board. Point to **grade**.)

Does this word contain a soft **c** or a soft **g**? (signal). *"No."*

(Write + **ing** after **grade**: **grade** + **ing**.)

So how do we spell **grading**? Get ready. (signal)

(If firm, go on to fluency).

Script #4: Doubling Rule (single syllable) [By Linda Ross, adapted from Dixon & Engelmann, 1979]

(Write on the board: double **c** when **cvc** + **v**. Point to rule).

Here is the rule for changing the spelling of single-syllable words, when you add a morphograph to the end of these words.

When a single-syllable word ends **CVC** and the next morphograph begins with a vowel letter, you must double this consonant (Point to final **c**).

(Repeat the rule).

My turn. When do you double the final **C** in a short word? (Pause).
When the word ends **CVC** and the next morphograph begins with **V**.

Your turn. When do you double the final **C** in a short word? (signal).
"When the word ends CVC and the next morphographs begins with v."
(Repeat until firm).

(Write **sad** on the board).

Look at the last three letters in this word.

Is **sad** a single-syllable **CVC** word? (signal) *"Yes."*

(Write + **er** after **sad**).

The next morphograph is **er**.

Does it begin with **V**? (signal) *"Yes."*

So do we double any letter? (signal) *"Yes."*

What letter do we double? (signal) *"d."*

(Replace **er** with **ly**).

The next morphograph is **ly**.

Does it begin with **V**? (signal). *"No."*

So do we double any letter? (signal). *"No."*

Why not? (signal). *"Because ly does not begin with v."*

(Replace **ly** with **est**).

The next morphograph is **est**.

Does it begin with **V**? (signal) *"Yes."*

So do we double any letter? (signal) *"Yes."*

What letter do we double? (signal). *"d."*

Everybody, spell **saddest** with me.
Remember to double the final **C**. Get ready.
(Signal and say each letter with students.)
"s-a-d-d-e-s-t."

(Replace **est** with **ly**).
Does **ly** does not begin with **V**? (signal) *"No."*
Spell **sadly**. Get ready. (signal)

(Replace **ly** with **er**).
Does **er** begins with **V**? (signal) *"Yes."*
Spell **sadder**. Get ready. (signal)

(Erase **sad** + **er**. Write **water** on the board).
Look at the last three letters in this word. (Pause).

Is **water** a single-syllable **CVC** word? (signal). *"No."*

- To correct:
- Single-syllable words have one sound unit.
 - (Repeat last step).

(Write + **ing** after **water**).
Water is not a single-syllable **CVC** word.
Everybody, spell **watering**. Get ready (signal).
(If firm, go on to fluency).

Script #5: Doubling rule (multi-syllable) [By Linda Ross, adapted from Dixon, 1993]

(Write on the board: double **c** when **cvc** + **v**. Point to rule).

In the last lesson, you learned that you double the final consonant of a single-syllable word when it ends **cvc** and the next morphograph begins with a vowel letter. What about words with more than one syllable? We usually use the same rule.

Here's the rule. If a word ends with a single-syllable **cvc** morphograph and the next morphograph begins with a vowel letter, you double.

My turn. When do you double consonants for words with more than one syllable? When the word ends with a single-syllable **cvc** and the next morphograph begins with a vowel.

Your turn. When do you double consonants for words with more than one syllable? (signal)

*"When the word ends with a single-syllable **cvc** and the next morphograph begins with a vowel."*

(Write **com** + **mit** on the board).

Look at the last three letters in this word.

Does **mit** end with a **cvc**? (signal) *"Yes."*

(Write + **ing** after **com** + **mit**: **com** + **mit** + **ing**).

The next morphograph is **ing**.

Does it begin with a vowel? (signal) *"Yes."*

So do we double any letter? (signal) *"Yes."*

What letter do we double? (signal) *"t."*

(Replace **ing** with **ment**).

The next morphograph is **ment**.

Does it begin with a vowel? (signal). *"No."*

So do we double any letter? (signal). *"No."*

Why not? (signal). *"Because **ment** does not begin with a vowel."*

(Replace **ment** with **ed**).

The next morphograph is **ed**.

Does it begin with a vowel? (signal) *"Yes."*

So do we double any letter? (signal) *"Yes."*

What letter do we double? (signal). *"t."*

Everybody, spell **committed** with me. Remember to double the final **C**. Get ready. (Signal and say each letter with students.)

"c-o-m-m-i-t-t-e-d."

(Replace **ed** with **ment**).

Ment does not begin with a vowel.

Spell **commitment**. Get ready. (signal)

(Replace **ment** with **ing**).

Ing begins with a vowel.

Spell **committing**. Get ready. (signal)

Sometimes, we don't double the final consonant when a word has more than one syllable. Here's the rule. We double the final consonant only if the primary stress is on the **cvc** after the parts are added together.

My turn. When do we double the final consonant when a word has more than one syllable? When the primary stress is on the **cvc** after the parts are added.

Your turn. When do we double the final consonant when a word has more than one syllable? (signal)

*"When the primary stress is on the **cvc** after the parts are added."*

(Repeat until firm.)

(Write **con** + **fer** on the board. Point to **con** + **fer**.)

In this word, the second syllable gets stressed more than the first. When you say this word out loud, you say **con-FER**.

Say the word. (signal) *"Confer."*

(Write + **ing** after **con** + **fer**: **con** + **fer** + **ing**.)

Say this word. (signal) *"Conferring."*

Which syllable has the primary stress? (signal). *"The second."*

To correct:

- Say the word out loud, pronouncing the stressed syllable loudly.
- Repeat instruction.

The primary stress is still on the second syllable, so you would double the consonant before adding the next morphograph. Everybody, spell **conferring** with me. Get ready. (signal) *"c-o-n-f-e-r-r-i-n-g."*

(Erase **ing** and write **ence**: **con** + **fer** + **ence**.)

Say this word. (signal) *"Conference."*

Which syllable has the primary stress? (signal) *"The first."*

Do we double the final consonant before adding **ence**? (signal) *"No."*

No, we don't double because the stress is not over the **cvc** morphograph.

Everybody, spell **conference**. Get ready. (signal)

(Write **ab** + **hor** + **ence** on the board.)

Say this word. (signal) *"Abhorrence."*

Which syllable has the primary stress? (signal) *"The second."*

Do we double? (signal) *"Yes."*

Everybody, spell **abhorrence**. Get ready. (signal)

(Write **re** + **fer** + **ence** on the board.)

Say this word. (signal) *"Reference."*

Do we double? (signal) *"No."*

Why not? (signal) *"The stress is on the first syllable"* or *"The stress is not on the **cvc** morphograph."*⁹

Spell **reference**. Get ready. (signal)

(Write **con** + **cur** + **ed** on the board.)

Do we double? (signal) *"Yes."*

Spell **concurred**. Get ready. (signal)

(Write **o** + **mit** + **ed** on the board.)

Spell **omitted**. Get ready. (signal)

(If firm, go on to fluency.)

Script #6: Doubling rule (compound words and letter exceptions) [By Linda Ross, adapted from Dixon, 1993]

In the last two lessons, we've talked about the doubling rule for single-syllable and multi-syllable words. Compound words are a type of multi-syllable words. A compound word is made up of two or more words that can stand alone, making it different from other multi-syllable words.

My turn. What is a compound word? A word made up of two or more words.

Your turn. What is a compound word? (signal)

"A word made up of two or more words."

(Write **horse** + **whip** on the board.)

Is this a compound word? (signal) *"Yes."*

(Write **sign** + **al** on the board.)

Is this a compound word? (signal) *"No."*

(Write **re** + **fer** on the board.)

Is this a compound word? (signal) *"No."*

(Write **out** + **fit** on the board.)

Is this a compound word? (signal) *"Yes."*

(Repeat until firm.)

Here's the rule: If the word is a compound, don't pay attention to the stress. Double the final consonant when adding a morphograph that begins with a vowel.

(Repeat the rule.)

My turn. When do we double the final consonant of a multi-syllabic word? When the word is a compound or the stress is on the last **cvc**.

Your turn. When do we double the final consonant of a multi-syllabic word? (signal)

*"When the word is a compound or the stress is on the last **cvc**."*

(Write **over** + **step** on the board. Point to **over** + **step**.)

Is this a compound word? (signal) *"Yes."*

(Write + **ed** after **over** + **step**: **over** + **step** + **ed**.)

Do we double the final consonant? (signal) *"Yes."*

Spell **overstepped**. Get ready. (signal)

(Write **dif** + **fer** on the board. Point to **dif** + **fer**.)

Is this a compound word? (signal) *"No."*

(Write + **ent** after **dif** + **fer**: **dif** + **fer** + **ent**.)

Is the stress on the final **cvc**? (signal) *"No."*

Spell **different**. Get ready. (signal)

(Practice until firm.)

You need to know a little more about vowel and consonant letters to use the doubling rule.

Some letters act as vowels in some words and consonants in others.

The letters **y** and **w** act as vowels at the end of a morphograph.

What two letters act as vowels at the end of morphographs? (signal) *"Y and w."*

So when a **y** or a **w** end a morphograph, you don't double it because the morphograph would not end **cvc**.

My turn. Why don't you double a morphograph ending in **y** or **w**? Because it does not end **cvc**.

Your turn. Why don't you double a morphograph ending in **y** or **w**? (signal) *"Because it does not end cvc."*

(Write **play** + **ed** on the board. Point to **play**.)

Do you double the final letter of this morphograph? (signal) *"No."*

Why not? (signal) *"Because it doesn't end cvc."*

Spell **played**. Get ready. (signal)

(Write **chew** + **ing** on the board. Point to **chew**.)

Do you double the final letter of this morphograph? (signal) *"No."*

Why not? (signal) *"Because it doesn't end cvc."*

Spell **chewing**. Get ready. (signal)

(Practice until firm. Use **boyish**, **lower**, **staying**, **brewed**.)

The letter **x** acts like two consonants, not one, because it has two sounds: /ek/ and /s/. A morphograph ending in **x** may be **cvcc**, but never **cvc**, so you wouldn't double it.

My turn. Why don't you double the final consonant when the morphograph ends with an **x**? Because it doesn't end **cvc**.

Your turn. Why don't you double the final consonant when the morphograph ends with an **x**? (signal)

"Because it doesn't end cvc."

(Write **fix** + **ing** on the board. Point to **fix**.)

Do you double the final letter in this word? (signal) *"No."*

Why not? (signal). *"Because it doesn't end cvc."*

Spell **fixing**. Get ready. (signal)

(Write **box + er** on the board. Point to **box**.)
 Do you double the final letter in this word? (signal) *"No."*
 Why not? (signal). *"Because it doesn't end **cvc**."*
 Spell **boxer**. Get ready. (signal)

(Write **tax + es** on the board.)
 Spell **taxes**. Get ready. (signal)

Last but not least, the letter **u** after a **q** acts as a consonant. So when a **q-u** appear near the end of a morphograph, it is possible for that morphograph to end **cvc**.

My turn. Why might you double a final consonant when the morphograph contains **q-u**?
 Because it might end **cvc**.
 Your turn. Why might you double a final consonant when the morphograph contains **q-u**?
 (signal)
*"Because it might end **cvc**."*
 (Repeat until firm.)

(Write **quiz + ed** on the board. Point to **quiz**.)
 Do you double the final letter? (signal) *"Yes."*
 Why? (signal) *"Because it ends **cvc**."*
 Spell **quizzed**. Get ready. (signal)

(Write **con + quest + ing** on the board. Point to **quest**.)
 Do you double the final letter? (signal) *"No."*
 Why not? (signal) *"Because it doesn't end **cvc**."*
 Spell **conquering**. Get ready. (signal)

(Write **quit + er** on the board. Point to **quit**.)
 Spell **quitter**. Get ready. (signal)
 (Practice until firm.)

So in this lesson we learned that we double all final consonants in compound words ending **cvc**, **y** and **w** are vowels at the end of morphographs, **x** functions as two consonants at the end of morphographs, and **u** functions as a consonant when it follows **q**.
 (If firm on all rules, go to fluency.)

Script #7: Y to I Rule [From Dixon & Engelmann, 1979]

(Write on the board: change **y** when consonant-and-**y** + anything, except **i**).
Here is a new rule for changing the spelling of a word. When the word ends with a consonant and the letter **y**, and you add a morphograph that begins with anything except **i**, you must change the **y** to **i**.

(Repeat rule).

My turn. When do you change the **y** to **i** in a word:
When the word ends with a consonant-and-**y**, and the next morphograph begins with anything, except **i**.

Your turn. When do you change the **y** to **i** in a word? (signal)
"When the word ends with a consonant-and-y, and the next morphograph begins with anything, except i."

(Write **pity** on the board. Point to **pity**).
Tell me the last two letters in this word. (Pause).
Get ready. (signal) *"t-y"*
So does this word end with a consonant-and-**y**? (signal) *"Yes."*

(Write + **ful** after **pity**: **pity + ful**)
The next morphograph is **ful**.
Does it begin with **i**? (signal) *"No."*
So would we change the **y**? (signal) *"Yes."*
What do we change the **y** to ? (signal) *"i."*
So the word **pitiful** is spelled: **p-i-t-i-f-u-l**.

(Replace **ful** with **ing**: **pity + ing**)
Does the word **pity** end with a consonant-and-**y**? (signal). *"Yes."*
Does the next morphograph begin with **i**? (signal) *"Yes."*
So do we change the **y**? (signal) *"No."*

To correct:
a. No. Change the **y** to **i** when the word ends with a consonant-and-**y**, and the next morphograph begins with anything, except **i**.
b. (Repeat last step).

How do we spell the word **pitying**? Get ready (signal).

(Replace **pity** with **play**: **play + ing**. Point to **play**.)
Tell me the last two letters in this word. (Pause).
Get ready. (signal) *"a-y."*
So does the word end with a consonant-and-**y**? (signal) *"No."*

So do we change the **y**? *"No."*

This word does not end consonant-and-**y**, so you do not change the **y**.

How do we spell the word **playing**? Get ready. (signal).

(Replace **ing** with **ful**: **play + ful**. Point to **play**).

Does this word end with a consonant-and-**y**? (signal). *"No."*

Do we change the **y**? (signal). *"No."*

How do we spell the word **playful**? Get ready. (signal).

(Replace **play + ful** with **copy + ed**. Point to **copy**.)

Tell me the last two letters in this word. (Pause).

Get ready. (signal). *"p-y."*

So does this word end with a consonant-and-**y**? (signal). *"Yes."*

The next morphograph is **ed**.

Does it begin with **i**? (signal). *"No."*

So would we change the **y**? (signal). *"Yes."*

What do we change it to? (signal). *"i."*

How do we spell the word **copied**? Get ready. (signal).

(Replace **ed** with **ing**: **copy + ing**. Point to **copy**).

Does this word end with a consonant-and-**y**? (signal). *"Yes."*

The next morphograph is **ing**.

Does it begin with **i**. (signal). *"Yes."*

So do we change the **y**? (signal). *"No."*

How do we spell the word **copying**? Get ready. (signal).

(If firm, go to fluency.)

Script #8: Y-to-i for plurals and verbs [By Linda Ross, adapted from Dixon, 1993]

(Write on the board: vowel + **y**, add **s**; consonant + **y**, change to **i** and add **es**.)

Here is a rule for changing the spelling of a word to make a plural or to change the verb tense. For plurals (and some verbs) just add **s** to words that end with a vowel + **y**, and change **y** to **i** and add **es** to words that end with a consonant + **y**.

My turn. When do you add only an **s** to a word? When the plural or verb ends with a vowel + **y**.

Your turn. When do you add only an **s** to a word? (signal)

"When the plural or verb ends with a vowel + y."

(Repeat until firm.)

My turn. When do you change the **y** to **i** and add **es**? When the plural or verb ends with a consonant + **y**.

Your turn. When do you change the **y** to **i** and add **es**? (signal)

"When the plural or verb ends with a consonant + y."

(Repeat until firm.)

(Write **de + lay** on the board. Point to **de + lay**.)

Tell me the last two letters in this word. (Pause).

Get ready. (signal) *"a-y"*

Does this word end with a consonant-and-y or vowel-and-y? (signal) *"Vowel-and-y."*

So do we change the **y** to **i**? (signal) *"No."*

Do we add **s** or **es**? (signal) *"s."*

Spell **delays** with me. Get ready. (signal) *"d-e-l-a-y-s."*

(Write **carry** on the board. Point to **carry**.)

Tell me the last two letters of this word. (signal) *"r-y."*

Does this word end with a consonant-and-y or vowel-and-y? (signal) *"Consonant-and-y."*

So would we change the **y**? (signal) *"Yes."*

What do we change the **y** to ? (signal) *"i."*

Do we add **s** or **es**? (signal) *"es."*

Spell **carries**. Get ready. (signal)

(Write **monkey** on the board. Point to **monkey**.)

Does this word end with a consonant-and-y or vowel-and-y? (signal) *"Vowel-and-y."*

So would we change the **y**? (signal) *"No."*

Do we add **s** or **es**? (signal) *"s."*

Spell **monkeys**. Get ready. (signal)

(Write **trophy** on the board. Point to **trophy**.)

Would we change the **y**? (signal) *"Yes."*

To what? (signal) *"i."*

And what do you add? (signal) *"es."*

Spell **trophies**. Get ready. (signal)

(Write **pity** on the word. Point to **pity**.)

Spell **pities**. Get ready. (signal)

(If firm, go to fluency.)

Script #9: Plural variation: [By Linda Ross, adapted from Dixon & Engelmann, 1979]

(Write on the board: **s, z, sh, ch**)

In the last lesson we learned how to make plurals of words ending in **y**.

(Point to letters on the board.)

If words end in any of these letters or letter combinations, you add **es** to make the plural word.

Listen: **match**. What letters does it end in? (signal) "*ch*."

So what letters do you add to make the plural word for **match**? (signal) "*es*."

And how do you say the plural word? (signal) "*matches*."

Yes, you can hear the **e-s**: **matches**.

Listen: **buzz**. What letter does it end in? (signal) "*z*."

So what letters do you add to make the plural word for **buzz**? (signal) "*es*."

And how do you say the plural word? "*buzzes*."

You can hear the **e-s**.

Listen: **brush**. What letters does it end in? (signal) "*sh*."

So what letters do you add to make the plural word for **brush**? (signal) "*es*."

And how do you say the plural word? "*brushes*."

You can hear the **e-s**.

Listen: **pass**. What letter does it end in? (signal) "*s*."

So what letters do you add to make the plural word for **pass**? (signal) "*es*."

And how do you say the plural word? "*passes*."

You can hear the **e-s**.

(Repeat practice until firm.)

(Write **box** on the board. Point to the **x**.)

We also add **es** to words that end in the letter **x**.

What letters do we add to the word **box** to make the plural word? (signal) "*es*."

Right. We don't double the **x**. You remember from previous lessons that the **x** acts like two consonant letters.

How many consonant letters does **x** act like? (signal) "*two*."

Now spell the word **boxes**. Get ready. (signal)

Listen: **tax**. What letter does it end in? (signal) "*x*."

So what letters do you add to make the plural word for **tax**? (signal) "*es*."

Do you double the **x**? (signal) "*No*."

Spell **taxes**. Get ready. (signal)

(If firm go on to fluency.)

Script #10: Plural Variation "ves" [By Linda Ross, adapted from Dixon & Engelmann, 1979]

In this lesson, we will continue to learn about plurals. Let's say some words that have the sound **vvv** in the plural.

My turn. The plural of **leaf** is (pause) **leaves**.

The plural of **half** is (pause) **halves**.

The plural of **thief** is (pause) **thieves**.

Your turn. What is the plural of **thief**? (signal) "*thieves*."

To correct:

- a. The plural of **thief** is **thieves**.
- b. (Repeat instruction.)

What is the plural of **half**? (signal) "*halves*."

What is the plural of **wolf**? (signal) "*wolves*."

What is the plural of **calf**? (signal) "*calves*."
(Repeat until firm.)

(Write on the board: **leaf, leaves**.)

Some words that end if the sound **fff** have the letters **ves** in the plural. You can always hear the sound **vvv** in the plural.

(Point to **leaf**.)

Everybody, spell the word **leaf**. Get ready. (signal)

Say the plural of **leaf**. (signal) "*leaves*."

Yes, you can hear the sound **vvv** in **leaves**.

Spell **leaves**. Get ready. (signal)

Everybody, spell the word **half**. Get ready. (signal)

Say the plural of **half**. (signal) "*halves*."

Spell **halves**. Get ready. (signal)

(For **wolf-wolves** and **thief-thieves**, have the students spell the singular, say the plural, and spell the plural. When firm, go on to fluency.)

Script #11: Contractions [From Dixon & Engelmann, 1979]

(Write on the board: **wasnot, youwill, shouldnot, heis, hasnot, and itis.**)
Listen. A contraction is made from two words, and a contraction has a part missing.

(Point to **wasnot.**) The contraction for **was not** is **wasn't**.

(Erase the **o.**) The missing part in **wasn't** is **o**.

We show that the part is missing with an apostrophe.

(Make an apostrophe in place of **o.**)

(Point to **youwill.**) What is the contraction for **you will**? (signal) "*you'll.*"

What part is missing in **you'll**? (signal) "*wi.*"

(Erase the **wi.**) What mark goes in place of **wi**? (signal) "*An apostrophe.*"

(Make an apostrophe.)

(Point to **shouldnot.**)

What is the contraction of **should not**? (signal) "*shouldn't.*"

What part is missing in **shouldn't**? (signal) "*o.*"

(Erase the **o.**)

What mark goes in place of **o**? (signal) "*An apostrophe.*"

(Point to **heis.**) What is the contraction of **he is**? (signal) "*he's.*"

What part is missing in **he's**? (signal) "*i.*"

(Erase the **i.**)

What mark goes in place of **i**. (signal) "*An apostrophe.*"

(Make an apostrophe.)

(Repeat steps for **hasnot** and **itis.**)

(Erase the board.)

My turn to spell **wasn't**: **w-a-s-n-apostrophe-t.**

Your turn. Spell **wasn't**. Get ready (signal)

Spell **hasn't**. Get ready. (signal)

(Repeat for **he's, shouldn't, you'll, and it's.**)

(Repeat spelling of all words until firm. Go on to fluency.)

Script #12: en Variation [From Dixon & Engelmann, 1979]

(Write on the board: **show + en = shown.**)

Here is a new rule. When a word ends with the letter **w** and you add **en**, drop the **e**.

(Point to **show**.)

The word **show** ends with the letter **w**. So we drop the **e** from **en** when we write **shown**.

(Cross out the **e** in **en**.)

Everybody, spell **shown**. Get ready. (signal)

The word **throw** ends with the letter **w**.

So tell me how to spell the word **thrown**. (pause). Get ready. (signal)

What letter does the word **blow** end with? (signal) "w."

So tell me how to spell the word **blown**. (pause) Get ready. (signal)

What letter does the word **grow** end with? (signal) "w."

So tell me how to spell the word **grown**. Get ready. (signal)

Remember, when a word ends with the letter **w** and you add **en**, drop the **e**.

(When firm, go on to fluency.)

Script #13: **al** Insertion [From Dixon & Engelmann, 1979]

Here's a new rule for words that end in **ic**. Listen. When the word ends in the letters **ic**, you must add the morphograph **al** before adding **ly**.

Listen again. When the word ends in the letters **ic**, you must add the morphograph **al** before adding **ly**.

Everybody, tell me when you add **al** before **ly**. Get ready. (signal)

*"When the word ends in the letters **ic**."*

(Write on the board: **logic**, **magic**, and **physic**.)

What letters do these words end in? (signal) *"ic."*

(Point to **logic**.)

So if we write the word **logically**, what morphograph must we add before the **ly**? (signal)

"al."

(Write + **al** after **logic**.)

Now we add **ly**.

(Write + **ly** after **logic + al**.)

Everybody, spell **logically**. Get ready. (signal)

(Repeat until firm.)

(Point to **magic**.)

What letters does **magic** end in? (signal) *"ic."*

So what morphograph would we add before the **ly** in **magically**? (signal) *"al."*

Everybody, spell **magically**. Get ready. (signal)

(Repeat until firm.)

(Point to **physic**.)

What letters does **physic** end in? (signal) *"ic."*

So what morphograph would we add before the **ly** in **physically**? (signal) *"al."*

Everybody, spell **physically**. Get ready. (signal)

(When firm, go to fluency.)

Script #14: Add k Rule [By Linda Ross, adapted from Dixon, 1993]

A few lessons back we learned about hard and soft **c**. Here's a rule to apply when a word ends in **ic** and the letter **c** remains hard. Add the letter **k** when adding a suffix beginning with **e, i, or y**.

Listen again. If a word ends in **ic** and the **c** remains hard, add the letter **k** when adding a suffix beginning with **e, i, or y**

What letter do we add? (signal) "*k*."

When adding what suffixes? (signal) "*e, i, or y*."

(Repeat until firm.)

(Write **picnic** on the board. Point to **picnic**.)

What letters does this word end in? (signal) "*ic*."

Is the **c** hard or soft? (signal) "*hard*."

(Write + **ing** after **picnic**: **picnic + ing**).

What letter do we need to add before we can add the **ing**? (signal) "*k*."

So **picnicking** is spelled **p-i-c-n-i-c-k-i-n-g**.

(Write **traffic** on the board.)

What letters does this word end in? (signal) "*ic*."

Is the **c** hard or soft? (signal) "*hard*."

(Write + **er** after **traffic**: **traffic + er**.)

What letter do we need to add before we can add the **er**? (signal) "*k*."

Spell **trafficker**. Get ready. (signal).

(Write **panic** on the board.)

What letters does this word end in? (signal) "*ic*."

Is the **c** hard or soft? (signal) "*hard*."

(Write + **y** after **panic**: **panic + y**.)

Spell **panicky**. Get ready. (signal)

(When firm, go to fluency.)

Script #15: or/er Rule [From Dixon & Engelmann, 1979]

(Write on the board: **actor** and **helper**.)

In words like **actor**, the ending is spelled **o-r**. In words like **helper**, the ending is spelled **e-r**.

Here is a rule for spelling many words that end with the morphograph **o-r**. Use **o-r** if a form of the word ends **i-o-n**.

Listen again. Use **o-r** if a form of the word ends **i-o-n**.

When do you spell the ending **o-r**? (signal)

"When a form of the word ends i-o-n."

(Repeat until firm.)

Listen to this word: **instruct**.

What word? (signal) *"instruct."*

Tell me if there is a form of the word that ends **i-o-n**. (pause) Get ready. (signal) *"Yes."*

What word is that? (signal) *"instruction."*

So how do we spell the last morphograph in instructor? (signal) *"o-r."*

Listen to this word: **compose**.

What word? (signal) *"compose."*

Tell me if there is a form of the word that ends **i-o-n**. (pause) Get ready. (signal) *"No."*

There is no word '**compose-shun**.'

So how do we spell the last morphograph in **composer**? (signal) *"e-r."*

Listen to this word: **perform**.

What word? (signal) *"perform."*

Tell me if there is a form of the word that ends **i-o-n**. (pause) Get ready. (signal) *"No."*

There is no '**perform-shun**.'

So how do we spell the last morphograph in **performer**? (signal) *"e-r."*

Listen to this word: **protect**.

What word? (signal) *"protect."*

Tell me if there is a form of the word that ends **i-o-n**. (pause) Get ready. (signal) *"Yes."*

What word is that? (signal) *"protection."*

So how do we spell the last morphograph in **protector**? (signal) *"o-r."*

(When firm, go on to fluency.)

Script #16: Related **able** vs. **ible** [By Linda Ross, adapted from Dixon, 1993]

In the last lesson we learned that if you can add **i-o-n** to a word, the ending morphograph would be **o-r** rather than **e-r**. Today we will learn we you use **able (a-b-l-e)** versus when you use **ible (i-b-l-e)**.

(Write on the board: base + **i** morphograph = **ible**.)

Here's the rule. If the base morphograph can take a morphograph that begins with **i**, like **i-o-n**, **i-v-e**, **i-t-e**, or **i-f-y**, then it also taken **ible**, or **i-b-l-e**.

Listen again. If the base morphograph can take a morphograph that begins with **i**, like **i-o-n**, **i-v-e**, **i-t-e**, or **i-f-y**, then it also taken **ible**, or **i-b-l-e**.

My turn. When do we use the morphograph **ible**? When the base morphograph can take an **i** morphograph.

Your turn. When do we use the morphograph **ible**? (signal)

*"When the base morphograph can take an **i** morphograph."*

(Repeat until firm.)

(Write **de** + **duct** on the board.)

What word? (signal) *"deduct."*

Yes, **deduct**. The base morphograph in this word is **duct**. What's the base? (signal) *"duct."*

(Write **pro** + **duct** on the board.)

Another word with the same base is **product**.

(Write + **ive** after **pro** + **duct**: **pro** + **duct** + **ive**.)

The word product can take the **i** morphograph **ive** to form the word **productive**. So any word with the base morphograph **duct** would end **ible**.

(Write + **ible** after **de** + **duct**.)

So the word **deductible** is spelled **d-e-d-u-c-t-i-b-l-e**.

(Write **siz** + **_ ble** on the board.)

The base morphograph in this word is **size**. What's the base? (signal) "*size*."

Can we add an **i** morphograph to another word with this base? (pause). Get ready. (signal) "*No*."

(Write an **a** in the blank in **siz** + **_ble**.)

No, we can't. So **sizable** is spelled **s-i-z-a-b-l-e**.

(Write **horr** + **_ble** on the board.)

What's the base in this word? (signal) "*horr*."

Can **horr** take an **i** morphograph? (signal) "Yes."

Yes, **horr** can take the morphograph **ify**: **horrify**.

(Point to the blank in **horr** + **_ble**.)

So what letter do we write in the blank? (signal) "*i*."

Yes, **i**.

(Write **i** in the blank in **horr** + **_ble**.)

Spell the word **horrible**. Get ready. (signal)

(Write **dis** + **miss** + **_ble** on the board.)

What's the base? (signal) "*miss*."

Can **miss** take an **i** morphograph? (signal) "Yes."

Yes, it can. Give me a word with the same base plus the **i** morphograph. (signal) (Accept answers such as **mission**, **permission**, **permissive**, etc.)

So what letter do we write in the blank? (signal) "*i*."

(Write **i** in the blank in **dis** + **miss_****ble**.)

Spell the word **dismissible**. Get ready. (signal)

(When firm, go on to fluency.)

Script #17: al vs. le Rule [By Linda Ross, adapted from Dixon, 1993]

Many words end with the sound "uhl." Some of these are spelled **al** and some are spelled **le**. Here's a simple rule to keep those spellings straight.

Listen. **al** is a morphograph, but **le** is part of other morphographs.

Listen again. **al** is a morphograph, but **le** is part of other morphographs.

Is **al** a morphograph? (signal) *"Yes."*

Is **le** a morphograph? (signal) *"No."*

What is **le**? (signal) *"Part of other morphographs."*

(Repeat until firm.)

(Write **re + fuse** on the board.)

My turn. Are these complete morphographs? Yes, they are.

Your turn. Are these complete morphographs? (signal) *"Yes, they are."*

(Write + **al** after **re + fuse: re + fuse + al**.)

So we add **al**. We remember the final vowel rule and spell **refusal: r-e-f-u-s-a-l**.

(Write **amp** on the board.)

My turn. Is this a complete morphograph? No, it's not.

Your turn. Is this a complete morphograph? (signal) *"No, it's not."*

(Write **le** after **amp: ample**.)

The entire morphograph is **ample**. **Ample** is the base morphograph.

So **ample** is spelled: **a-m-p-l-e**.

(Write **brute** on the board.)

Is this a complete morphograph? (pause.) Get ready. (signal). *"Yes."*

Yes, it is. So do we add **al** or **el**? (signal) *"al."*

(Write + **al** after **brute**.)

Spell **brutal**. Get ready. (signal)

Right. You drop the final **e** and spell **brutal: b-r-u-t-a-l**.

(Write **simp** on the board.)

Is this a complete morphograph? (pause.) Get ready. (signal). *"No."*

No, it's not. So do we add **al** or **le**? (signal) *"le."*

Spell **simple**. Get ready. (signal)

(Write **class + ic** on the board.)

Are these complete morphographs? (signal) *"Yes, they are."*

So what do we add? (signal) *"al."*

Yes, **al**. The **c** remains hard so we don't double it.

Spell **classical**. Get ready. (signal)

(Write **sett** on the board.)

Is this a complete morphograph? (pause.) Get ready. (signal). *"No."*

So what do we add? (signal) *"le."*

Spell **settle**. Get ready. (signal)

(Write **fab** on the board.)

Is this a complete morphograph? (pause.) Get ready. (signal). *"No."*

So what do we add? (signal) *"le."*

Spell **fable**. Get ready. (signal)

(Write **sign** on the board.)

Is this a complete morphograph? (pause.) Get ready. (signal). *"Yes."*

So what do we add? (signal) *"al."*

Spell **signal**. Get ready. (signal)

(Write **shack** on the board.)

This one is tough. Is it a complete morphograph? (pause). Get ready. *"No."*

So what do you add? (signal) *"le."*

Maybe you thought that **shackle** was **shack** + **al**. Actually, **shackle** has its strongest relationship to **shake**, not **shack**. So **shackle** has evolved to be just one morphograph.

Spell **shackle**. Get ready. (signal)

(When firm, go on to fluency.)

Script #18: Related **ize** vs. **ise** rule [By Linda Ross, adapted from Dixon, 1993]

In the last lesson, we learned that **al** is a morphograph that is added to other morphographs, but that **le** is part of other morphographs. The same is true about words that have an ending that sounds like "eyes," spelled **ize** or **ise**.

Listen. **ize** is a morphograph, but **ise** is part of other morphographs.
Listen again. **ize** is a morphograph, but **ise** is part of other morphographs.

Is **ize** a morphograph? (signal) *"Yes."*
Is **ise** a morphograph? (signal) *"No."*
What is **ise**? (signal) *"Part of other morphographs."*
(Repeat until firm.)

(Write **organ** on the board.)
My turn. Is this a complete morphograph? Yes, it is.
Your turn. Is this a complete morphograph? (signal) *"Yes, it is."*

(Write + **ize** after **organ**: **organ + ize**.)
So we add **ize**. We spell **organize**: **o-r-g-a-n-i-z-e**.

(Write **adv** on the board.)
My turn. Is this a complete morphograph? No, it's not.
Your turn. Is this a complete morphograph? (signal) *"No, it's not."*

(Write **ise** after **adv**: **advise**.)
The entire morphograph is **advise**. **vise** is the base morphograph.
So **advise** is spelled: **a-d-v-i-s-e**.

(Write **ration + al** on the board.)
Are these complete morphographs? (pause.) Get ready. (signal). *"Yes."*
Yes, they are. So do we add **ize** or **ise**? (signal) *"ize."*
(Write + **ize** after **ration + al**.)
Spell **rationalize**. Get ready. (signal)

(Write **disgu** on the board.)
Is this a complete morphograph? (pause.) Get ready. (signal). *"No."*
No, it's not. So do we add **ize** or **ise**? (signal) *"ise."*
Right. **guise** is the base morphograph.
Spell **disguise**. Get ready. (signal)

(Write **vise + u + al** on the board.)
Are these complete morphographs? (signal) *"Yes, they are."*
So what do we add? (signal) *"ize."*
Spell **visualize**. Remember the final **e** rule. Get ready. (signal)

(Write **compr** on the board.)

Is this a complete morphograph? (pause.) Get ready. (signal). *"No."*

So what do we add? (signal) *"ise."*

Spell **comprise**. Get ready. (signal)

(Write **surpr** on the board.)

Is this a complete morphograph? (pause.) Get ready. (signal). *"No."*

So what do we add? (signal) *"ise."*

Spell **surprise**. Get ready. (signal)

(Write **real** on the board.)

Is this a complete morphograph? (pause.) Get ready. (signal). *"Yes."*

So what do we add? (signal) *"ize."*

Spell **realize**. Get ready. (signal)

(Write **com + prom** on the board.)

This one is tough. Are these complete morphographs? (pause). Get ready. *"No."*

(Change **com + prom** so that it reads **com + pro + m_____**.)

Here's how **compromise** is really broken down into morphographs, missing one part of the final morphograph. What part? (signal) *"ise."*

Spell **compromise**. Get ready. (signal)

(When firm, go on to fluency.)

Script #19: ious vs. ous Rule [By Linda Ross, adapted from Dixon, 1993]

One suffix that can give you trouble from time to time is **ous**. **ous** endings are often confused with **ious** endings.

Here's the rule. Add **ious** to words that have an "ee-us" or /sh/-us sound at the end. The /sh/-us sound occurs when **ious** follows a **c**, **t**, or **x**.

Listen again. Add **ious** to words that have an "ee-us" or /sh/-us sound at the end.

My turn. When do we add **ious**? When the word has an "ee-us" or /sh/-us sound at the end.

Your turn. When do we add **ious**? (signal) *"When the word has an "ee-us" or /sh/-us sound at the end."*

(Write **labor** on the board.)

Say this word: **laborious**. (signal) *"laborious."*

Does it have an "ee-us" or /sh/-us sound at the end? (signal) *"Yes."*

Which sound? (signal) *"ee-us."*

(Write + **ious** after **labor**: **labor + ious**.)

So we spell **laborious**: **l-a-b-o-r-i-o-u-s**.

(Write **nutrit** on the board.)

Say this word: **nutritious**. (signal) *"nutritious."*

Does it have an "ee-us" or /sh/-us sound at the end? (signal) *"Yes."*

Which sound? (signal) *"/sh/-us."*

(Write + **ious** after **nutrit**: **nutrit + ious**.)

So we spell **nutritious**: **n-u-t-r-i-t-i-o-u-s**.

(Write **humor** on the board.)

Say this word: **humorous**. (signal) *"humorous."*

Does it have an "ee-us" or /sh/-us sound at the end? (signal) *"No."*

No, it doesn't.

(Write + **ous** after **humor**: **humor + ous**.)

So we spell **humorous**: **h-u-m-o-r-o-u-s**.

(Write **desire** on the board.)

Say this word: **desirous**. (signal) *"desirous."*

Does it have an "ee-us" or /sh/-us sound at the end? (signal) *"No."*

No, it doesn't.

(Write + **ous** after **desire**: **desire + ous**.)

So we remember the final **e** rule and spell **desirous**: **d-e-s-i-r-o-u-s**.

(Write **outrage** on the board.)

Say this word: **outrageous**. (signal) "*outrageous*."

Does it have an "ee-us" or /sh/-us sound at the end? (signal) "*No*."

No, it doesn't. But it does have a soft **g** or /j/ sound.

(Write + **ous** after **outrage**: **outrage + ous**.)

So we remember to keep the final **e** and spell **outrageous**: **o-u-t-r-a-g-e-o-u-s**.

(Write **obnox** on the board.)

Say this word: **obnoxious**. (signal) "*obnoxious*."

Does it have an "ee-us" or /sh/-us sound at the end? (signal) "*Yes*."

Which sound? (signal) "*/sh/-us*."

So do we add **ious** or **ous**? (signal) "*ious*."

Spell **obnoxious**. Get ready. (signal)

(Write **poison** on the board.)

Say this word: **poisonous**. (signal) "*poisonous*."

Does it have an "ee-us" or /sh/-us sound at the end? (signal) "*No*."

No, it doesn't.

So do we add **ious** or **ous**? (signal) "*ous*."

Spell **poisonous**. Get ready. (signal)

(Write **victory** on the board.)

Say this word: **victorious**. (signal) "*victorious*."

Does it have an "ee-us" or /sh/-us sound at the end? (signal) "*Yes*."

Which sound? (signal) "*ee-us*."

So do we add **ious** or **ous**? (signal) "*ious*."

Spell **victorious**. Remember about the **y**. Get ready. (signal)

(Write **advantage** on the board.)

Say this word: **advantageous**. (signal) "*advantageous*."

Does it have an "ee-us" or /sh/-us sound at the end? (signal) "*No*."

No, it doesn't. What sound does it have? (signal) "*soft g or /j/ sound*."

So do we add **ious** or **ous**. (signal) "*ous*."

Spell **advantageous**. Get ready. (signal)

(Write **offic** on the board.)

Say this word: **officialious**. (signal) "*officialious*."

Does it have an "ee-us" or /sh/-us sound at the end? (signal) "*Yes*."

Which sound? (signal) "*/sh/-us*."

So do we add **ious** or **ous**? (signal) "*ious*."

Spell **officialious**. Get ready. (signal)

(When firm, go on to fluency.)

Script #20: ion vs ian Rule [By Linda Ross, adapted from Dixon, 1993]

In some words, it is easy to tell when to add **ian**, because the sound at the end of the word is "ee-un." However, sometimes the endings **ion** and **ian** both take the sound /shun/. Here's an easy rule to help you remember when to use **ian** and when to use **ion**.

Listen. Use **ian** when the word refers to a person or people. Otherwise, use **ion**.
Listen again. Use **ian** when the word refers to a person or people. Otherwise, use **ion**.

My turn. When do you use **ian**? When the word refers to a person.
Your turn. When do you use **ian**? (signal) "*When the word refers to a person.*"
(Repeat until firm.)

(Write **techno + ic** on the board.)
Say this word: **technician**. (signal) "*technician.*"

(Write + **ian** after **techno + ic**: **techno + ic + ian**.)
This word refers to a person, so we add **ian**.
We remember the final vowel rule, and spell **technician**: **t-e-c-h-n-i-c-i-a-n**.)

(Write **sect** on the board.)
Say this word: **section**. (signal) "*section.*"

(Write + **ion** after **sect**: **sect + ion**.)
This word does not refer to a person, so we add **ion**.
We spell **section**: **s-e-c-t-i-o-n**.)

(Write **diet + ite** on the board.)
Say this word: **dietitian**. (signal) "*dietitian.*"
Does this word refer to a person? (signal) "*Yes.*"
Yes, it does. So do we add **ian** or **ion**? (signal) "*ian.*"
Spell **dietitian**. Remember the final **e** rule. Get ready. (signal)

(Write **pro + mote** on the board.)
Say this word: **promotion**. (signal) "*promotion.*"
Does this word refer to a person? (signal) "*No.*"
No, it doesn't. So do we add **ian** or **ion**? (signal) "*ion.*"
Spell **promotion**. Remember the final **e** rule. Get ready. (signal)

(Write **re + volu + ute** on the board.)
Say this word: **revolution**. (signal) "*revolution.*"
Does this word refer to a person? (signal) "*No.*"
No, it doesn't. So do we add **ian** or **ion**? (signal) "*ion.*"
Spell **revolution**. Get ready. (signal)

(Write **mort** + **ic** on the board.)

Say this word: **mortician**. (signal) "*mortician*."

Does this word refer to a person? (signal) "*Yes*."

Yes, it does. So do we add **ian** or **ion**? (signal) "*ian*."

Spell **mortician**. Get ready. (signal)

(When firm, go on to fluency.)

Script #21: x drops s Rule [By Linda Ross, adapted from Dixon, 1993]

Many lessons back we learned that **x** acts like two consonant letters because it has two consonant sounds: /k/ and /s/. You can hear them when you say "**x**" to yourself: "eks." Here's a rule about the morphograph **ex**. When **ex** is followed by a morphograph that begins with an **s**, the **s** drops. We don't need it anymore because of the /s/ sound in **ex**. Listen. When **ex** is followed by an **s** morphograph, the **s** drops. Listen again. When **ex** is followed by an **s** morphograph, the **s** drops.

My turn. When do we drop the **s**? When **ex** is followed by an **s** morphograph.
Your turn. When do we drop the **s**? (signal) "*When ex is followed by an s morphograph.*"
(Repeat until firm.)

(Write **ex + spect** on the board.)
Is there **ex** in this word? (signal) "*Yes.*"
Is **ex** followed by an **s** morphograph? (signal) "*Yes.*"
So we drop the **s** and spell **expect**: **e-x-p-e-c-t**.

(Write **ex + amine** on the board.)
Is there **ex** in this word? (signal) "*Yes.*"
Is **ex** followed by an **s** morphograph? (signal) "*No.*"
There's no **s** to drop, so we spell **examine**: **e-x-a-m-i-n-e**.

(Write **ex + sult** on the board.)
Is there **ex** in this word? (signal) "*Yes.*"
Is **ex** followed by an **s** morphograph? (signal) "*Yes.*"
Spell **exult**. Get ready. (signal)

(Write **ex + secu + ute** on the board.)
Is there **ex** in this word? (signal) "*Yes.*"
Is **ex** followed by an **s** morphograph? (signal) "*Yes.*"
Spell **execute**. Remember the final vowel rule. Get ready. (signal)

(Write **ex + cept** on the board.)
Is there **ex** in this word? (signal) "*Yes.*"
Is **ex** followed by an **s** morphograph? (signal) "*No.*"
Spell **except**. Get ready. (signal)

(Write **ex + stinct + ion** on the board.)
Is there **ex** in this word? (signal) "*Yes.*"
Is **ex** followed by an **s** morphograph? (signal) "*Yes.*"
Spell **extinction**. Get ready. (signal)

(Write **ex + sist** on the board.)
Is there **ex** in this word? (signal) "*Yes.*"

Is **ex** followed by an **s** morphograph? (signal) *"Yes."*
Spell **exist**. Get ready. (signal)

(Write **ex** + **empt** on the board.)

Is there **ex** in this word? (signal) *"Yes."*

Is **ex** followed by an **s** morphograph? (signal) *"No."*

Spell **exempt**. Get ready. (signal)

(When firm, go on to fluency.)

Appendix C: Passive Instruction Scripts

Introduction to Morphographs

Today you are going to learn a method of spelling that is based on morphology, which is the study of the structure of words. Morphographs are the smallest units of meaning that combine to form words. Prefixes, suffixes, and bases are all morphographs.

(Write **happy** on the board.)

The word happy is a base

I can add other morphographs to create other words.

(Write **un** + in front of **happy**: **un + happy**)

Now I have a new word: **unhappy**.

(Write + **ness** after **un + happy**: **un + happy + ness**)

I've added another morphograph to make a new word. Now I have a new word: **unhappiness**.

(Erase **un + happy + ness**. Write **faith + ful**)

Two morphographs are presented: **faith** and **ful**.

(Erase + **ful**. Write + **less**: **faith + less**)

The morphographs in this word are **faith** and **less**.

(Erase **faith + less**. Write **tain** on the board)

A morphograph isn't always a word. This base is a morphograph because you get words that have meaning when you add other morphographs.

(Write **con** + before **tain**: **con + tain**)

Now we have a word with two morphographs.

(Write + **er** after **con + tain**: **con + tain + er**)

Now we have a word with three morphographs.

(Write **ject** on the board)

This a morphograph. I could add other morphographs to this word.

(Write morphographs to form reject, project, projection, etc.)

All of the rules of spelling that you will learn are based on the morphographs, or bits of meaning, contained in the words.

Script #2: Final Vowel Rule

Here is the rule. When a word or morphograph ends in a vowel and you add a morphograph that begins with a vowel letter, you must drop the vowel from the first morphograph. Vowels include the letters **a, e, i, o, u**, and the morphograph **y**, so you drop the vowel when adding a morphograph that begins with a vowel letter.

Once again. When do you drop the vowel from a word?
When the next morphograph begins with a vowel letter.

(Write **cyclo** on the board. Point to **cyclo**.)
This word ends with the vowel **o**.

(Write + **ic** after cyclo: **cyclo + ic**).
The next morphograph is **ic**.
ic begins with a vowel letter, so we drop the **o** from the word.
So **cyclic** is spelled: **c-y-c-l-i-c**.

(Replace **ic** with **scope**: **cyclo + scope**).
The next morphograph is **scope**.
It begins with a consonant letter, so we do not drop the vowel from the word.
We spell the word **cycloscope c-y-c-l-o-s-c-o-p-e**.

(Replace **scope** with **ize**: **cyclo + ize**)
We drop the vowel from the word, and spell **cyclize (spell it)**.

Once again. When do you drop the vowel from a word?
When the next morphograph begins with a vowel letter. (go to fluency).

Script #3: Keep Final E Rule

When a word or morphograph ends in a vowel and you add a morphograph that begins with a vowel letter, you must drop the vowel from the first morphograph. Sometimes, you do not drop an **e** when adding a morphograph that begins with a vowel letter. We may keep the final **e** when the word or morphograph contains a **c** or a **g**.

That's because both of these letters make hard and soft sounds. The hard sound for **c** is /k/.

The soft sound for **c** is /s/.

The hard sound for **g** is /g/. The soft sound for **g** is /j/.

Here's the rule. When a soft **c** or soft **g** appears right before the **e**, keep the final **e** to avoid turning the **c** or **g** into hard sounds.

(Write **trace** on the board. Point to **trace**.)

This word contains a soft **c**.

(Write + **able** after **trace**: **trace** + **able**).

The next morphograph is **able**.

Able begins with a vowel letter?

So we do not drop the **e** from the word.

So **traceable** is spelled: **t-r-a-c-e-a-b-l-e**.

(Replace **trace** with **mate**. Point to **mate**.)

This word does not contain a **c** or a **g**.

(Write + **ing** after **mate**: **mate** + **ing**.)

The next morphograph is **ing**.

So we drop the **e** from the word.

We spell mating (spell it).

(Replace **mate** with **courage**. Point to **courage**.)

This word contains a soft **g**.

(Write + **ous** after **courage**: **courage** + **ous**).

The next morphograph is **ous**.

We do not drop the **e** from the word.

We spell **courageous** (spell it).

(Erase **courage** + **ous**. Write **grade** on the board. Point to **grade**).

This word does not contain a soft **c** or a soft **g**.

(Write + **ing** after **grade**: **grade** + **ing**).

So we spell **grading** (spell it).

Script #4: Doubling Rule (single syllable)

(Write on the board: double **c** when **cvc** + **v**. Point to rule).

Here is the rule for changing the spelling of single-syllable words, when you add a morphograph to the end of these words.

When a single-syllable word ends **CVC** and the next morphograph begins with a vowel letter, you must double this consonant (Point to final **c**).

(Repeat the rule).

(Write **sad** on the board).

Look at the last three letters in this word.

Sad is a single-syllable **CVC** word.

(Write + **er** after **sad**).

The next morphograph is **er**.

It begins with **V**, so we double the final **d**.

(Replace **er** with **ly**).

The next morphograph is **ly**.

It does not begin with **V**.

So we do not double any letter.

(Replace **ly** with **est**).

The next morphograph is **est**.

It begins with **V**. So do we double the final **d**.

So **saddest** is spelled: s-a-d-d-e-s-t.

(Replace **est** with **ly**).

Ly does not begin with **V**.

So **sadly** is spelled: s-a-d-l-y.

(Replace **ly** with **er**).

Er begins with **V**.

So **sadder** is spelled: s-a-d-d-e-r.

(Erase **sad** + **er**. Write **water** on the board).

Look at the last three letters in this word. (Pause).

Water is not a single-syllable **CVC** word.

(Write + **ing** after **water**).

So **watering** is spelled: w-a-t-e-r-i-n-g.

Script #6: Doubling rule (compound words and letter exceptions)

In the last two lessons, we've talked about the doubling rule for single-syllable and multi-syllable words. Compound words are a type of multi-syllable words. A compound word is made up of two or more words that can stand alone, making it different from other multi-syllable words.

Once again. A compound word is a word made up of two or more words.

(Write **horse** + **whip** on the board.)

This is a compound word, made up of the words **horse** and **whip**.

(Write **sign** + **al** on the board.)

This is not a compound word, because **al** is a morphograph, but not a word.

(Write **re** + **fer** on the board.)

This isn't a compound word either.

(Write **out** + **fit** on the board.)

This is.

Here's the rule: If the word is a compound, don't pay attention to the stress. Double the final consonant when adding a morphograph that begins with a vowel.

Once again. We double the final consonant of a multi-syllabic word when the word is a compound or the stress is on the last **cvc**.

(Write **over** + **step** on the board. Point to **over** + **step**.)

This is a compound word.

(Write + **ed** after **over** + **step**: **over** + **step** + **ed**.)

So we double the final consonant, and spell **overstepped... (spell)**

(Write **dif** + **fer** on the board. Point to **dif** + **fer**.)

This is not a compound word.

(Write + **ent** after **dif** + **fer**: **dif** + **fer** + **ent**.)

The stress is not on the final **cvc**.

So **different** is spelled... (spell)

You need to know a little more about vowel and consonant letters to use the doubling rule. Some letters act as vowels in some words and consonants in others.

The letters **y** and **w** act as vowels at the end of a morphograph.

So when a **y** or a **w** end a morphograph, you don't double it because the morphograph would not end **cvc**.

Once again. You do not double a morphograph ending in **y** or **w** because it does not end **cvc**.

(Write **play** + **ed** on the board. Point to **play**.)

You do not double the final letter of this morphograph because it doesn't end **cvc**.

So **played** is spelled...(spell it)

(Write **chew** + **ing** on the board. Point to **chew**.)

You don't double the final letter of this morphograph, because it doesn't end **cvc**.

So **chewing** is spelled...(spell it)

(Use **boyish**, **lower**, **staying**, **brewed** as further examples, if necessary.)

The letter **x** acts like two consonants, not one, because it has two sounds: /ek/ and /s/. A morphograph ending in **x** may be **cvcc**, but never **cvc**, so you wouldn't double it.

Once again. You don't double the final consonant when the morphograph ends with an **x** because it doesn't end **cvc**.

(Write **fix** + **ing** on the board. Point to **fix**.)

You don't double the final letter in this word because it doesn't end **cvc**.

So **fixing** is spelled... (spell it)

(Write **box** + **er** on the board. Point to **box**.)

You don't double the final letter in this word because it doesn't end **cvc**.

So **boxer** is spelled...(spell it)

Last but not least, the letter **u** after a **q** acts as a consonant. So when a **q-u** appear near the end of a morphograph, it is possible for that morphograph to end **cvc**.

Once again. You might double a final consonant when the morphograph contains **q-u** because it might end **cvc**.

(Write **quiz** + **ed** on the board. Point to **quiz**.)

You double the final letter in this word because it ends **cvc**.

So **quizzed** is spelled... (spell it)

(Write **con** + **quest** + **ing** on the board. Point to **quest**.)

You don't double the final letter in this word, because it doesn't end **cvc**.

So **conquesting** is spelled...(spell it)

(Write **quit** + **er** on the board. Point to **quit**.)

This word does end **cvc**, so **quitter** is spelled...(spell it)

So in this lesson we learned that we double all final consonants in compound words ending **cvc**, **y** and **w** are vowels at the end of morphographs, **x** functions as two consonants at the end of morphographs, and **u** functions as a consonant when it follows **q**.

(If firm on all rules, go to fluency.)

Script #9: Plural variation

(Write on the board: **s, z, sh, ch**)

In the last lesson we learned how to make plurals of words ending in **y**.

(Point to letters on the board.)

If words end in any of these letters or letter combinations, you add **es** to make the plural word.

The word **match** ends in the letters **ch**.

So you add **es** to make the plural word for **match**.

You can hear the **e-s**: **matches**.

The word **buzz** ends in the letter **z**.

So you add **es** to make the plural word for **buzz**.

You can hear the **e-s**: **buzzes**

The word **brush** ends in the letters **sh**.

You add **es** to make the plural word for **brush**.

You can hear the **e-s**: **brushes**..

The word **pass** ends in the letter **s**.

So you add **es** to make the plural word for **pass**.

You can hear the **e-s**: **passes**.

(Write **box** on the board. Point to the **x**.)

We also add **es** to words that end in the letter **x**.

We don't double the **x**. You remember from previous lessons that the **x** acts like two consonant letters.

So the word **boxes** is spelled...(spell it)

The word **taxes** is spelled...(spell it)

So if words end in **s, z, ch, sh, or x**, always add **es** to make the word a plural.

(If firm go on to fluency.)

Script #10: Plural Variation "ves"

In this lesson, we will learn about words that have the sound **vvv** in the plural.

My turn. The plural of **leaf** is (pause) **leaves**.

The plural of **half** is (pause) **halves**.

The plural of **thief** is (pause) **thieves**.

(Write on the board: **leaf, leaves**.)

Some words that end if the sound **fff** have the letters **ves** in the plural. You can always hear the sound **vvv** in the plural.

(Point to **leaf**.)

You spell the plural for the word **leaf**: **l-e-a-v-e-s**.

When you say **leaves**, you can hear the sound **vvv** at the end.

(Point to **half**.)

You spell the plural for the word **half**: **h-a-l-v-e-s**.

When you say **halves**, you can hear the sound **vvv** at the end.

(Repeat for **wolf-wolves** and **thief-thieves**.)

Script #11: Contractions

(Write on the board: **wasnot, youwill, shouldnot, heis, hasnot, and itis.**)
A contraction is made from two words, and a contraction has a part missing.

(Point to **wasnot.**) The contraction for **was not** is **wasn't**.
(Erase the **o.**) The missing part in **wasn't** is **o**.
We show that the part is missing with an apostrophe.
(Make an apostrophe in place of **o.**)

(Point to **youwill.**) The contraction for **you will** is **you'll**.
The part that is missing is **wi**.
(Erase the **wi.**) An apostrophe goes in place of **wi**.
(Make an apostrophe.)

(Point to **shouldnot.**)
The contraction of **should not** is **shouldn't**.
The part that is missing is the **o**.
(Erase the **o.**)
An apostrophe goes in place of **o**.

(Point to **heis.**)
The contraction of **he is** is **he's**.
The **i** is missing in **he's**.
(Erase the **i.**)
An apostrophe goes in place of **i**.
(Make an apostrophe.)

(Repeat steps for **hasnot** and **itis.**)

Script #12: en Variation

(Write on the board: **show + en = shown.**)

Here is a new rule. When a word ends with the letter **w** and you add **en**, drop the **e**.

(Point to **show**.)

The word **show** ends with the letter **w**. So we drop the **e** from **en** when we write **shown**.

(Cross out the **e** in **en**.)

So **shown is** spelled... (spell it)

The word **throw** ends with the letter **w**.

So the word **thrown** is spelled...(spell it)

The word **blow** ends with the letter **w**.

So the word **blown** is spelled... (spell it)

Remember, when a word ends with the letter **w** and you add **en**, drop the **e**.

(When firm, go on to fluency.)

Script #13: **al** Insertion

Here's a new rule for words that end in **ic**. Listen. When the word ends in the letters **ic**, you must add the morphograph **al** before adding **ly**.

Once again. When the word ends in the letters **ic**, you must add the morphograph **al** before adding **ly**.

(Write on the board: **logic**, **magic**, and **physic**.)

All of these words end in **ic**.

(Point to **logic**.)

So if we write the word **logically**, we must we add the **al** morphograph before the **ly**.

(Write + **al** after logic.)

Now we add **ly**.

(Write + **ly** after **logic + al**.)

So **logically** is spelled...(spell it)

(Point to magic.)

The word **magic** ends in **ic**.

So we add the **al** morphograph before the **ly** in **magically**.

So **magically** is spelled... (spell it).

(Point to **physic**.)

Same goes with **physically**? (spell it)

Script #14: Add k Rule

A few lessons back we learned about hard and soft **c**. Here's a rule to apply when a word ends in **ic** and the letter **c** remains hard. Add the letter **k** when adding a suffix beginning with **e**, **i**, or **y**.

Listen again. If a word ends in **ic** and the **c** remains hard, add the letter **k** when adding a suffix beginning with **e**, **i**, or **y**.

(Write **picnic** on the board. Point to **picnic**.)

This word ends with the letters **ic**.

The **c** is hard.

(Write + **ing** after **picnic**: **picnic + ing**).

We need to add **k** before we can add the **ing**.

So **picnicking** is spelled **p-i-c-n-i-c-k-i-n-g**.

(Write **traffic** on the board.)

This word ends in the letters **ic**.

The **c** is hard.

(Write + **er** after **traffic**: **traffic + er**.)

We need to add **k** before we can add the **er**.

So **trafficker** is spelled **t-r-a-f-f-i-c-k-e-r**.

(Write **panic** on the board.)

This word ends in the letters **ic**.

The **c** is hard.

(Write + **y** after **panic**: **panic + y**.)

So **panicky** is spelled **p-a-n-i-c-k-y**.

Script #15: or/er Rule

(Write on the board: **actor** and **helper**.)

In words like **actor**, the ending is spelled **o-r**. In words like **helper**, the ending is spelled **e-r**.

Here is a rule for spelling many words that end with the morphograph **o-r**. Use **o-r** if a form of the word ends **i-o-n**.

Once again. Use **o-r** if a form of the word ends **i-o-n**.

Listen to this word: **instruct**.

There is a form of the word that ends **i-o-n**: **instruction**.

So we spell **instructor**...(spell it)

Listen to this word: **compose**.

There is no word '**compose-shun**.'

So we spell **composer**... (spell it)

Listen to this word: **perform**.

There is no '**perform-shun**.'

So we spell **performer**... (spell it)

Listen to this word: **protect**.

There is a form of the word that ends **i-o-n**: **protection**

So we spell **protector**...(spell it)

(When firm, go on to fluency.)

Script #16: Related **able** vs. **ible**

Today we will learn when you use **able (a-b-l-e)** versus when you use **ible (i-b-l-e)**.

(Write on the board: base + **i** morphograph = **ible**.)

Here's the rule. If the base morphograph can take a morphograph that begins with **i**, like **i-o-n**, **i-v-e**, **i-t-e**, or **i-f-y**, then it also taken **ible**, or **i-b-l-e**.

Listen again. If the base morphograph can take a morphograph that begins with **i**, like **i-o-n**, **i-v-e**, **i-t-e**, or **i-f-y**, then it also taken **ible**, or **i-b-l-e**.

(Write **de** + **duct** on the board.)

The base morphograph in this word is **duct**.

(Write **pro** + **duct** on the board.)

Another word with the same base is **product**.

(Write + **ive** after **pro** + **duct**: **pro** + **duct** + **ive**.)

The word product can take the **i** morphograph **ive** to form the word **productive**. So any word with the base morphograph **duct** would end **ible**.

(Write + **ible** after **de** + **duct**.)

So the word **deductible** is spelled **d-e-d-u-c-t-i-b-l-e**.

(Write **siz** + **_ ble** on the board.)

The base morphograph in this word is **size**.

We cannot add an **i** morphograph to another word with this base.

(Write an **a** in the blank in **siz** + **_ ble**.)

So **sizable** is spelled **s-i-z-a-b-l-e**.

(Write **horr** + **_ ble** on the board.)

The base in this word is **horr**.

Horr can take an **i** morphograph.

Horr can take the morphograph **ify**: **horrify**.

(Point to the blank in **horr + _ ble**.)

So the letter we write in the blank is **i**.

(Write **i** in the blank in **horr + _ ble**.)

So the word **horrible** is spelled: **h-o-r-r-i-b-l-e**.

(Write **dis + miss + _ ble** on the board.)

The base in this word is **miss**.

Miss can take an **i** morphographs such as **mission, permission, permissive**.

So the letter we write in the blank is **i**.

(Write **i** in the blank in **dis + miss_ ble**.)

So the word **dismissible** is spelled **d-i-s-m-i-s-s-i-b-l-e**.

Script #17: **al** vs. **le** Rule

Many words end with the sound "uhl." Some of these are spelled **al** and some are spelled **le**. Here's a simple rule to keep those spellings straight.

Listen. **al** is a morphograph, but **le** is part of other morphographs.

Once again. **al** is a morphograph, but **le** is part of other morphographs.

(Write **re + fuse** on the board.)

These are complete morphographs.

(Write + **al** after **re + fuse**: **re + fuse + al**.)

So we add **al**. We remember the final vowel rule and spell **refusal**: **r-e-f-u-s-a-l**.

(Write **amp** on the board.)

This is not a complete morphograph.

(Write **le** after **amp**: **ample**.)

The entire morphograph is **ample**. **Ample** is the base morphograph.

So **ample** is spelled: **a-m-p-l-e**.

(Write **brute** on the board.)

This is a complete morphograph, so we add **al** or **el**.

(Write + **al** after **brute**.)

So **brutal** is spelled... (spell it).

(Write **simp** on the board.)

This is not a complete morphograph, so we add **le**.

So **simple** is spelled... (spell it)

(Write **class + ic** on the board.)

These are complete morphographs, so we add **al**.

The **c** remains hard so we don't double it.

Classical is spelled...(spell it)

(Write **sett** on the board.)

This is not a complete morphograph, so we add **le**.

Settle is spelled...(spell it)

(Write **fab** on the board.)

This is not a complete morphograph, so we add **le**.

Fable is spelled...(spell it)

(Write **sign** on the board.)

This is a complete morphograph, so we add **al**.

Signal is spelled...(spell it)

(Write **shack** on the board.)

This one is tough. It is not a complete morphograph, so you add **le**.

Maybe you thought that **shackle** was **shack** + **al**. Actually, **shackle** has its strongest relationship to **shake**, not **shack**. So **shackle** has evolved to be just one morphograph.

Shackle is actually spelled...(spell it).

(When firm, go on to fluency.)

Script #18: Related **ize** vs. **ise** rule

In the last lesson, we learned that **al** is a morphograph that is added to other morphographs, but that **le** is part of other morphographs. The same is true about words that have an ending that sounds like "eyes," spelled **ize** or **ise**.

Listen. **ize** is a morphograph, but **ise** is part of other morphographs.

Once again. **ize** is a morphograph, but **ise** is part of other morphographs.

(Write **organ** on the board.)

This is a complete morphograph.

(Write + **ize** after **organ**: **organ + ize**.)

So we add **ize**. We spell **organize**: **o-r-g-a-n-i-z-e**.

(Write **adv** on the board.)

This is not a complete morphograph.

(Write **ise** after **adv**: **advise**.)

Vise is the base morphograph.

So **advise** is spelled: **a-d-v-i-s-e**.

(Write **ration + al** on the board.)

These are complete morphographs, so we add **ize**.

(Write + **ize** after **ration + al**.)

Rationalize is spelled... (spell it)

(Write **disgu** on the board.)

This is not a complete morphograph, so we add **ise**.

Guise is the base morphograph.

Disguise is spelled...(spell it)

(Write **vise + u + al** on the board.)

These are complete morphographs, so we add **ize**.

Visualize is spelled... (spell it)

(Write **compr** on the board.)

This is not a complete morphograph, so we add **ise**.

Comprise is spelled... (spell it)

(Write **surpr** on the board.)

Surprise is spelled (spell it).

(Write **real** on the board.)

Realize is spelled...(spell it)

(Write **com + prom** on the board.)

This one is tough. These are not actual morphographs.

(Change **com** + **prom** so that it reads **com** + **pro** + **m**____.)

Here's how **compromise** is really broken down into morphographs, missing one part of the final morphograph.

So **compromise** is spelled... (spell it)

(When firm, go on to fluency.)

Script #19: **ious** vs. **ous** Rule [By Linda Ross, adapted from Dixon, 1993]

One suffix that can give you trouble from time to time is **ous**. **ous** endings are often confused with **ious** endings.

Here's the rule. Add **ious** to words that have an "ee-us" or /sh/-us sound at the end. The /sh/-us sound occurs when **ious** follows a **c**, **t**, or **x**.

Listen again. Add **ious** to words that have an "ee-us" or /sh/-us sound at the end.

(Write **labor** on the board.)

This word is **laborious**.

It has an "ee-us" sound at the end.

(Write + **ious** after **labor**: **labor** + **ious**.)

So we spell **laborious**: **l-a-b-o-r-i-o-u-s**.

(Write **nutrit** on the board.)

This word is **nutritious**.

It has /sh/-us sound at the end.

(Write + **ious** after **nutrit**: **nutrit** + **ious**.)

So we spell **nutritious**: **n-u-t-r-i-t-i-o-u-s**.

(Write **humor** on the board.)

This word is **humorous**.

It does not have an "ee-us" or /sh/-us sound at the end

(Write + **ous** after **humor**: **humor** + **ous**.)

So we spell **humorous**: **h-u-m-o-r-o-u-s**.

(Write **desire** on the board.)

This word is **desirous**.

It does not have an "ee-us" or /sh/-us sound at the end

(Write + **ous** after **desire**: **desire** + **ous**.)

So we remember the final **e** rule and spell **desirous**: **d-e-s-i-r-o-u-s**.

(Write **outrage** on the board.)

This word is **outrageous**.

It does not have an "ee-us" or /sh/-us sound at the end?

But it does have a soft **g** or /j/ sound.

(Write + **ous** after **outrage**: **outrage** + **ous**.)

So we remember to keep the final **e** and spell **outrageous**: **o-u-t-r-a-g-e-o-u-s**.

(Write **obnox** on the board.)

This word is **obnoxious**.

It has a /sh/-us sound at the end.

So we spell **obnoxious: o-b-n-o-x-i-o-u-s**.

Repeat with poisonous, victorious, advantageous, officious.

(When firm, go on to fluency.)

Script #20: **ion** vs **ian** Rule [By Linda Ross, adapted from Dixon, 1993]

In some words, it is easy to tell when to add **ian**, because the sound at the end of the word is "ee-un." However, sometimes the endings **ion** and **ian** both take the sound /shun/. Here's an easy rule to help you remember when to use **ian** and when to use **ion**.

Listen. Use **ian** when the word refers to a person or people. Otherwise, use **ion**.
Listen again. Use **ian** when the word refers to a person or people. Otherwise, use **ion**.

(Write **techno** + **ic** on the board.)

This word is **technician**.

(Write + **ian** after **techno** + **ic**: **techno** + **ic** + **ian**.)

This word refers to a person, so we add **ian**.

We remember the final vowel rule, and spell **technician**: **t-e-c-h-n-i-c-i-a-n**.)

(Write **sect** on the board.)

This word is **section**.

(Write + **ion** after **sect**: **sect** + **ion**.)

This word does not refer to a person, so we add **ion**.

We spell **section**: **s-e-c-t-i-o-n**.

(Write **diet** + **ite** on the board.)

This word is **dietitian**.

This word refers to a person.

So we add **ian** and spell **dietitian**: **d-i-e-t-i-t-i-a-n**.

(Write **pro** + **mote** on the board.)

This word is **promotion**.

It does not refer to a person.

So we add **ion** and spell **promotion**: **p-r-o-m-o-t-i-o-n**.

(When firm, go on to fluency.)

Script #21: x drops s Rule [By Linda Ross, adapted from Dixon, 1993]

Many lessons back we learned that **x** acts like two consonant letters because it has two consonant sounds: /k/ and /s/. You can hear them when you say "**x**" to yourself: "eks."
 Here's a rule about the morphograph **ex**. When **ex** is followed by a morphograph that begins with an **s**, the **s** drops. We don't need it anymore because of the /s/ sound in **ex**.
 Listen. When **ex** is followed by an **s** morphograph, the **s** drops.
 Listen again. When **ex** is followed by an **s** morphograph, the **s** drops.

(Write **ex** + **spect** on the board.)
 There is **ex** in this word.
Ex is followed by an **s** morphograph.
 So we drop the **s** and spell **expect**: **e-x-p-e-c-t**.

(Write **ex** + **amine** on the board.)
 There is an **ex** in this word.
 But **ex** is not followed by an **s** morphograph.
 There's no **s** to drop, so we spell **examine**: **e-x-a-m-i-n-e**.

(Write **ex** + **sult** on the board.)
 There is an **ex** in this word.
 The **ex** is followed by an **s** morphograph.
 So we drop the **s** and spell **exult**: **e-x-u-l-t**.

(Write **ex** + **cept** on the board.)
 There is an **ex** in this word.
 But **ex** is not followed by an **s** morphograph, so we spell **except**: **e-x-c-e-p-t**.

(When firm, go on to fluency.)

Appendix D: Experimenter-designed Rate Tests/Practice Sheets (Version 1)

Rule 2 - Final vowel - Version 1

Name _____ Date _____ Time _____ Correct _____ L.D. _____

- | | |
|----------------------------|------------------------------|
| 1. vine +ing _____ | 26. labi + y _____ |
| 2. triend + less _____ | 27. fease + y _____ |
| 3. drade + ing _____ | 28. me+fine+ite+ion _____ |
| 4. en+cide+ent+al+ly _____ | 29. ese + able _____ |
| 5. poma + ing _____ | 30. tafe + ly _____ |
| 6. fre + par + ing _____ | 31. ace + y _____ |
| 7. gro + fess + ion _____ | 32. ip + para + ent _____ |
| 8. queize + ure _____ | 33. fre + place + ment _____ |
| 9. divil + ite + y _____ | 34. hace + ing _____ |
| 10. kiet + ed _____ | 35. numan + ness _____ |
| 11. mauthor + ing _____ | 36. hame + ly _____ |
| 12. cull + ness _____ | 37. sote + ing _____ |
| 13. vine +ing _____ | 38. ase + ed _____ |
| 14. dine + est _____ | 39. natire+ic+al _____ |
| 15. dide + ness _____ | 40. u + tone + ment _____ |
| 16. stotor + ing _____ | 41. loma + pare _____ |
| 17. nonu + y _____ | 42. ase + less _____ |
| 18. muace + y _____ | 43. ese + able _____ |
| 19. rerve + ing _____ | 44. cose + ing _____ |
| 20. se + late + ion _____ | 45. al+liter+ate _____ |
| 21. sact + ice + al _____ | 46. tin + cise + ion _____ |
| 22. troni + ed _____ | 47. mare + ful _____ |
| 23. pup + port + er _____ | 48. tare + less _____ |
| 24. on+spect+ion _____ | 49. natch + less _____ |
| 25. frea + sure + y _____ | 50. mope + ful _____ |

Rule 3 - Keeping Final e - Version 1

Name _____ Date _____ Time _____ Correct _____ L.D. _____

- | | |
|------------------------------|-------------------------------|
| 1. not + ice + able _____ | 26. re + place + ing _____ |
| 2. trace + able _____ | 27. know + ledge + able _____ |
| 3. mange + y _____ | 28. cour + age + ous _____ |
| 4. change + able _____ | 29. re + place + able _____ |
| 5. inter+change+able _____ | 30. change + ing _____ |
| 6. manage + ment _____ | 31. un+manu+age+able _____ |
| 7. know + ledge + able _____ | 32. cour + age + ous _____ |
| 8. cour + age + ous _____ | 33. ir+re+place+ment _____ |
| 9. ir+re+place+ment _____ | 34. out + rage + ed _____ |
| 10. out + rage + ous _____ | 35. change + able _____ |
| 11. serve + ice + able _____ | 36. un+manu+age+able _____ |
| 12. rage + ing _____ | 37. out +rage + ous _____ |
| 13. change + able _____ | 38. re + place + ed _____ |
| 14. anger + ed _____ | 39. ir+re+place+ment _____ |
| 15. ad+vant+age+ous _____ | 40. out + rage + ous _____ |
| 16. re + place + able _____ | 41. serve + ice _____ |
| 17. ir+re+place+ment _____ | 42. out + rage + ed _____ |
| 18. un+manu+age+able _____ | 43. re + place + able _____ |
| 19. cour + age + ous _____ | 44. ir+re+place+ment _____ |
| 20. ice + y _____ | 45. un+manu+age+able _____ |
| 21. not + ice + able _____ | 46. re + place + ing _____ |
| 22. trace + able _____ | 47. change + able _____ |
| 23. un+manu+age+able _____ | 48. ad+vant+age+ed _____ |
| 24. inter+change+ing _____ | 49. inter+change+able _____ |
| 25. out + rage + ed _____ | 50. un+manu+age+able _____ |

Rule 4 - Doubling Rule - Version 1

Name _____ Date _____ Time _____ Correct _____ L.D. _____

- | | |
|------------------------|------------------------|
| 1. trit + ing _____ | 26. lig + er _____ |
| 2. snak + ed _____ | 27. sliss + ful _____ |
| 3. lat + ed _____ | 28. stan + ing _____ |
| 4. rick + ness _____ | 29. pad + ness _____ |
| 5. thop + er _____ | 30. trand + ness _____ |
| 6. sime + less _____ | 31. gar + ed _____ |
| 7. stak + less _____ | 32. nad + ly _____ |
| 8. srip + ed _____ | 33. cot + er + _____ |
| 9. nop + ing _____ | 34. kig + er _____ |
| 10. nope + ing _____ | 35. mell + er _____ |
| 11. fad + ly _____ | 36. tun + er _____ |
| 12. kad + est _____ | 37. gop + ing _____ |
| 13. sich + est _____ | 38. grand + ly _____ |
| 14. sup + y _____ | 39. phan + ing _____ |
| 15. wim + er _____ | 40. larm + ing _____ |
| 16. thop + ed _____ | 41. trop + ed _____ |
| 17. thope + less _____ | 42. shope + ed _____ |
| 18. chop + ing _____ | 43. shot + est _____ |
| 19. chope + ing _____ | 44. mag + ed _____ |
| 20. rit + ing _____ | 45. tran + er _____ |
| 21. tate + ing _____ | 46. rad + est _____ |
| 22. stel + ing _____ | 47. skack + ed _____ |
| 23. quies + ly _____ | 48. ghad + en _____ |
| 24. trag + ed _____ | 49. thop + er _____ |
| 25. shay + ing _____ | 50. phap + ed _____ |

Rule 5 - Doubling rule with stressed morphographs - Version 1

Name _____ Date _____ Time _____ Correct _____ L.D. _____

- | | |
|------------------------------|------------------------------|
| 1. pro + pel + er _____ | 26. bene + fit + ed _____ |
| 2. un + heed + ed _____ | 27. re + fer + ed _____ |
| 3. re + lige + ence _____ | 28. in + fer + ence _____ |
| 4. eu + phem + ism _____ | 29. ad + mit + ance _____ |
| 5. chivel + ous _____ | 30. e + quip + ment _____ |
| 6. ex + pel + ing _____ | 31. ship + ment _____ |
| 7. de + ter + ed _____ | 32. over + state + ing _____ |
| 8. out + fit + ed _____ | 33. be + gin + er _____ |
| 9. eu + thanas + ia _____ | 34. re + pel + ion _____ |
| 10. dys + peps + ia _____ | 35. an + nul + ed _____ |
| 11. per + mit + ed _____ | 36. re + fer + ing _____ |
| 12. ad + mit + ance _____ | 37. re + pel + ant _____ |
| 13. re + cur + ence _____ | 38. e + quip + ed _____ |
| 14. photo + stat + ed _____ | 39. an + nul + ment _____ |
| 15. eu + logo + y _____ | 40. en + velope + ing _____ |
| 16. eu + geno + ic + s _____ | 41. re + fer + ed _____ |
| 17. for + bid + en _____ | 42. con + trol + able _____ |
| 18. con + trol + ing _____ | 43. ad + mit + ance _____ |
| 19. marvel + ous _____ | 44. pro + pel + ent _____ |
| 20. dys + enter + y _____ | 45. re + fer + ed _____ |
| 21. pro + pel + er _____ | 46. oc + cur + ence _____ |
| 22. ex + pel + ing _____ | 47. com + mit + ing _____ |
| 23. con + fer + ence _____ | 48. de + velop + er _____ |
| 24. re + fer + ence _____ | 49. in + habit + able _____ |
| 25. de + fer + ence _____ | 50. oc + cur + ence _____ |

Rule 6 - Doubling rule for compound words - Version 1

Name _____ Date _____ Time _____ Correct _____ L.D. _____

- | | |
|-----------------------------|----------------------------|
| 1. out + cry _____ | 26. ship + ment _____ |
| 2. fiz + ed _____ | 27. box+step+ed _____ |
| 3. joy + ous _____ | 28. over +turn+ed _____ |
| 4. over + step + ed _____ | 29. hoax +ing _____ |
| 5. slow + est _____ | 30. horse+whip+ing _____ |
| 6. wax + es _____ | 31. turbo+charge +ed _____ |
| 7. hand+slap+ed _____ | 32. coax +ed _____ |
| 8. over +turn+ed _____ | 33. blow +ing _____ |
| 9. whiz + ing _____ | 34. zig+zag+ing _____ |
| 10. stew + ed _____ | 35. stew +ing _____ |
| 11. stay + ing _____ | 36. hob+nob+ed _____ |
| 12. stay + ing _____ | 37. slay+ed _____ |
| 13. out +post +ed _____ | 38. chew +ing _____ |
| 14. out + fit + ed _____ | 39. e + quip + ment _____ |
| 15. show + ing _____ | 40. quiet +ing _____ |
| 16. box + er _____ | 41. down +trod +en _____ |
| 17. e+quip+ed _____ | 42. riff+raff+ed _____ |
| 18. play + ed _____ | 43. out + fit + ing _____ |
| 19. out + fit + ed _____ | 44. spine + less _____ |
| 20. rip +tide+ing _____ | 45. ship + ment _____ |
| 21. half+wit+ed _____ | 46. zig+zag+ed _____ |
| 22. show + er _____ | 47. horse + whip +ed _____ |
| 23. horse + whip + ed _____ | 48. over + step + ed _____ |
| 24. skin + less _____ | 49. joy + ous _____ |
| 25. out +wit+ed _____ | 50. box + er _____ |

Rule 7 - Y to I rule - Version 1

Name _____ Date _____ Time _____ Correct _____ L.D. _____

- | | |
|--------------------------------|----------------------------|
| 1. rorry + ed _____ | 26. culti+ply+ed _____ |
| 2. pony + ing _____ | 27. score + y + est _____ |
| 3. trisk + y + ness _____ | 28. hash + y + est _____ |
| 4. chuck + y + ly _____ | 29. sneady + est _____ |
| 5. percy + ful _____ | 30. pream + y + est _____ |
| 6. hurny + ing _____ | 31. sheave + y + est _____ |
| 7. dis + ploy + ed _____ | 32. dom + ply + ment _____ |
| 8. por + nay + al _____ | 33. shurry + ing _____ |
| 9. hemploy + er _____ | 34. pony + est _____ |
| 10. hity + ing _____ | 35. coly + er _____ |
| 11. re + sly + ed _____ | 36. scry + er _____ |
| 12. multi+cly+ic+ate+ion _____ | 37. stidy + ed _____ |
| 13. score + y + est _____ | 38. ploy + ful _____ |
| 14. ropy + er _____ | 39. schnofly + ness _____ |
| 15. flirt + y + est _____ | 40. clay + ing _____ |
| 16. trace + y + est _____ | 41. clay + er _____ |
| 17. stully + ing _____ | 42. koy + ish _____ |
| 18. troy + ed _____ | 43. kludy + ing _____ |
| 19. boy + er _____ | 44. bry + ly _____ |
| 20. pice + y + ly _____ | 45. shappy + ness _____ |
| 21. snarfy + al _____ | 46. sturdy + ness _____ |
| 22. im + play + ing _____ | 47. whorry + ed _____ |
| 23. hive + y + est _____ | 48. bly + er _____ |
| 24. pan + noy + ed _____ | 49. teal + er _____ |
| 25. ream + y + est _____ | 50. grote + ed _____ |

Rule 8 - Y to I rule for plurals and verbs - Version 1

Name _____ Date _____ Time _____ Correct _____ L.D. _____

- | | |
|----------------------------|---------------------------|
| 1. shay + (s/es) _____ | 26. kerry + (s/es) _____ |
| 2. lopy + (s/es) _____ | 27. glary + (s/es) _____ |
| 3. thorry + (s/es) _____ | 28. stedy + (s/es) _____ |
| 4. bory + (s/es) _____ | 29. mity + (s/es) _____ |
| 5. bloy + (s/es) _____ | 30. juy + (s/es) _____ |
| 6. kly + (s/es) _____ | 31. biby + (s/es) _____ |
| 7. narry + (s/es) _____ | 32. bloy + (s/es) _____ |
| 8. poy + (s/es) _____ | 33. snay + (s/es) _____ |
| 9. sray + (s/es) _____ | 34. sopy + (s/es) _____ |
| 10. blay + (s/es) _____ | 35. corry + (s/es) _____ |
| 11. kly + (s/es) _____ | 36. splay + (s/es) _____ |
| 12. ludy + (s/es) _____ | 37. forry + (s/es) _____ |
| 13. schtory + (s/es) _____ | 38. bly + (s/es) _____ |
| 14. gry + (s/es) _____ | 39. laby + (s/es) _____ |
| 15. morry + (s/es) _____ | 40. hoy + (s/es) _____ |
| 16. goy + (s/es) _____ | 41. gry + (s/es) _____ |
| 17. farry + (s/es) _____ | 42. sory + (s/es) _____ |
| 18. herry + (s/es) _____ | 43. phay + (s/es) _____ |
| 19. raby + (s/es) _____ | 44. charry + (s/es) _____ |
| 20. tity + (s/es) _____ | 45. coty + (s/es) _____ |
| 21. kry + (s/es) _____ | 46. ghoy + (s/es) _____ |
| 22. scray + (s/es) _____ | 47. pudy + (s/es) _____ |
| 23. roy + (s/es) _____ | 48. querry + (s/es) _____ |
| 24. cody + (s/es) _____ | 49. kray + (s/es) _____ |
| 25. shay + (s/es) _____ | 50. sry + (s/es) _____ |

Rule 9: Plural Variation - Version 1

Name _____ Date _____ Time _____ Correct _____ L.D. _____

- | | |
|-----------------------------|---------------------------|
| 1. meason + (s/es) _____ | 26. krash + (s/es) _____ |
| 2. trass + (s/es) _____ | 27. yox + (s/es) _____ |
| 3. trush + (s/es) _____ | 28. huzz + (s/es) _____ |
| 4. naby + (s/es) _____ | 29. bign + (s/es) _____ |
| 5. rox + (s/es) _____ | 30. tight + (s/es) _____ |
| 6. topy + (s/es) _____ | 31. max + (s/es) _____ |
| 7. nashion + (s/es) _____ | 32. wuzz + (s/es) _____ |
| 8. sich + (s/es) _____ | 33. gress + (s/es) _____ |
| 9. kass + (s/es) _____ | 34. trun + (s/es) _____ |
| 10. clanger + (s/es) _____ | 35. hox + (s/es) _____ |
| 11. trogress + (s/es) _____ | 36. trush + (s/es) _____ |
| 12. sary + (s/es) _____ | 37. fatch + (s/es) _____ |
| 13. tox + (s/es) _____ | 38. truzz + (s/es) _____ |
| 14. atory + (s/es) _____ | 39. san + (s/es) _____ |
| 15. biry + (s/es) _____ | 40. gother + (s/es) _____ |
| 16. sox + (s/es) _____ | 41. tress + (s/es) _____ |
| 17. vay + (s/es) _____ | 42. metch + (s/es) _____ |
| 18. mory + (s/es) _____ | 43. strox + (s/es) _____ |
| 19. triend + (s/es) _____ | 44. bl + (s/es) _____ |
| 20. flory + (s/es) _____ | 45. hopy + (s/es) _____ |
| 21. glay + (s/es) _____ | 46. sproy + (s/es) _____ |
| 22. snox + (s/es) _____ | 47. svay + (s/es) _____ |
| 23. stuzz + (s/es) _____ | 48. sporry + (s/es) _____ |
| 24. bap + (s/es) _____ | 49. swy + (s/es) _____ |
| 25. bretch + (s/es) _____ | 50. loy + (s/es) _____ |

Rule 10: Plural Variation "ves" - Version 1

Name _____ Date _____ Time _____ Correct _____ L.D. _____

1. dold _____

2. rife _____

3. toaf _____

4. niff _____

5. shief _____

6. welf _____

7. sold _____

8. snive _____

9. kolf _____

10. zife _____

11. peff _____

12. chalf _____

13. rieht _____

14. teafs _____

15. salf _____

16. shied _____

17. mife _____

18. hiff _____

19. taff _____

20. melf _____

21. noad _____

22. talf _____

23. beid _____

24. dolf _____

25. rife _____

26. khelf _____

27. wief _____

28. ceaf _____

29. lalf _____

30. xife _____

31. hief _____

32. mief _____

33. wuff _____

34. solf _____

35. suff _____

36. taff _____

37. beit _____

38. mald _____

39. cife _____

40. theff _____

41. tiff _____

42. bife _____

43. woff _____

44. holf _____

45. rold _____

46. hife _____

47. ralf _____

48. veff _____

49. melf _____

50. noff _____

Rule 11: contractions - Version 1

Name _____ Date _____ Time _____ Correct _____ L.D. _____

- | | |
|----------------------|---------------------|
| 1. phey are _____ | 26. mare not _____ |
| 2. tan not _____ | 27. nid not _____ |
| 3. shere not _____ | 28. mey are _____ |
| 4. mey will _____ | 29. ne have _____ |
| 5. chould not _____ | 30. sare not _____ |
| 6. bare not _____ | 31. te have _____ |
| 7. a have _____ | 32. hoes not _____ |
| 8. at is _____ | 33. mould not _____ |
| 9. wey will _____ | 34. che will _____ |
| 10. here not _____ | 35. swere not _____ |
| 11. thou will _____ | 36. hey are _____ |
| 12. wet us _____ | 37. hey have _____ |
| 13. chould not _____ | 38. the will _____ |
| 14. se will _____ | 39. phe is _____ |
| 15. dare not _____ | 40. noes not _____ |
| 16. yey had _____ | 41. shat is _____ |
| 17. thave not _____ | 42. bould not _____ |
| 18. met us _____ | 43. pan not _____ |
| 19. chat is _____ | 44. te will _____ |
| 20. tou have _____ | 45. gare not _____ |
| 21. noes not _____ | 46. bit is _____ |
| 22. the is _____ | 47. mere not _____ |
| 23. ne are _____ | 48. shey will _____ |
| 24. nit is _____ | 49. loes not _____ |
| 25. bat is _____ | 50. si have _____ |

Rule 12: en variation Version 1

Name _____ Date _____ Time _____ Correct _____ L.D. _____

- | | |
|------------------------|------------------------|
| 1. thow + en _____ | 26. prow + en _____ |
| 2. prow + en _____ | 27. chrow + en _____ |
| 3. slight + en _____ | 28. low + en _____ |
| 4. dow + en _____ | 29. mide + en _____ |
| 5. grove + en _____ | 30. snide + en _____ |
| 6. new + en _____ | 31. prow + en _____ |
| 7. jow + en _____ | 32. dow + en _____ |
| 8. mength + en _____ | 33. tad + en _____ |
| 9. phow + en _____ | 34. bide + en _____ |
| 10. drength + en _____ | 35. glow + en _____ |
| 11. mide + en _____ | 36. row + en _____ |
| 12. traight + en _____ | 37. phrow + en _____ |
| 13. bide + en _____ | 38. drength + en _____ |
| 14. glow + en _____ | 39. gresh + en _____ |
| 15. pow + en _____ | 40. few + en _____ |
| 16. tad + en _____ | 41. mide + en _____ |
| 17. row + en _____ | 42. traight + en _____ |
| 18. shon + en _____ | 43. row + en _____ |
| 19. tow + en _____ | 44. tad + en _____ |
| 20. snow + en _____ | 45. kide + en _____ |
| 21. flight + en _____ | 46. slength + en _____ |
| 22. row + en _____ | 47. prow + en _____ |
| 23. gresh + en _____ | 48. slight + en _____ |
| 24. tew + en _____ | 49. jow + en _____ |
| 25. slength + en _____ | 50. shon + en _____ |

Rule 13: al insertion Version 1

Name _____ Date _____ Time _____ Correct _____ L.D. _____

1. seal + y _____
2. eval + ly _____
3. bassic + ly _____
4. kasic + ly _____
5. flure + ly _____
6. slat + ly _____
7. hagic + ly _____
8. mopeful + ly _____
9. sat + ly _____
10. sute + ly _____
11. thysic + ly _____
12. maint + ly _____
13. leavy + ly _____
14. hologic + ly _____
15. quainful + ly _____
16. gick + ly _____
17. neroic + ly _____
18. slive + ly _____
19. raphic + ly _____
20. riendly + ly _____
21. masic + ly _____
22. sranform + er + ly _____
23. phief + ly _____
24. lartistic + ly _____
25. lory + ly _____

26. tragic + ly _____
27. welf + ly _____
28. plassic + ly _____
29. transic + ly _____
30. bofuse + ly _____
31. glasic + ly _____
32. dresse + ly _____
33. mefine + ly _____
34. chysic + ly _____
35. nopeful + ly _____
36. lasic + ly _____
37. bive + ly _____
38. grat + ly _____
39. chirst + y _____
40. tount + ly _____
41. plass + ly _____
42. chousand + ly _____
43. bick + ly _____
44. thopic + ly _____
45. mogic + ly _____
46. borgetful + ly _____
47. pathletic + ly _____
48. glush + ly _____
49. funic + ly _____
50. lasic + ly _____

Rule 14: add k - Version 1

Name _____ Date _____ Time _____ Correct _____ L.D. _____

- | | |
|----------------------------|-------------------------------|
| 1. picnic + ing _____ | 26. manic + al + ly _____ |
| 2. tragic + al + ly _____ | 27. paradoxical + ly _____ |
| 3. colic + y _____ | 28. garlic + y _____ |
| 4. panic + y _____ | 29. quizzical + al _____ |
| 5. frolic + ing _____ | 30. picnic + ing _____ |
| 6. garlic + y _____ | 31. panic + y _____ |
| 7. heroic + al _____ | 32. mystic + al _____ |
| 8. garlic + y _____ | 33. music + al _____ |
| 9. picnic + s _____ | 34. colic + y _____ |
| 10. phonic + s _____ | 35. sonic + s _____ |
| 11. panic + ing _____ | 36. panic + s _____ |
| 12. panic + y _____ | 37. intrinsic + al + ly _____ |
| 13. picnic + ing _____ | 38. quizzical + al _____ |
| 14. traffic + er _____ | 39. picnic + ing _____ |
| 15. colic + y _____ | 40. traffic + s _____ |
| 16. mystic + al _____ | 41. colic + y _____ |
| 17. traffic + er _____ | 42. phonic + al + ly _____ |
| 18. sonic + s _____ | 43. frolic + ing _____ |
| 19. tragic + al + ly _____ | 44. maniac + al _____ |
| 20. frolic + ing _____ | 45. traffic + er _____ |
| 21. picnic + ing _____ | 46. heroic + al + ly _____ |
| 22. panic + s _____ | 47. frolic + ing _____ |
| 23. frolic + ing _____ | 48. garlic + y _____ |
| 24. mystic + al _____ | 49. music + al _____ |
| 25. phonic + al + ly _____ | 50. ascetic + al + ly _____ |

Rules 15: or/er rule Version 1

Name _____ Date _____ Time _____ Correct _____ L.D. _____

- | | |
|-------------------------------|--------------------------------|
| 1. fact + (or/er) _____ | 26. perform + (or/er) _____ |
| 2. design + (or/er) _____ | 27. protect + (or/er) _____ |
| 3. photograph + (or/er) _____ | 28. direct + (or/er) _____ |
| 4. speak + (or/er) _____ | 29. inspect + (or/er) _____ |
| 5. act + (or/er) _____ | 30. review + (or/er) _____ |
| 6. invent + (or/er) _____ | 31. dictate + (or/er) _____ |
| 7. detract + (or/er) _____ | 32. propel + (or/er) _____ |
| 8. plant + (or/er) _____ | 33. farmer + (or/er) _____ |
| 9. transgress + (or/er) _____ | 34. collect + (or/er) _____ |
| 10. revise + (or/er) _____ | 35. supervise + (or/er) _____ |
| 11. light + (or/er) _____ | 36. report + (or/er) _____ |
| 12. abh + (or/er) _____ | 37. profess + (or/er) _____ |
| 13. bant + (or/er) _____ | 38. dictate + (or/er) _____ |
| 14. stretch + (or/er) _____ | 39. detect + (or/er) _____ |
| 15. contract + (or/er) _____ | 40. elevate + (or/er) _____ |
| 16. report + (or/er) _____ | 41. exhibit + (or/er) _____ |
| 17. vise + (or/er) _____ | 42. strengthen + (or/er) _____ |
| 18. invent + (or/er) _____ | 43. rotate + (or/er) _____ |
| 19. misspell + (or/er) _____ | 44. illustrate + (or/er) _____ |
| 20. confess + (or/er) _____ | 45. deceive + (or/er) _____ |
| 21. inject + (or/er) _____ | 46. attack + (or/er) _____ |
| 22. vise + (or/er) _____ | 47. instruct + (or/er) _____ |
| 23. profess + (or/er) _____ | 48. inspect + (or/er) _____ |
| 24. review + (or/er) _____ | 49. office + (or/er) _____ |
| 25. contract + (or/er) _____ | 50. climb + (or/er) _____ |

Rule 16: able vs. ible - Version 1

Name _____ Date _____ Time _____ Correct _____ L.D. _____

- | | |
|----------------------------------|----------------------------------|
| 1. aud (ible/able) _____ | 26. comprehend (ible/able) _____ |
| 2. inscrut (ible/able) _____ | 27. digest (ible/able) _____ |
| 3. combust (ible/able) _____ | 28. avail (ible/able) _____ |
| 4. commend (ible/able) _____ | 29. excite (ible/able) _____ |
| 5. cred (ible/able) _____ | 30. invis (ible/able) _____ |
| 6. culp (ible/able) _____ | 31. deduct (ible/able) _____ |
| 7. formid (ible/able) _____ | 32. leg (ible/able) _____ |
| 8. impecc (ible/able) _____ | 33. prob (ible/able) _____ |
| 9. implaus (ible/able) _____ | 34. deny (ible/able) _____ |
| 10. impression (ible/able) _____ | 35. correct (ible/able) _____ |
| 11. comprehend (ible/able) _____ | 36. dismiss (ible/able) _____ |
| 12. impregn (ible/able) _____ | 37. defense (ible/able) _____ |
| 13. inconceive (ible/able) _____ | 38. deduct (ible/able) _____ |
| 14. controvert (ible/able) _____ | 39. illeg (ible/able) _____ |
| 15. dispute (ible/able) _____ | 40. combust (ible/able) _____ |
| 16. question (ible/able) _____ | 41. reverse (ible/able) _____ |
| 17. indefatig (ible/able) _____ | 42. unrely (ible/able) _____ |
| 18. inexor (ible/able) _____ | 43. ostense (ible/able) _____ |
| 19. inimit (ible/able) _____ | 44. irresponse (ible/able) _____ |
| 20. innumer (ible/able) _____ | 45. conceive (ible/able) _____ |
| 21. insati (ible/able) _____ | 46. tang (ible/able) _____ |
| 22. neglig (ible/able) _____ | 47. immute (ible/able) _____ |
| 23. intract (ible/able) _____ | 48. vulner (ible/able) _____ |
| 24. irasc (ible/able) _____ | 49. verit (ible/able) _____ |
| 25. laud (ible/able) _____ | 50. vener (ible/able) _____ |

Rule 17: al vs le Version 1

Name _____ Date _____ Time _____ Correct _____ L.D. _____

- | | |
|--------------------------------|--------------------------------|
| 1. scrup (al/le) _____ | 26. vand (al/le) _____ |
| 2. skeptic (al/le) _____ | 27. universe (al/le) _____ |
| 3. liter (al/le) _____ | 28. theoretic (al/le) _____ |
| 4. arab (al/le) _____ | 29. bubb (al/le) _____ |
| 5. irration (al/le) _____ | 30. tangib (al/le) _____ |
| 6. subt (al/le) _____ | 31. superfici (al/le) _____ |
| 7. audib (al/le) _____ | 32. squabb (al/le) _____ |
| 8. symmetric (al/le) _____ | 33. scrup (al/le) _____ |
| 9. combustib (al/le) _____ | 34. satiric (al/le) _____ |
| 10. convention (al/le) _____ | 35. proverbi (al/le) _____ |
| 11. trivi (al/le) _____ | 36. radic (al/le) _____ |
| 12. cordi (al/le) _____ | 37. nett (al/le) _____ |
| 13. convivi (al/le) _____ | 38. premordi (al/le) _____ |
| 14. unethic (al/le) _____ | 39. mystic (al/le) _____ |
| 15. cynic (al/le) _____ | 40. methodic (al/le) _____ |
| 16. ritu (al/le) _____ | 41. mediev (al/le) _____ |
| 17. culpab (al/le) _____ | 42. ineffectu (al/le) _____ |
| 18. affab (al/le) _____ | 43. jovi (al/le) _____ |
| 19. disgrunt (al/le) _____ | 44. dismant (al/le) _____ |
| 20. alchemic (al/le) _____ | 45. integr (al/le) _____ |
| 21. estimab (al/le) _____ | 46. conspiritori (al/le) _____ |
| 22. amiab (al/le) _____ | 47. impermeab (al/le) _____ |
| 23. fick (al/le) _____ | 48. attributab (al/le) _____ |
| 24. antithetic + (al/le) _____ | 49. grapp (al/le) _____ |
| 25. musc (al/le) _____ | 50. pick (al/le) _____ |

Rule 18: ise vs. ize Version 1

Name _____ Date _____ Time _____ Correct _____ L.D. _____

- | | |
|------------------------------|-----------------------------|
| 1. synthes (ize/ise) _____ | 26. idol (ize/ise) _____ |
| 2. scrutin (ize/ise) _____ | 27. compr (ize/ise) _____ |
| 3. surm (ize/ise) _____ | 28. modern (ize/ise) _____ |
| 4. revival (ize/ise) _____ | 29. prophes (ize/ise) _____ |
| 5. scandal (ize/ise) _____ | 30. surpr (ize/ise) _____ |
| 6. mesmer (ize/ise) _____ | 31. rev (ize/ise) _____ |
| 7. gu (ize/ise) _____ | 32. repr (ize/ise) _____ |
| 8. galvan (ize/ise) _____ | 33. gu (ize/ise) _____ |
| 9. empath (ize/ise) _____ | 34. ostrac (ize/ise) _____ |
| 10. desp (ize/ise) _____ | 35. galvan (ize/ise) _____ |
| 11. comp (ize/ise) _____ | 36. appr (ize/ise) _____ |
| 12. categor (ize/ise) _____ | 37. capital (ize/ise) _____ |
| 13. appr (ize/ise) _____ | 38. reorgan (ize/ise) _____ |
| 14. antagon (ize/ise) _____ | 39. fertil (ize/ise) _____ |
| 15. priorit (ize/ise) _____ | 40. disgu (ize/ise) _____ |
| 16. disgu (ize/ise) _____ | 41. mesmer (ize/ise) _____ |
| 17. prophes (ize/ise) _____ | 42. scandal (ize/ise) _____ |
| 18. adv (ize/ise) _____ | 43. hypnot (ize/ise) _____ |
| 19. repr (ize/ise) _____ | 44. revival (ize/ise) _____ |
| 20. rational (ize/ise) _____ | 45. rev (ize/ise) _____ |
| 21. surm (ize/ise) _____ | 46. ostrac (ize/ise) _____ |
| 22. visual (ize/ise) _____ | 47. organ (ize/ise) _____ |
| 23. exerc (ize/ise) _____ | 48. scrutin (ize/ise) _____ |
| 24. fertil (ize/ise) _____ | 49. exerc (ize/ise) _____ |
| 25. caps (ize/ise) _____ | 50. synthes (ize/ise) _____ |

Rule 19: ious vs. ous - Version 1

Name _____ Date _____ Time _____ Correct _____ L.D. _____

- | | |
|------------------------------------|------------------------------------|
| 1. avarice + (ious/ous) = _____ | 26. conscient + (ious/ous) = _____ |
| 2. continue + (ious/ous) = _____ | 27. magnanim + (ious/ous) = _____ |
| 3. obnox + (ious/ous) = _____ | 28. victory + (ious/ous) = _____ |
| 4. ardu + (ious/ous) = _____ | 29. innocu + (ious/ous) = _____ |
| 5. cope + (ious/ous) = _____ | 30. egreg + (ious/ous) = _____ |
| 6. outrage + (ious/ous) = _____ | 31. surreptit + (ious/ous) = _____ |
| 7. nutrit + (ious/ous) = _____ | 32. moment + (ious/ous) = _____ |
| 8. advantage + (ious/ous) = _____ | 33. offic + (ious/ous) = _____ |
| 9. victory + (ious/ous) = _____ | 34. assidu + (ious/ous) = _____ |
| 10. humor + (ious/ous) = _____ | 35. nox + (ious/ous) = _____ |
| 11. ingenu + (ious/ous) = _____ | 36. desire + (ious/ous) = _____ |
| 12. continue + (ious/ous) = _____ | 37. anonym + (ious/ous) = _____ |
| 13. ostentat + (ious/ous) = _____ | 38. vivac + (ious/ous) = _____ |
| 14. felicit + (ious/ous) = _____ | 39. frivol + (ious/ous) = _____ |
| 15. prodigy + (ious/ous) = _____ | 40. vigor + (ious/ous) = _____ |
| 16. moment + (ious/ous) = _____ | 41. nutrit + (ious/ous) = _____ |
| 17. offic + (ious/ous) = _____ | 42. zeal + (ious/ous) = _____ |
| 18. peril + (ious/ous) = _____ | 43. victory + (ious/ous) = _____ |
| 19. judic + (ious/ous) = _____ | 44. covet + (ious/ous) = _____ |
| 20. victory + (ious/ous) = _____ | 45. offic + (ious/ous) = _____ |
| 21. surreptit + (ious/ous) = _____ | 46. omin + (ious/ous) = _____ |
| 22. ambigu + (ious/ous) = _____ | 47. obnox + (ious/ous) = _____ |
| 23. illustr + (ious/ous) = _____ | 48. meticu + (ious/ous) = _____ |
| 24. vapor + (ious/ous) = _____ | 49. labor + (ious/ous) = _____ |
| 25. loquac + (ious/ous) = _____ | 50. mystery + (ious/ous) = _____ |

Rule 20: ion vs. ian - Version 1

Name _____ Date _____ Time _____ Correct _____ L.D. _____

- | | |
|------------------------------------|------------------------------------|
| 1. statistic+(ion/ian) = _____ | 26. dissect + (ion/ian) = _____ |
| 2. enunciate+(ion/ian) = _____ | 27. music + (ion/ian) = _____ |
| 3. vivisect + (ion/ian) = _____ | 28. mortic + (ion/ian) = _____ |
| 4. obstetric+(ion/ian) = _____ | 29. petit +(ion/ian) = _____ |
| 5. barbar + (ion/ian) = _____ | 30. desolate+(ion/ian) = _____ |
| 6. guard + (ion/ian) = _____ | 31. derise + (ion/ian) = _____ |
| 7. insinuate +(ion/ian) = _____ | 32. ambit +(ion/ian) = _____ |
| 8. except +(ion/ian) = _____ | 33. barbar + (ion/ian) = _____ |
| 9. volit + (ion/ian) = _____ | 34. electric + (ion/ian) = _____ |
| 10. technic + (ion/ian) = _____ | 35. equestr + (ion/ian) = _____ |
| 11. college + (ion/ian) = _____ | 36. admonit + (ion/ian) = _____ |
| 12. equestr +(ion/ian) = _____ | 37. quest + (ion/ian) = _____ |
| 13. admiss +(ion/ian) = _____ | 38. apprehense + (ion/ian) = _____ |
| 14. fabricate + (ion/ian) = _____ | 39. custod +(ion/ian) = _____ |
| 15. obstetric+(ion/ian) = _____ | 40. pedestr + (ion/ian) = _____ |
| 16. mathematic + (ion/ian) = _____ | 41. technic + (ion/ian) = _____ |
| 17. implicate + (ion/ian) = _____ | 42. alluse + (ion/ian) = _____ |
| 18. incarcerate +(ion/ian) = _____ | 43. statistic+(ion/ian) = _____ |
| 19. physic +(ion/ian) = _____ | 44. enunciate+(ion/ian) = _____ |
| 20. indignant + (ion/ian) = _____ | 45. dissect + (ion/ian) = _____ |
| 21. obstetric+(ion/ian) = _____ | 46. obstetric+(ion/ian) = _____ |
| 22. vivisect + (ion/ian) = _____ | 47. barbar + (ion/ian) = _____ |
| 23. lacerate + (ion/ian) = _____ | 48. petit + (ion/ian) = _____ |
| 24. dietite + (ion/ian) = _____ | 49. dietite + (ion/ian) = _____ |
| 25. guard+ (ion/ian) = _____ | 50. obfuscate + (ion/ian) = _____ |

Rule 21: x drops s - Version 1

Name _____ Date _____ Time _____ Correct _____ L.D. _____

1. e + vase + ive = _____
2. ex + stinct = _____
3. ex + sist = _____
4. ex + tra + vag + ant = _____
5. ex + saserbe + ate = _____
6. ex + stinct + ion = _____
7. ex + ot + ic = _____
8. ex + stent + ual = _____
9. ex + sege + sis = _____
10. ex + pose = _____
11. ex + secu + ute = _____
12. ex + sult + ate + ion = _____
13. ex + sasper + ate = _____
14. ex + cluse + ive = _____
15. e + voc + ate + ive = _____
16. ex + cept = _____
17. ex + stent + ual = _____
18. e + volu + ute + ion = _____
19. ex + sempt = _____
20. ex + sist + ence = _____
21. ex + cept + ion = _____
22. ex + plore = _____
23. ex + stinct + ion = _____
24. ex + quise + ite = _____
25. ex + port = _____
26. ex + sege + sis = _____
27. ex + stant = _____
28. ex + sist + ence = _____
29. ex + sasper + ate = _____
30. ex + ca + vate = _____
31. ex + sist + ence = _____
32. ex + saserbe + ate = _____
33. e + volu + ute + ion = _____
34. ex + stent + ion = _____
35. ex + sege + sis = _____
36. ex + semp + lar = _____
37. ex + stent + ual = _____
38. ex + secu + ute = _____
39. ex + tra + vag + ant = _____
40. ex + stinct + ion = _____
41. ex + sist = _____
42. ex + press = _____
43. e + voc + ate + ive = _____
44. ex + stent + ion = _____
45. ex + sten + u + ate = _____
46. ex + secu + ute = _____
47. e + vase + ive = _____
48. ex + stant = _____
49. ex + sist = _____
50. ex + stent + ual = _____

Appendix E: Experimenter-designed Endurance Test (Version 1)

Cumulative Rules - Version 1

Name _____ Date _____ Time _____ Correct _____ L.D. _____

1. chysic + ly = _____
2. dro + duce + ing = _____
3. inspect + (or/er) = _____
4. offic + (ious/ous) = _____
5. rox + (s/es) = _____
6. ex + stinct + ion = _____
7. know + ledge + able = _____
8. prow + en = _____
9. shey are _____
10. re + sly + ed = _____
11. pol + i + tic + (ion/ian) = _____
12. com + pre + hense + (ible/able) = _____
13. ex + sasper + ate = _____
14. bene + fit + ed = _____
15. over + step + ed = _____
16. ve + cise + ion = _____
17. picnic + ing = _____
18. snuff _____
19. ex + sempt = _____
20. nop + ing = _____
21. re + place + able = _____
22. shack + (al/le) = _____
23. sopy + (s/es) = _____
24. adv + (ize/ise) = _____
25. boy + er = _____
26. snak + ed = _____
27. re + fuse + (al/le) = _____
28. slength + en = _____
29. barbar + (ion/ian) = _____
30. pigra + ate = _____
31. pro + pel + er = _____
32. pro + pel + (or/er) = _____
33. huzz + (s/es) = _____
34. panic + y = _____
35. cour + age + ous = _____
36. fertile + (ize/ise) = _____
37. ex + stent + ual = _____
38. hasgic + ly = _____
39. re + verse + (ible/able) = _____
40. vise + u + al + (ize/ise) = _____
41. re + fer + ed = _____
42. labor + (ious/ous) = _____
43. rorry + ed = _____
44. ex + stent + ion = _____
45. avail + (ible/able) = _____
46. juy + (s/es) = _____
47. te will _____
48. riot + (ious/ous) = _____
49. fiz + ed = _____
50. wulf _____

Appendix F: Experimenter-designed Application Test (Version 1)

Write the following words into a sentence. You will have ten sec to complete each sentence.

Rule 1	Rule 2	Rule 3	Rule 4	Rule 5
likable	migrate	traceable	saddest	committed
phoned	manage	courageous	hopping	conferring
baby	adequate	outrageous	shopped	abhorrence
preparing	manual	irreplaceable	swimmer	concurred
dining	music	unmanageable	batter	expelled
moped	cyclic	advantageous	runny	controlling
Rule 6	Rule 7	Rule 8	Rule 9	Rule 10
horsewhipped	pitiful	carries	matches	leaves
chewing	copied	delays	brushes	thieves
overstepped	fanciful	monkeys	passes	lives
quizzed	friskiness	trophies	boxes	wolves
taxes	fried	plays	fizzes	knives
boxer	happiness	strawberries	patches	calves
Rule 11	Rule 12	Rule 13	Rule 14	Rule 15
wasn't	blown	magically	picnicking	photographer
you'll	thrown	graphically	trafficking	transgressor
shouldn't	grown	logically	panicky	instructor
he's	straighten	physically	garlicky	performer
hasn't	freshen	musically	frolicking	contractor
couldn't	happen	manically	trafficker	composer

Rule 16

horrible
sizable
legible
reversible
excitable
deductible

Rule 17

refusal
ample
classical
settle
triple
brutal

Rule 18

organize
advise
visualize
revise
surprise
rationalize

Rule 19

laborious
humorous
desirous
obnoxious
nutritious
ambiguous

Rule 20

promotion
mortician
musician
desolation
barbarian
revolution

Rule 21

expect
examine
exult
extinction
execute
exist

