Now I Know My АБВ's:
A Comparison of Inductive and Deductive Methods of Teaching on the Acquisition of the Cyrillic Alphabet

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Abstract

The study was designed to compare the effects of inductive verse deductive teaching methods on acquisition of the Russian alphabet. Inductive instruction refers to methods in which learners are first exposed to examples and then asked to extrapolate a rule from the example, whereas deductive instruction refers to methods in which learners are presented with a rule from the start. Eighty participants were randomly divided into two instructional groups, one receiving deductive instruction and the other receiving inductive instruction. Participants were given a pretest on Russian words and given instruction on the Cyrillic alphabet based on an inductive or a deductive lesson plan. A post-test was then administered. The results indicated the inductive group performed significantly higher than those in the deductive group on Cyrillic alphabet acquisition. Pedagogical implications are discussed.

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Learning the Cyrillic alphabet is among the first orders of business in any beginning Russian language class. A significant amount of instruction in the first weeks of elementary courses centers on learning to recognize, write, and pronounce the letters of the Russian alphabet. Each of the four currently available introductory Russian textbooks (*Golosa, Nachalo, Live from Moscow,* and *Troika*[i]) begins with an introduction to the alphabet, offering numerous exercises to help learners make appropriate sound-symbol correspondences. While each

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[i] *Russkij jazyk dlja vsekh* is excluded from this discussion, as it is no longer in print.

textbook varies slightly in the sequence in which letters are presented, the basic approach to alphabet instruction is essentially the same: letters are introduced individually before learners attempt to decipher words[ii]. This approach is essentially *deductive*, a teaching method in which the instructor explains a rule at the beginning of instruction and only then gives students an opportunity to practice with the rule (Norris and Ortega 2000). However, results from the present study suggest that *inductive*[iii] methods, in which learners are first exposed to instances of language use and then required to derive the rules from those examples (DeCoo 1996; Gollin 1998; Norris and Ortega 2000), may lead to quicker and more accurate acquisition of the Cyrillic alphabet.

The terms "deduction" and "induction" are used differently when applied to learning of an alphabetic system. Deduction generally involves presentation of a single rule followed by examples of that rule, whereas induction involves extrapolation of a single underlying rule from a number of examples. However, an orthographic system does not have a single underlying principle; it is composed of individual graphemes. Therefore, we will apply the term "induction" to describe an approach in which learners first see letters in context and are then guided on their own to discover the sound-symbol correspondences. "Deduction" will refer to an approach in which learners arefirst taught the sounds of individual symbols and then apply them to deciphering whole words.

Relevant Literature

The teaching and learning of the Russian alphabet is an area that has been largely ignored in the research literature. A small number of articles were

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[ii] The structure of *Nachalo* allows for an inductive presentation of the alphabet. It opens with illustrated dialogues of informal greetings. The dialogues are recorded on the accompanying audio CD so that students can listen to the tapes, read the dialogues, and independently decipher the sound-symbol correspondences. The instructor's manual, however, recommends a *deductive* approach to teaching the alphabet. *Golosa* also includes an optional inductive presentation of the alphabet on its supplementary website.

[iii] The term "induction" has many uses in the literature, ranging from situations in which the instructor verbalizes the rule at the end of discussion to more implicit methods of instruction in which the rule is never verbalized by instructor or student, nor do students receive instruction to look for a rule. For purposes of this discussion we will consider induction to be an explicit approach to language teaching, in which learners are guided to discover a rule with the help of an instructor, who does verbalize the rule at the end of the instructional session.

published on the topic between 1967 and 1990. With the exception of Crother and Suppe's (1967) study on the effectiveness of including phonemic transcriptions in alphabet instruction[iv], there has been no empirical research comparing different teaching methods. A few articles, (eg., Leaver 1984; Arant 1978; Guzdik 1990) present approaches to teaching the Cyrillic alphabet (which are essentially deductive), but do not empirically examine the effectiveness of the particular method. While there is a large literature on the teaching of literacy skills to Russian children (see for example Goretskii, Kiriusin, & Fedosova 2003; Betenkova 2005), it is primarily composed of methodological notes for teachers.

There is a similar dearth of research on the teaching of other foreign alphabets. Numerous studies investigate the learning of syllabary and ideographic alphabets, examining such questions as the role of metalinguistic awareness and linguistic knowledge in the processing of orthographic meaning (Li, Anderson, Nagy, and Zhang 2002; Xu, and Potter 1999) or the effects of the L1 orthographic system on L2 reading (Wang, Koda, and Perfetti 2002; Koda 2007). However, only a very few have investigated methods of teaching the alphabetic system. One study (Werdelin 1968) examined the effects of induction and deduction on the acquisition of the Arabic alphabet. Werdelin's experiments involved three groups of learners: one receiving deductive instruction (e.g.,"instruction in principle before application to examples"), a second receiving inductive instruction ("examples followed by principle clarification and supplemented by further examples"), and a third receiving no explicit instruction (e.g., "examples only"). The study found that learners in the deductive group performed significantly better on a test requiring them to transcribe from Arabic to English immediately following instruction. However, learners in the deductive group did not perform as well on tests that required slightly different skills (transcribing from English to Arabic), and their performance significantly decreased when similar tests were administered two weeks later. On the other hand, the group that received no instruction (e.g., they saw only examples with no verbalization of the rules) was superior in the areas of retention and transfer. This study, together with Crother and Suppes' research (1967) are the only available empirical studies investigating the effectiveness of particular methods of teaching foreign alphabets.

[iv] Crothers and Suppes found that phonemic transcriptions interfered with learning the sound equivalents for Cyrillic letters.

This gap in the research is of particular concern in light of a recent study by Comer and Murphy-Lee (2004), which draws attention to the importance of learning the sound representations of Cyrillic letters. Their study found that the earlier students acquire letter-sound knowledge, the better they perform in introductory Russian courses. Similar results have been found in studies of first language literacy, where letter sound-knowledge is considered one of the best predictors of preschool children's reading acquisition (see Foy and Mann 2006 for an overview).

While there is very little data specific to learning the Cyrillic alphabet, or to the learning of foreign orthographic systems in general, there is some literature on the efficacy of inductive and deductive approaches to language teaching that can inform the present study. However, many of the studies on the effectiveness of deductive and inductive approaches to grammar instruction have been inconclusive, at best. Several studies (e.g., Robinson 1996; Seliger 1975) have found an advantage for deductive approaches to teaching of particular grammatical features, while others (e.g., Herron and Tomasello 1992) have found inductive approaches to be more effective. Yet other studies (e.g., Rosa & O'Neill 1999 and Shaffer 1989) have found no significant differences for either approach. Erlam's (2003) study of the acquisition of French direct objects found that learners who received deductive instruction performed better on most measures of explicit learning. However, learners who received inductive instruction performed better on measures assessing morphological, rather than syntactical features. Combined methods (e.g., Hsiao, 1999) produced only marginally better scores than exclusively inductive or deductive designs.

In 1975, Hammerly posited that inductive instruction may be more effective for teaching simple grammatical constructions. Subsequent research findings, however, have been contradictory. Shaffer (1989), DeKeyser (1995), and Sprang (2003) found that an inductive approach produced better results among subjects learning complex grammatical concepts. Sun and Wang (2003), on the other hand, found that *deductive* instruction is more appropriate for difficult concepts, whereas an *inductive* approach produces higher test scores when simpler concepts are presented.

Another important question in the literature concerns the appropriateness of deductive or inductive instruction for particular audiences. Rivers (1975) asserts that deductive approaches may be more appropriate for

mature, well-motivated students, whereas inductive instruction may be more appropriate for younger language learners. Ausubel (1963) and Carroll (1964) have asserted that an inductive approach is unsuitable for weaker students, who will not be able to puzzle out the underlying patterns. They offer no empirical evidence to support this claim, however. In fact, Shaffer's (1989) study contradicted this claim; she found that an inductive approach is particularly beneficial for weaker students.

This brief overview of the literature on induction and deduction demonstrates that the issues surrounding the methods are far from resolved. Norris and Ortega (2000, 2006) suggest further research and recommend short instructional interventions that may "yield greater observed effects than do longer interventions" (p. 501). They also encourage the use of simpler research designs with fewer variables, asserting that investigation of too many variables in comparison studies results in a weak test of the features of interest. The present study follows Norris and Ortega's suggestions. It compares the effects of deductive and inductive teaching methods on the acquisition of a single, simple linguistic feature of the Russian language. It uses a very short instructional intervention (less than twenty minutes), and focuses on only one variable— method of instruction. This simple, practical study may provide more clearly defined results than those presented in the existing research. The results of the present study may also shed some light on the much-debated question regarding which approach is more effective when teaching simple linguistic elements, and it may also be directly applicable to the design of alphabet instruction in entry-level Russian courses.

Research Design

Participants

This study used a convenience sample drawn primarily from undergraduate students at Brigham Young University. It is important to note that the research participants were not studying Russian; rather they were recruited in undergraduate psychology courses. The total number of participants was eighty. Subjects were randomly assigned to one of two

groupsⱽ—one received an inductive treatment of the alphabet, while the other received deductive treatment. Thirty-eight participants were in the deductive group, with forty-two in the inductive group. Because this study used a convenience sample, participants could not be matched on such variables as gender, age, or previous language learning background. Instead, we randomly assigned students to the treatment groups to compensate for any effects such variables may have had on the outcomes.

Procedures

The experiment was conducted on three separate occasions in Fall 2006. In order to control for any effects of live instruction and interaction, the instructional sessions were recorded on audio CD with accompanying handouts and PowerPoint slide shows. A pre-test was administered before instruction began and a post-test was administered immediately after. The purpose of the pre-test was to control for any effects of guessing. Logistical constraints prevented administration of a post-test with time delay, so there was no way to measure long-term retention of the alphabet. Six participants who scored 100 percent on the pre-test were eliminated from the study.

Pre-Test and Post-Test. A pre-test (Appendix A) was administered immediately before instruction, and a post-test (Appendix B) was administered directly after. Both tests consisted of ten randomly named geographical locations. With one exception, the words on both tests were different (one word, *Даллас* was repeated on the post-test). Students heard the locations read aloud on a CD, and noted the order in which the words were read.

Our choice of aural recognition rather than oral production for evaluation was dictated by practical concerns. Requiring students to produce the sounds would have involved more time and technological resources than were readily available. Aural recognition is an important component in the learning of an orthographic system, and such recognition exercises proliferate in first-year Russian textbooks.

ⱽ To ensure randomization, participants were assigned an entry from a table of uniform random numbers. Students who were assigned an even number were taught the alphabet inductively; students who were assigned an odd number were taught deductively.

Deductive procedures. Participants in the deductive group saw letters of the Russian alphabet on a PowerPoint screen as the letter was pronounced on the accompanying CD. Letters were divided into four groups: 1) letters that look and sound like their English counterparts, 2) letters that look like English letters but have different sounds, 3) letters derived from the Greek alphabet, and 4) miscellaneous letters. After each group of letters, learners were instructed to sound out a series of words on their handouts. After a pause of approximately three seconds, the words were read aloud on the audio CD to allow learners to check their recognition. Students in this group read a total of thirty-three words. The entire deductive procedure took just over five minutes, not counting the administration of pre- and post-tests. All materials used in the deductive group are available in Appendix C.

Inductive procedures. The materials for the inductive presentation were adapted from "The Story of Эрик" (Robin *et. al* 2006)[vi] available on *Golosa's* supplemental website. This is an English story about a college Russian student, in which Russian cognates or other Russian words easily recognized from context are embedded. The story was adapted to include the name of the students' own university and the city and state in which it is located. This particular method was chosen for time efficiency over another inductive method such as that in *Nachalo*, where students could read along with several dialogues of greeting on CD. Our choice meant that students did not have to decipher the meanings of unfamiliar words. Instead they heard cognates of familiar words in context, and thus all of their attention could be directed to learning the letters of the alphabet. (See Appendix D for all materials used in the inductive group.)

After following along with the story, learners had a chance to review each word individually. The words were written out on their handouts and then read aloud on CD, with pauses in between to allow students to sound out the words. Following this presentation, learners were instructed to find the letter that made a given sound. After a short pause of three seconds, the correct letter was flashed on a slide to allow learners to discover whether or not they had guessed accurately. Participants were then given a chance to sound out individual words that they had not yet seen or heard. As with the deductive instruction, learners were given two to three seconds to decipher the word before they heard the

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[vi] The Story of Эрик appeared in the first edition textbook of *Golosa*. It is not included in subsequent editions.

word on the CD. The participants in the inductive group heard a total of forty-four words in Russian, some of them repeated more than once.

The inductive instruction took approximately 20 percent longer (seven minutes as opposed to five minutes) than the deductive instruction. While we could have controlled for this in the research design, it was our choice to approximate as closely as possible an actual lesson. We also included a verbalization of the sound-symbol correspondences, which is an option in inductive language teaching (see Erlam 2003). In this case, we wanted learners not only to draw hypotheses about sound-symbol correspondences, but to have the opportunity to learn whether or not their assumptions were correct. A chance to test their hypotheses was of particular importance for learning sound-symbol correspondences, as vowel reduction and devoicing alter the pronunciation of letters within the context of whole words.

Statistical Analysis. We first calculated the mean scores for each group on the pre-test and the post-test. Next, we calculated the difference between each group on the two tests. Finally, we measured the statistical significance of the difference by means of an independent two-sample t-test.

Findings

The mean pre-test scores were 3.76 out of 10 for the deductive group, and 3.4 for the inductive group. Mean post-test scores were 6.97 (out of 10) for the deductive group and 7.76 for the inductive group. The deductive group had a mean difference between the pre-test and post-test scores of 3.21 (on a 10-point scale) with a standard deviation of 2.83. For the inductive group, the mean difference was 4.36 with a standard deviation of 2.69. The effect size was $d=.70$, indicating a strong effect. In testing for one-way significance, a t-value of 1.86 was compared to the critical value of t at 1.67 with 78 degrees of freedom. The p–value of .03 indicates a significant difference. A repeated measures t-test was not used, as a simple t-test yielded a low p-value; a repeated measures test would have only shown more statistical significance. Table 1 displays the mean scores on the pre- and post-tests for each group, and Table 2 shows the difference between the pre- and post-tests for both groups.

Table 1

	Deductive Group	Inductive Group	Difference between Deductive and Inductive
Pre-Test Mean	3.76	3.40	-0.36
Post-Test Mean	6.97	7.76	0.79
Improvement Mean	3.21	4.36	1.15

Table 2
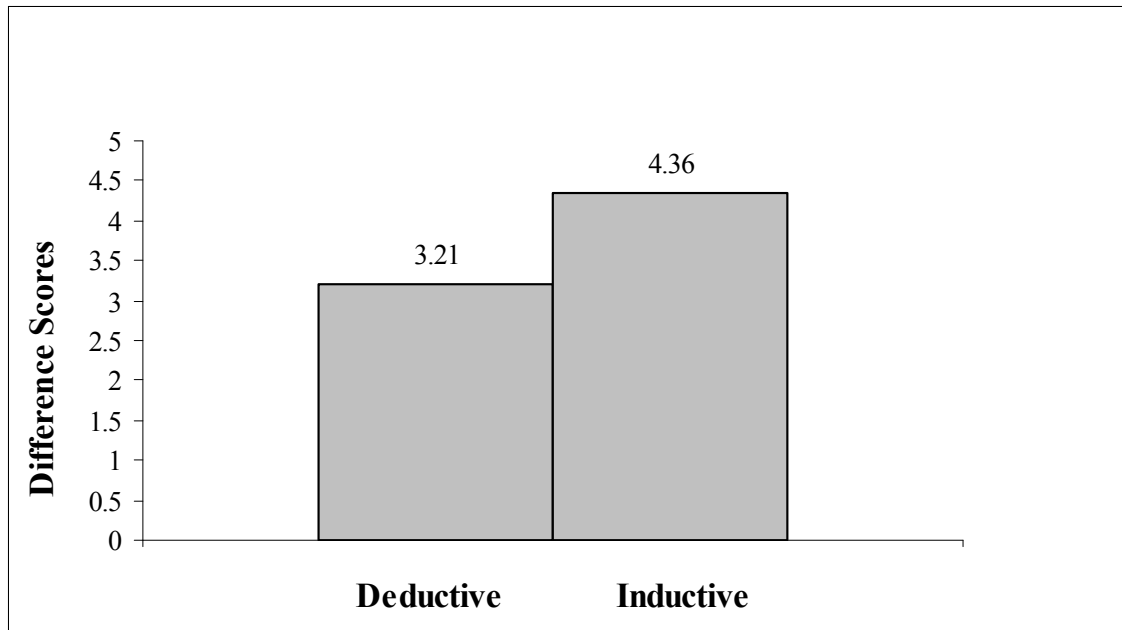
Discussion

The data indicate a significant positive effect for inductive instruction on the acquisition of the Cyrillic alphabet. This finding is substantial, in light of the fact that most first-year textbooks employ a deductive approach to teaching the alphabet. These findings also suggest that inductive approaches are particularly useful for teaching very simple target language concepts. Certainly the findings of this study are significant enough to suggest that the question of methods of teaching the Cyrillic alphabet merits further investigation.

A number of factors may have influenced the outcome of this study. One of the reasons why participants in the inductive group may have performed better on the post-test is that they spent 20 percent more time on the task than did the deductive group. This possibility, however, does not undermine the findings of the present study, as it is generally accepted that inductive teaching methods are more time-consuming than deductive teaching methods. If it is time on task that is the best predictor of success, then inductive methods may be preferred, precisely because of the additional time such methods imply.

Another factor that may have affected the results of this study is the fact that learners in the inductive group were exposed to forty-four Russian words, while the learners in the deductive group saw only thirty-three, or 25 percent fewer words. To control for these effects, further studies should include more words in the deductive treatment group. It is worth bearing in mind, however, that inductive approaches to language instruction naturally utilize numerous examples of the target lexical or grammatical feature in order to allow learners to induce the rule on their own, whereas deductive instruction requires few—if any—examples. Using more examples in a deductive approach may lead to greater learning precisely because it allows learners to draw their own conclusions about the feature at hand.

Another potential concern with the study is the question of the pre- and post-tests. The instruments used to measure learning in this study may have been too easy. Thirty-nine of the participants (48.8 percent) scored 100 percent on the post-test. This suggests a flaw in the design of the instrument, which might be remedied in future investigations. In spite of the ceiling effects, the data in this study yielded a high degree of statistical significance in favor of the inductive group.

Context, too, may have played a role in the better performance of learners in the inductive group. Learners heard a series of words in the context of a narrative. The words were also of particular relevance to their lives as students, since the name of their university and its city and state were given in the target language. The language teaching profession has long recognized the importance of context in teaching languages (e.g., Omaggio Hadley 2001). Context has been found to enhance comprehension of written or spoken language, as well as to enhance acquisition of grammar (see Omaggio Hadley 2001 for an overview of research).

Next Steps. This study has demonstrated significant effects for some aspects of inductive instruction for teaching a simple linguistic feature, in this case the Russian orthographic system. In order to verify the results of this investigation, we suggest that further studies are warranted. A longer study involving actual students of Russian with appropriately-spaced follow-up testing will help elucidate the effects of inductive versus deductive instruction for long-term retention of the Cyrillic alphabet.

This study used a simple statistical design, and therefore did not control for potentially confounding factors such as gender, age, aptitude, prior foreign language experience, and learning style. Future investigations should examine the interactions of these factors with inductive and deductive instruction and acquisition of linguistic features. However, Norris and Ortega (2000) recommend against using multiple variables in a single experiment. Instead they suggest that "interactions of variables should be investigated systematically across multiple experiments" (p. 497).

Pedagogical implications. We approach the pedagogical implications for this study with caution, aware that teachers rarely introduce the alphabet in isolation, whether the textbook does or not. In Russian language courses, teachers provide learners with aural, visual, and textual materials from the very first day, materials which provide context and enrich the learning experience. Our findings suggest introducing letters within words and words within a narrative or dialogic framework may be more effective than introducing letters individually. Using words that have personal relevance to the particular population of students (such as the name of the university and the town and state in which it is located) may also influence learning. Additionally, more time on task and more exposure to the graphemes in the context of words appear to lead to greater immediate retention of the alphabet. Increasing time on task and the number of total words to which learners are exposed during the initial learning stage may help students to learn the sound-symbol correspondences more quickly. Since Comer and Lee's (2004) investigation suggests that early mastery of sound-symbol correspondences predicts success in beginning Russian courses, methods that lead to more rapid and accurate learning of the alphabet should be seriously considered.

Conclusions

The findings of this study suggest a significant positive effect for inductive instruction on acquisition of the Cyrillic alphabet, which may have been enhanced by the use of words in a narrative context and exposure to a larger number of words. While we do not wish to purport that teachers should use only inductive methods for teaching the alphabet—or any other linguistic feature, for that matter—we suggest that incorporating some aspects of inductive instruction, particularly using words in context, may lead to more rapid acquisition of the alphabet. We also assert that the question of how to teach foreign alphabets should be given more serious consideration by both researchers and educators alike.

Appendix A: Pre-Test

You will hear a list of geographic locations. Number each location in the order it is read. You will hear the list twice.

____Голландия	____Венгрия
____Вермонт	____Орегон
____Португалия	____Даллас
____Бостон	____Бразилия
____Филадельфия	____Норвегия

Appendix B: Post Test

You will hear a list of geographic locations. Number the locations in the order they are read. You will hear the list twice.

___Замбия	___Даллас
___Бразилия	___Венесуэла
___Виктория	___Дания
___Германия	___Голландия
___Эквадор	___Зимбабве

Appendix C: Deductive Presentation

Several letters of the Russian alphabet look and sound very similar to their English counterparts:

А а
К к
М м
О о
Т т
С с

Try reading the following words:

1. мама
2. кот
3. атака
4. маска
5. такт

Other letters are what we call "false friends." They look like English letters, but represent different sounds:

В в
Е е
Н н
У у
Р р

Try to sound out the following words, which you will probably recognize:

1. камера
2. момент
3. ветеран
4. Москва
5. контракт
6. трактор
7. нос
8. Вермонт

Still other letters come from the Greek alphabet. You may recognize some of these letters from mathematical or scientific terminology, or if you've ever been around fraternity houses:

П п
Г г
Д д
Л л
Ф ф

Now try to read the following cognates:

1. папа
2. *Даллас*
3. *лампа*
4. донор

5. Флорида
6. кенгуру
7. телеграмма
8. панорама

And, of course, there are a number of letters in Russian that are unlike any other letters you've seen. Some of these are:

З з
Б б
Э э
И и
Ю ю
Я я

Try reading the following words to yourself:

1. аппетит
2. философия
3. Япония
4. Россия
5. бизнес
6. Юпитер

7. экватор
8. гитара
9. зебра
10. Америка
11. юмор
12. *дипломат*

Appendix C: Inductive Presentation Materials

The Story of Eric

Эрик is from the город of Сан Диего in the штат of Калифорния. His мама, *Лара*, is a профессор of история at the local университет. His папа, Виктор, is a бизнесмен at a local фирма. Эрик has an older сестра, Анна, who studies

биология and зоология at the университет of Висконсин in Мадисон. She volunteers at a nearby зоопарк, and especially enjoys working with the the тигр and the зебра.

Эрик is attending the Университет of Бригам Янг in the город of Прово, in the штат of Юта. Эрик studies русский язык and русская литература. He especially likes the work of Гоголь, because he has a unique sense of юмор.

Эрик decided to go on study abroad to improve his русский язык. Now he lives in Москва, the capital of Россия. He lives with his host mother, Наталья. He thinks that Москва is a great город, but he looks forward to returning to Прово, Юта to finish his studies.

Now let's review some of the words from the story. Try reading them to yourself first:

1. Эрик	12. Виктор	23. зебра
2. город	13. бизнесмен	24. XXX
3. Сан Диего	14. фирма	25. XXX
4. штат	15. сестра	26. XXX
5. Калифорния	16. Анна	27. русский язык
6. мама	17. биология	28. русская литература
7. Лара	18. зоология	29. Гоголь
8. профессор	19. Висконсин	30. юмор
9. история	20. Мадисон	31. Москва
10. университет	21. зоопарк	32. Россия
11. папа	22. тигр	33. Наталья

Go back and try to found the letters that make the sounds you will hear.

Try to sound out the following words:

1. суп	5. футбол	9. баскетбол
2. момент	6. панорама	10. Гватемала
3. пропаганда	7. Япония	11. ветеран
4. физика	8. Юпитер	

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