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When to Pull Back the Curtain: Approaches to Inductive and Deductive Language Instruction in an e-Learning Setting

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Abstract

Rosetta Stone is a language-learning software company with years of experience offering a wide variety of instructional design types for learners of various kinds and at different proficiency levels. In our experience teaching language online, we have discovered that the diversity and sheer number of discrete objectives that learners face in the process of acquiring a language suggest that not all learning objectives are best achieved using a single approach.

This perspective is supported by research in second language acquisition focused, for example, on the potential benefits of instruction with or without supporting explanation. Importantly, researchers have clarified the difference between implicit and explicit learning on the one hand, and inductive and deductive instructional treatment on the other, indicating a complex relationship that yields multiple distinct approaches.

In the classroom, teachers can attempt different approaches depending on how instruction is received by learners in real time. By contrast, delivering e-learning content means making a conscious commitment to a specific approach for a particular proficiency level or type of objective. How do we decide on the right approach? The choice must be made thoughtfully to ensure the best experience for the widest range of learners, in the context of software and other priorities and constraints.

Keywords: e-learning, inductive, deductive, curriculum

1. Introduction

Language is complex because human thought is complex. As children, we acquire the complexity of our native language naturally—but acquiring a second language rarely goes quite as smoothly. How do we structure learning content to maximize the efficiency and effectiveness of learning? Rosetta Stone, a worldwide provider of technology-based learning solutions, exists because our co-founder was dissatisfied with his efforts to learn foreign languages in a traditional classroom setting rooted in translation and the application of grammar rules. He became dedicated to the idea that an immersion learning environment could be effectively simulated with software.[1]

However, simulating such an environment requires careful curriculum design. Learners need just the right amount of challenge for their proficiency level.[2] For example, if content is delivered only in the target language (L2), to maintain an immersion experience, grammar explanations will likely be too advanced for novice learners. One way to avoid this problem is by eliminating grammar explanations altogether—but that design choice leads to other challenges.

Thus, the decision of whether to offer a supporting explanation for a particular feature of L2—in other words, to "pull back the curtain" for learners—can depend on a host of factors. A classroom teacher can choose to pull back the curtain as necessary, but an e-learning designer must commit ahead of time to a particular approach for a particular situation. This paper presents some design choices Rosetta Stone has made in the context of modern second-language acquisition perspectives and our 25-year product history.

2. Inductive and deductive learning

Inductive language learning requires learners to take examples as input and generate rules. In contrast, deductive learning requires learners to be given a set of rules and apply these to new situations.

It is important that the inductive/deductive distinction not be conflated with the implicit/explicit distinction. As DeKeyser notes, "inductive learning (going from the particular to the general, from examples to rules) and implicit learning (learning without awareness) are two orthogonal concepts."[3] In the same article, DeKeyser clarifies a salient difference: "an instructional treatment is explicit if rule explanation forms part of the instruction (deduction) or if learners are asked to attend to particular

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forms and try to find the rules themselves (induction).” By this standard, then, if these features are absent from instruction, the treatment would be considered implicit.[4]
Glaser points out that these orthogonal concepts can be combined to yield three possible pairs: inductive treatments can target implicit or explicit learning, and deductive treatments can target explicit learning (a fourth potential combination, a deductive treatment targeting implicit learning, makes no sense; see Fig. 1).[5]

	Explicit learning	Implicit learning
Deductive instruction	**Explicit-deductive**	(n/a)
Inductive instruction	**Explicit-inductive**	**Implicit-inductive**

Fig. 1. Possible relationships between explicit/implicit learning and deductive/inductive instruction. (Adapted from Glaser[6])

We can use this framework to label components of instruction in Rosetta Stone products. In the following sections we discuss critical design choices we’ve made and some lessons learned from those choices.

3. L2-only inductive treatment: novice learners

The “yellow-box” product now known in the consumer market as Learn Languages, first released over 10 years ago, continues to be an important offering for the company. One of the distinguishing features of this product is the complete lack of both translation and explanation in course activities, representing a strong commitment to inductive instruction. Content is structured to enable learners to derive meaning from patterns of images, sound, and text. The linear curriculum focuses first on simple vocabulary and concepts and then builds on that basis to model more abstract vocabulary and complex concepts.
Grammar is one aspect of language learning that can be difficult to teach in this fashion. Our initial approach identified areas in the course content where grammar concepts were foregrounded and provided learners with additional opportunities to interact with that content (see Figs. 2-3).

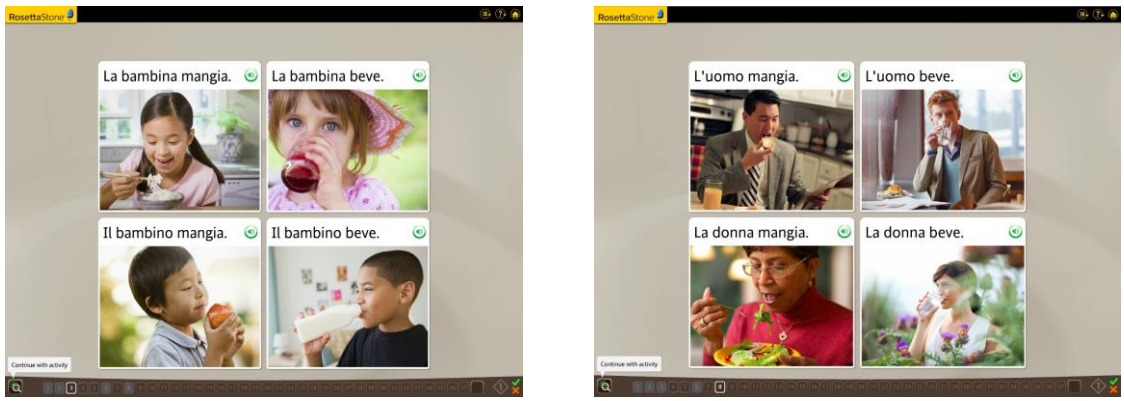

Fig. 2. In this Core Lesson from our Italian product, learners see screens introducing definite articles. Reprinted with permission from Rosetta Stone Ltd. ©1999-2017. All Rights Reserved.

Fig. 3. In the original grammar pedagogy, learners were shown the same text and images as in the Core Lesson and asked to demonstrate knowledge of forms. Reprinted with permission from Rosetta Stone Ltd. ©1999-2017. All Rights Reserved.

Learners were originally expected to use their inductive skills to develop an understanding of grammar, without being directed to attend to particular forms or structures. After significant internal user testing, however, we determined that this method was not optimal. Later language projects, therefore, explicitly encourage learners to direct their attention to specific forms and structures (see Fig. 4).

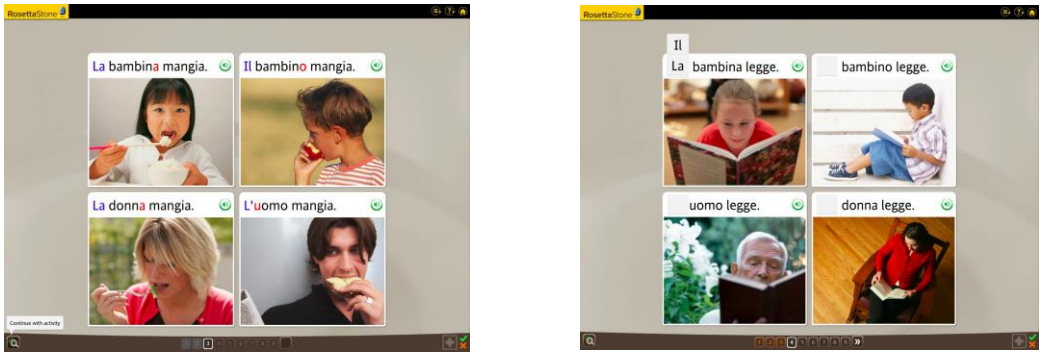

Fig. 4. In the revised grammar pedagogy, learners' attention is directed to specific forms using red and blue text (left) before learners are asked to demonstrate comprehension (right). Reprinted with permission from Rosetta Stone Ltd. ©1999-2017. All Rights Reserved.

The advantages of this inductive approach are numerous. Learners are encouraged from the outset to focus on how concepts relate to one another in L2 rather than via the L1. This is particularly important since many learners struggle to understand grammar rules presented explicitly. Furthermore, inductive rule discovery may engage learners better than deductive rule application.[7] This approach allows us to avoid the question of how to structure deductive-style explanation: whether it should be in L1 or L2, what level of metalinguistic knowledge we should assume, and how exhaustive the explanation should be.

However, there are drawbacks to this approach as well. Using images to teach vocabulary requires careful attention to the content of those images to ensure learners are not led astray by distractions or ambiguity. Sometimes, even simple grammar phenomena are difficult to model efficiently. Learners may not have the opportunity to familiarize themselves with as much vocabulary as they might with lists in the same amount of time. The approach puts a heavy burden on content creators to pattern content clearly enough to enable learners to discover rules and meaning on their own.

4. L2-only deductive treatment: the advanced business curriculum

Recently, Rosetta Stone has been developing solutions that better meet the needs of corporate and educational institutions. These clients require functionality beyond that required by the individual, casual learner, including the following features:

- Clearer, more discrete tracking of learner progress in the product
- More business-oriented content
- More intermediate- and advanced-level content

- A clear relationship between content and various standards, particularly Common European Framework of Reference (CEFR) proficiency levels[8]

To meet these needs, we decided to build new products. The intermediate and advanced business English curriculum (hereafter called “advanced business curriculum,” part of the Rosetta Stone Catalyst solution) relies on a pedagogical structure that is dramatically different from Learn Languages. Rather than encourage novice learners to follow a linear path from the simple and concrete to the complex and abstract, this curriculum asks more advanced learners what business-related goals they want to pursue and then offers bundles of lessons directed at those goals. Lessons can be completed in any order.

All lessons in this curriculum have a standard internal structure, which we call “Whole-Part-Whole”:

> In this application of Whole-Part-Whole, learners are exposed to language content in a real-life context (the whole), followed by explanations and examples that allow the learner to break down and more closely examine that content (the parts), and concluding with exercises and materials that allow the learner to create new output and utterances (the final whole).[9]

Although lessons contextualize learning objectives and vocabulary in introductory scenario videos, without explanations, the explanatory nature of other activities orients every lesson toward a more explicit, deductive treatment. Virtual “cards” in the Usage activity offer examples focusing on grammar, phonology, prosody, fixed or semi-fixed phrases, or aspects of business culture, followed by an explanation of the relevant features of those examples (see Fig. 5). Usage cards are followed by activities (Fig. 6) that allow learners to reinforce and demonstrate their understanding.

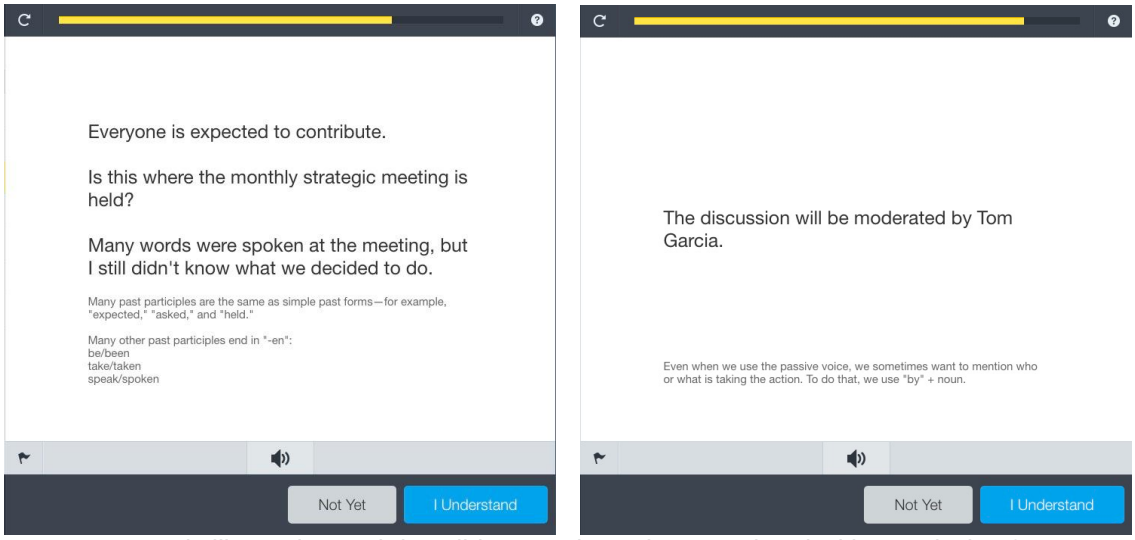

Fig. 5. Usage cards illustrating and describing passive voice. Reprinted with permission from Rosetta Stone Ltd. ©1999-2017. All Rights Reserved.

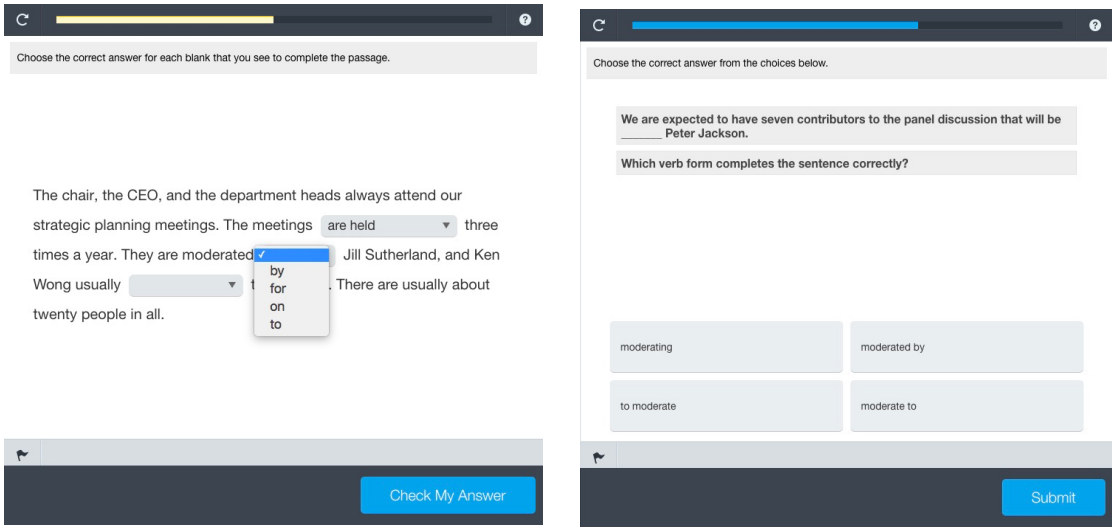

Fig. 6. Practice (left) and test question (right) addressing passive voice, from the same lesson as Fig. 5. Reprinted with permission from Rosetta Stone Ltd. ©1999-2017. All Rights Reserved.

This deductive approach has some clear advantages. First, potential ambiguity is reduced; more nuanced phenomena can be described and modeled accurately. Second, learner performance on specific objectives or vocabulary can be tracked more discretely, satisfying the requirements of program administrators and potentially giving learners better awareness of what they've learned. More generally, the flexible structure of this curriculum allows us to incorporate content-based, task-based, and other approaches to learning.[10]

However, there are also drawbacks. L2-only explanations are likely too difficult for beginners, restricting this approach to more advanced learners. Learners may not be as engaged when asked to apply rules rather than discover them. Explanations must be kept consistent across a wide swath of content to avoid confusion. Practice and test questions must be calibrated to ensure a scope consistent with explanations and an appropriate level of difficulty.

5. Conclusion

Rosetta Stone finds value in both inductive and deductive instructional treatments, with a deductive approach used more often for advanced learners, and an inductive approach more often for beginners. We continually analyze performance data to get a better sense of how our learners use our products, what gains they make, and how they feel their experience affects the real-life activities they perform.

Of course, even a product informed by a perfect scientific understanding of L2 acquisition would still be shaped by the real conditions under which it is developed. E-learning developers must contend with curriculum projects constrained by deadlines, budgets, software limitations, and user expectations. Effective curricula require advance awareness of, and planning for, the challenges of both pedagogy and software development.

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