



Linking Second Language Acquisition Research and Digital Language Learning

Detmar Meurers

University of Tübingen

based on collaborative research:

<http://icall-research.de>

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Introduction

- Schools going digital is a common topic in public discourse, e.g.:

Computers in all schools, all students at the computers – this is the program the ministers of education want to realize quickly.

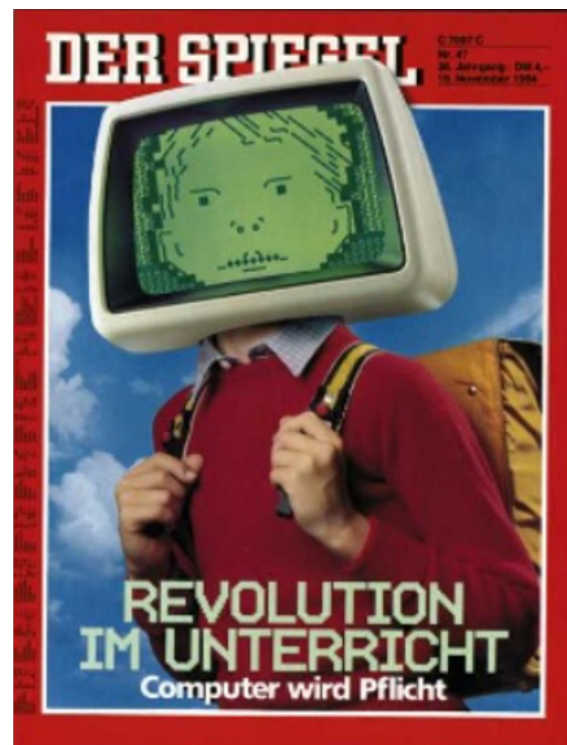


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[Spiegel No. 47 / 18.11.1984]





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- to increase **motivation** through authentic, multimedia material
 - authentic language material from the target language context (websites, audios, videos)
 - curated language learning material



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→ Computer are used to provide and exchange information & materials.



Beyond computers as digital materials

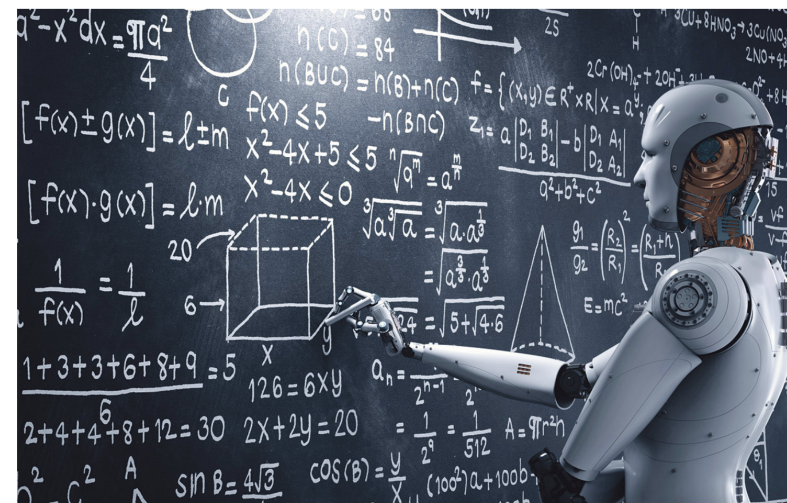
- More recently, Artificial Intelligence (AI) has become a popular buzzword in Education
 - esp. related to ChatGPT,
 - but usually illustrated with robots.

KI IN DER BILDUNG

DER DIGITALE LEHRER

Von Katharina Lehmann · 2021

Statt Frontalunterricht mit den gleichen Lerninhalten für über zwanzig Schüler zu geben, gehen KI-Systeme individuell auf die Lernbedürfnisse jedes einzelnen Schülers ein. Für Lehrer bedeutet das Entlastung – sie können sich vor allem um die Schüler kümmern, die ihre Hilfe am dringendsten brauchen.





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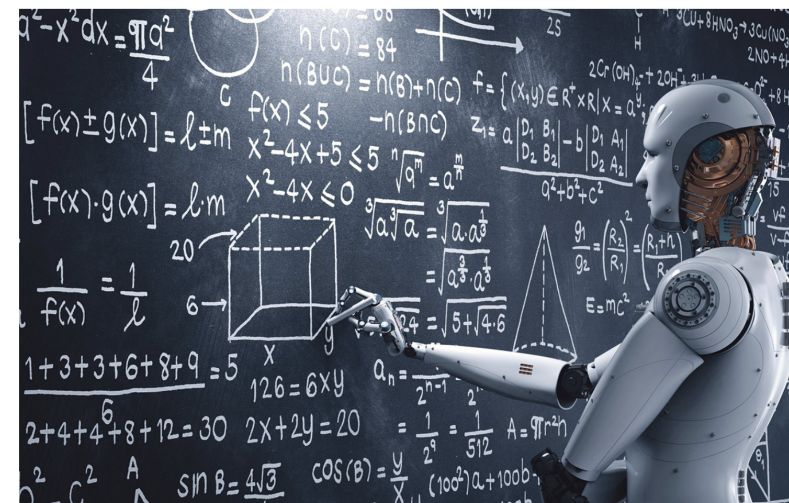
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 - esp. related to ChatGPT,
 - but usually illustrated with robots.
- What is AI and what opportunities can it potentially provide for (foreign language) education?

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 - limited: knowledge and rules not widely available & lack of robustness
- machine learning approach, since the 80s: systems learning from data
 - successful: (only) where a lot of data is available
 - limited: to make predictions, labeled training data is needed



What is Artificial Intelligence? (II)

- AI is increasingly used in practice since 2011: digital voice assistant Siri
 - typically hybrid approaches (“Don’t guess if you know.”)
 - digital assistants, dialog systems in cars, machine translation, recommender systems



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 - challenge: requires machine learning of billions of parameters
 - idea: use texts as “labeled” training data by predicting masked words
 - result: Large Language Models (LLM) trained on $\approx$ a billion words for GPT in 2018 to $\approx$ a trillion now



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Note: LLMs know about the world only through the language that they learn to predict.

“The boundaries of my language are the boundaries of my world.” (Wittgenstein)



Large Language Models in Practice: ChatGPT

- What can we already do with large language models?
- Potentially interesting opportunities for education.
 - Prompts support generating texts and dialogues
 - generating learning activities (and solving them)



Pretend to be an English tutor and teach me the difference between past perfect and simple past.



Hello! I'd be happy to help you understand the difference between the past perfect and the simple past tenses in English. Let's take a closer look at each one.



1. Simple Past:

The simple past tense is used to describe actions or events that occurred and were completed at a specific point in the past. It is often used with time expressions such as "yesterday," "last week," "in 2010," etc. The simple past tense is formed by adding "-ed" to the base form of regular verbs, or using the past form of irregular verbs.

Examples:

- She watched a movie last night. (regular verb)
- He ate his breakfast this morning. (irregular verb)

2. Past Perfect:

The past perfect tense is used to describe an action or event that was completed before



Limitations of Large Language Models

Being based on likely language sequences, systems such as ChatGPT cannot systematically

- provide reliable **knowledge**: GPT “hallucinates” whatever is needed to produce well-formed language
- perform **abstractions**: linguistic analysis, logical inferences
- detach from the social and cultural context of the language trained on → **bias**
- model **learners** and how to adaptively foster learning

Limitations: Linguistic analysis



Certainly! Let's practice using the simple past and past perfect tenses. I'll provide you with a short paragraph that has a few missing verbs. Your task is to fill in the blanks with the correct verb forms. Here's the paragraph:



Yesterday, Jane (1) her friend Mary for a coffee. Before they (2) each other, Jane (3) a book about a similar topic they (4) during their conversation. Jane (5) Mary about the book, and they (6) an interesting discussion about it.

Fill in the blanks using the following verbs in either simple past or past perfect tense: 'meet', 'read', 'have', 'discuss', 'tell', 'finish'.

Remember to consider whether the action was completed in the past or if it happened before another action in the past. Good luck!



1 meet



Great, you've got the first one correct! The simple past tense is used for actions completed in the past. Now try filling in the rest of the blanks with the correct verb forms. Here's the paragraph again with the first verb filled in:



Limitations: Linguistic analysis (II)



Apologies for the confusion, and you are absolutely right! The correct past form of "meet" is "met." Here's the corrected paragraph with the first verb filled in:  

Yesterday, Jane met her friend Mary for a coffee. Before they (2) each other, Jane (3) a book about a similar topic they (4) during their conversation. Jane (5) Mary about the book, and they (6) an interesting discussion about it.

Please proceed with filling in the remaining blanks.



2 have met



Good job! You've used the past perfect tense correctly for the second verb, showing that the action of meeting happened before another action in the past. Here's the updated paragraph:  

Yesterday, Jane met her friend Mary for a coffee. Before they had met each other, Jane (3) a

Limitations: Bias

+

New chat

🗨️

Buying in WhatsApp groups.

🗨️

Social Media Argument.

🗨️

Social Media Test.

✎️

🗑️

🗨️

Uniforms in Schools.

🗨️

School Uniforms Debate.

🗨️

Social media in Shakespeare

🗨️

Social media and Shakespeare

🗨️

Teaching Comment Writing.

🗨️

Social media's potential impac

🗑️

Clear conversations

👤

My plan

⚙️

Settings

📖

Get help

🚪

Log out

Model: GPT-4



Create a class test about social media.



Title: Social Media Test

👍

💬

Name: _____
Date: _____

Instructions: This test consists of 20 questions related to social media. Read each question carefully and choose the best answer from the options provided. You have 60 minutes to complete the test. Good luck!

Multiple Choice Questions (2 points each):

1. Which of the following is NOT a common feature of social media platforms?

a) User profiles
b) Instant messaging
c) Algorithmic news feed
d) Automatic dishwashing

2. In terms of social media, what does UGC stand for?

a) User-Generated Content
b) Universal Graphics Consortium
c) Unique Geographic Coordinates

🔄 Regenerate response

Send a message...

➤

ChatGPT Mar 23 Version.

ChatGPT may produce inaccurate information about people, places, or facts.

Limitations: Bias (II)

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chat.openai.com/c/fb8cc496-c61a-4340-821b-ae592975784f

c) Astroturfing

d) Phishing

True or False (1 point each):

11. True or False: Social media platforms can have both positive and negative effects on mental health.

12. True or False: Social media algorithms are designed to show users only the content they agree with.

13. True or False: Social media platforms have no responsibility for the content posted by their users.

14. True or False: Instagram and Snapchat are examples of image-based social media platforms.

15. True or False: It is impossible to make a living through social media.

Short Answer Questions (3 points each):

16. Briefly explain the concept of "FOMO" and how it relates to social media.

17. Describe two potential risks associated with oversharing personal information on social media platforms.

18. Name two ways businesses can use social media for marketing purposes.

19. Explain the term "echo chamber" in the context of social media.

20. List three benefits of using social media for educational purposes.

Regenerate response

Send a message...

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Towards AI-based tools for foreign language learning

- Digitalization and AI are not values in themselves – it is essential to consider
 - what concretely we want to facilitate,
 - to solve which real desiderata of the educational context,
 - based on which scientific insights into learning and teaching (SLA, psychology, pedagogy, . . .).



What do we want to facilitate?

- **Interactivity**

- facilitate interactive activities and tutorial dialogue
- provide feedback, stepwise leading to successful task completion



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⇒ How? It requires AI methods to

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- model **learners** and their development towards the curricular **learning goals**
- analyze and generate adaptive learning **activities**



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⇒ Why? To support individual learners (and teachers)

- How is this grounded in research on the mechanisms of foreign language learning?



Research on Foreign Language Teaching & Learning

- Systematic Second Language Acquisition Research (SLA)
 - since the 60s (Corder 1967; Selinker 1972)
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 - foundational SLA research, Instructed SLA (ISLA), Foreign Language Teaching and Learning (FLTL)



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- What key factors have been identified, and how can digitalization become relevant for those?
 - Input
 - Noticing and Focus-on-Form
 - Practice, Feedback
 - Output, Interaction

and the importance of Individual Differences in all of this.



Key Factors: **Input**

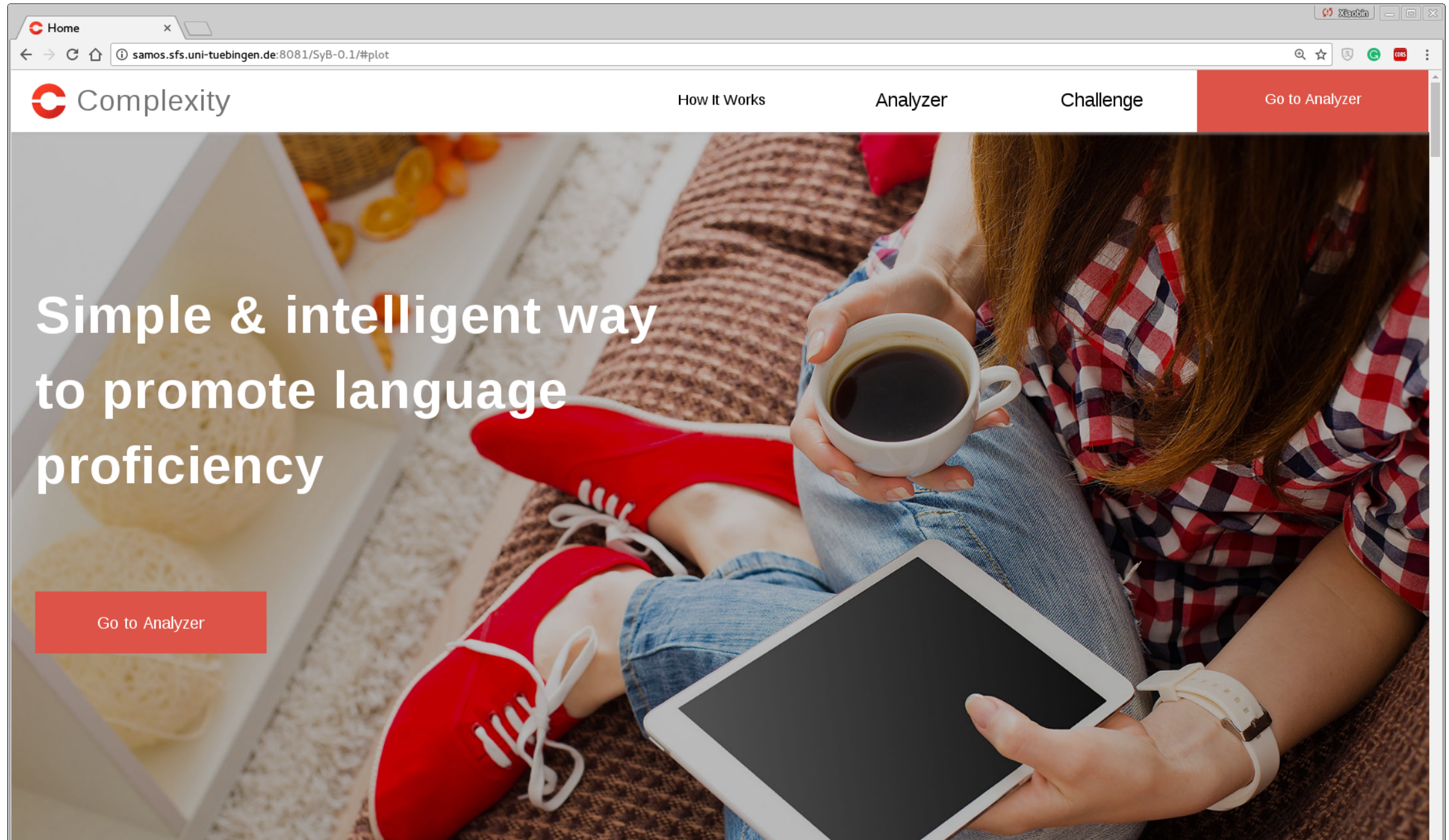
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 - access to comprehensible input at $i+1$ is essential
 - input should be one step more complex than the interlanguage of the learner



Key Factors: **Input**

- **Input Hypothesis** (Krashen 1985)
 - access to comprehensible input at $i+1$ is essential
 - input should be one step more complex than the interlanguage of the learner
- ⇒ AI-based digital tools can help us search for $i+1$ input:
 - SyB: Syntactic Benchmark (<http://complexity.schule>, Chen & Meurers 2019)
 - FLAIR (<http://flair.schule>, Chinkina & Meurers 2016)

SyB: Syntactic Benchmark (<http://complexity.schule>, Chen & Meurers 2017)

A screenshot of a web browser displaying the SyB website. The browser's address bar shows the URL 'samos.sfs.uni-tuebingen.de:8081/SyB-0.1/#plot'. The website has a white header with the 'Complexity' logo on the left and navigation links 'How It Works', 'Analyzer', and 'Challenge' in the center. A red button labeled 'Go to Analyzer' is on the right. The main content area features a background image of a person sitting on a couch, holding a cup of coffee and a tablet. Overlaid on the left side of this image is the text 'Simple & intelligent way to promote language proficiency' in white. A red button labeled 'Go to Analyzer' is also present in the bottom left of the main content area.

Home x

← → ↻ 🏠 samos.sfs.uni-tuebingen.de:8081/SyB-0.1/#plot 🔍 ☆ 🛡️ 🌐 📺

Complexity How It Works Analyzer Challenge [Go to Analyzer](#)

Simple & intelligent way
to promote language
proficiency

[Go to Analyzer](#)

Your Text

The children had three important traumatic experiences they went through. The gang violence and poverty at home, the dangers of travel and to be alone and illegal in the US. Also Lara saw gun violence, when she was a small child and had to change the neighbourhood, where everything was new for her. Both of them had the experience of violence at a little age but both of them got support. The children from the local shelters and the organisation KIND, who provides pro-bono lawyers to represent unaccompanied minors, and Lara from her dad, who tries to take of her fears. Because of him, Lara has the feeling of securunes. She wears a bullet prooffe capefrom a fairy tale, what tells her, her dad. The children feel secure in the shelters, where they get new clothes and other basic needs like food.

[Challenge](#)[Analyze](#)

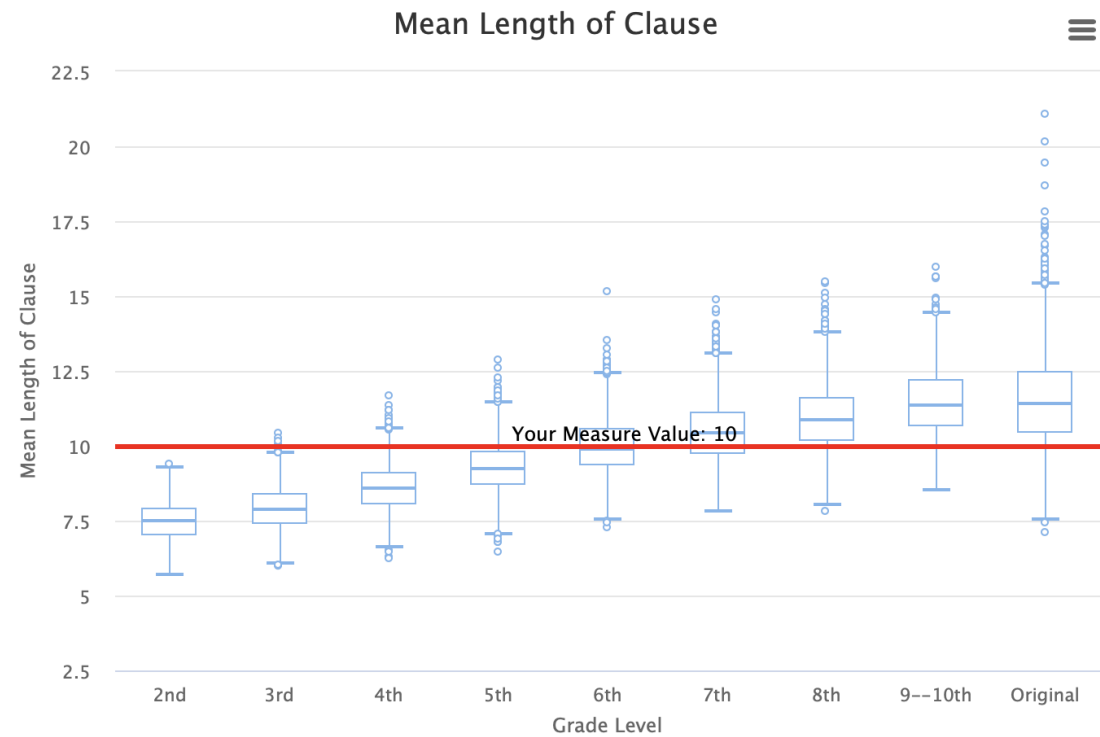
This text is used to scale your proficiency on the target levels. It will be analyzed automatically to identify the aspect of your language that needs to be further improved.

Your Position in Scale

Syntactic Measure:

Mean Length of Clause

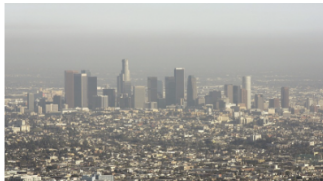
Challenge



Challenge Articles

All Grade Levels ▼

Challenge Level



Ozone pollution drifts over from Asia, shows up in the air over California

Target Measure: 11.54

CARMEL VALLEY, Calif. ? High above the Big Sur coast, atmospheric scientist Ian Faloona is detecting high levels of pollution on the edge of the continent. His findings are surprising because the place should have some of the country's cleanest air. From an astronomical observatory in the Santa Luci...

Grade Level: 9--10th



Educational gaming is catching on, especially in science class

Target Measure: 11.02

MILWAUKEE, Wis. ? The goal of the game "Citizen Science" is to save Lake Mendota in Wisconsin from pollution. To save the day, players must do all of the usual video game stunts, like travel through time or talk to animals. "Citizen Science" is just one of many video games developed by Games + Learn...

Grade Level: 7th



Latin America becoming fertile ground for online university courses

Target Measure: 11.20

ARMENIA, El Salvador ? Roosenberth Palacios sports braces on his teeth and a curly mop of hair. At 16, he finds high school boring. So after school, he logs onto his computer and hunts for challenges. He's found them in difficult online courses offered by professors at Stanford University and Massac...

Grade Level: Original

Challenge Articles

All Grade Levels ▼

Challenge Level



U.N. working group suggests U.S. work on racial reconciliation

Target Measure: 16.32

WASHINGTON ? The United States should consider reparations to African-American descendants of slavery, establish a national human rights commission and publicly acknowledge that the trans-Atlantic slave trade was a crime against humanity, a United Nations working group said Friday. The U.N. Working ...

Grade Level: Original



French police make woman remove clothing on Nice beach after burkini ban

Target Measure: 15.54

Photographs have emerged of armed French police confronting a woman on a beach and making her remove some of her clothing as part of a controversial ban on the burkini. Authorities in several French towns have implemented bans on the burkini, which covers the body and head, citing concerns about rel...

Grade Level: Original



A symphony of second opinions on Mozart's final illness

Target Measure: 16.08

For classical music lovers, December 5 may be the saddest day of the year. At 12:55 a.m., 225 years ago, Wolfgang Amadeus Mozart drew his last breath. Later, he was unceremoniously buried in a common grave ? as was the custom of his era ? in the St. Marx cemetery, just outside the Vienna city limits...

Grade Level: Original



From research to a tool useful in practice

- An exclusive focus on adaptive input is too academic.



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 - Enable **teachers** to specify overall proficiency level and pedagogically-focused linguistic target forms.



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- ⇒ FLAIR: Form-focused Linguistically Aware Information Retrieval
 - global complexity classification according to GER A1–C2.
 - identification of all language means on the official school curriculum for English

FLAIR Search Engine (<http://flair.schule>, Chinkina & Meurers 2016)

 FLAIR  

Search 

Click on the search icon below and type in a query. FLAIR will fetch the top results from the Bing Search Engine.

Configure 

Configure the settings: text (difficulty, length) and language (the passive, wh- questions, academic vocabulary, ...). You can export the settings to apply them to all further searches. FLAIR will re-rank the documents

 [Enter a query](#)

climate change | site:www.bbc.com

English 

50 Results 

CANCEL

SEARCH

FLAIR: analyzed search results

← FLAIR



50 Results (0 Filtered)

VISUALIZE

SHARE SEARCH SETUP

Text Characteristics:

Length:

☐ Prefer shorter texts.

Levels:

✓ A1-A2

0 / 50

✓ B1-B2

34 / 50

✓ C1-C2

16 / 50

Constructions:

▼ Sentences



▼ Parts of Speech



Language Use:

☐ Academic Vocabulary



'climate change site:www.bbc.com'

1

What is climate change? A really simple guide - BBC News

<https://www.bbc.com/news/science-environment-24021772>

Climate change is a shift in those average conditions. The rapid climate change we are now seeing is caused by humans using oil, gas and coal for their homes, factories and transport. When...

2

A brief history of climate change - BBC News

<https://www.bbc.com/news/science-environment-15874560>

Climate change hardly registers on the agenda, which centres on issues such as chemical pollution, atomic bomb testing and whaling. The United Nations Environment Programme (Unep) is formed as a ...

3

Climate change: IPCC report warns of 'irreversible' impacts ... - ...

<https://www.bbc.com/news/science-environment-60525591>

The Intergovernmental Panel on Climate Change says that humans and nature are being pushed beyond their abilities to adapt. Over 40% of the world's population are "highly vulnerable" to...

4

Climate change: 12 years to save the planet? Make that 18 mo...

<https://www.bbc.com/news/science-environment-48964736>

Prince Charles has stressed how important the next 12 months are in tackling climate change One of the understated headlines in last year's IPCC report was that global emissions of carbon dioxide...

5

Climate change: Young people very worried - survey - BBC News

<https://www.bbc.com/news/world-58549373>



← FLAIR



▼ Parts of Speech

▼ Verb Forms

Aspect

▼ Voice

▼ Phrasal

✓ Phrasal verbs

48/50

▼ Transitive

- ▼ Imperative

1

2

<https://www.bbc.com/news/science-environment-54797743>

3

<https://www.bbc.com/news/science-environment-63200589>

4

<https://www.bbc.com/news/science-environment-49238749>

5

<https://www.bbc.com/future/article/20221021-how-climate-change-in-film-shape-society>

B1-B2

149 Sentence(s)

2802 Word(s)

The short-term cycles of government can be a real problem for climate change. Even if climate goals are **laid down** in law, there can often be few concrete measures to stop a succession of governments from taking decisions that collectively **end up** with them being missed.

But a new and ambitious climate law recently passed in Denmark tries to find a way around this problem, and some of the other common pitfalls of climate laws. It makes Denmark one of a small number of countries beginning to provide new blueprints of how government can genuinely tackle climate change. Its law could **turn out** to be one of the closest things yet to a law that would make climate change – or at least the lack of effort to stop it – genuinely illegal.

You might also like:

?

Construction

Count

Weight

Verbs > Phrasal > Phrasal...

14

(5)

ALL CONSTRUCTIONS

Export document

☒ Include text formatting

FLAIR: exporting selected text

The law that could make climate change illegal - BBC Future

Source: <https://www.bbc.com/future/article/20200706-the-law-that-could-make-climate-change-illegal>

Text level	Sentences	Words
B1-B2	149	2802

Construction	Hits	Weight
Verbs > Phrasal > Phrasal verbs	14	(5)

One of the most robust laws on climate change yet has been created in Denmark. Can legislation really make failing to act on climate change illegal?

Imagine this: it's 2030 and a country has just missed its target for cutting carbon emissions, that was set back in 2020. People are frustrated, but several governments have come and gone since the goal was set. "Don't blame us," the current government says. "We didn't take the decisions that led us here."

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Key Factors: **Noticing** and **Focus-on-Form**

- Input alone only results in **Basic Varieties** (Klein & Perdue 1997).
- Some attention to forms crucial: **Noticing Hypothesis** (Schmidt 1995)
- Foreign language learners need a **Focus-on-Form** (Long 1991; Lightbown 1998).
 - Why? to overcome partial or missing competencies
 - How? **Input enhancement** to increase salience (Sharwood Smith 1993)



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 - Why? to overcome partial or missing competencies
 - How? **Input enhancement** to increase salience (Sharwood Smith 1993)
- ⇒ AI-based digital tools can support Input Enhancement (IE):
- ⇒ Visual Input Enhancement of the Web (Meurers et al. 2010)
 - ⇒ Functional IE: Generation of questions targeting sentences with relevant forms (Chinkina & Meurers 2017)

Visual Input Enhancement Example



Africa

Americas

Asia-Pacific

Europe

Middle East

South Asia

UK

England

Northern Ireland

Scotland

Wales

UK Politics

Education

Magazine

Business

Health

**Science &
Environment**

Technology

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Cows also 'have regional accents'

Cows have regional accents like humans, language specialists have suggested.

They decided to examine the issue after dairy farmers noticed their cows had slightly different moos, depending on which herd they came from.

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The farmers in Somerset who noticed the phenomenon said it may have been the result of the close bond between them and their animals.

Farmer Lloyd Green, from Glastonbury, said: "I spend a lot of time with my ones and they definitely moo with a Somerset drawl.



Cows moo with a regional twang



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Cow moo recordings

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Input enhancement supporting young readers (COAST, Holz et al. 2018)

COAST



Detmar Meurers

Startseite > Texte > Text anlegen

Eingabe ?

Titel

Herbst (aus dem Klexikon)

Inhalt

Der Herbst ist eine Jahreszeit. In Süddeutschland nennt man ihn auch Spätjahr, das Gegenteil zum Frühjahr oder Frühling. Der Herbst folgt auf den heißen Sommer. Nach dem Herbst kommt der kältere Winter.

Stil

ABC Der Tiere

Umwandeln

Verwerfen

Speichern

Vorschau

Der Herbst ist eine Jahreszeit. In Süddeutschland nennt man ihn auch Spätjahr, das Gegenteil zum Frühjahr oder Frühling. Der Herbst folgt auf den heißen Sommer. Nach dem Herbst kommt der kältere Winter.

In der Natur ist der Herbst die Zeit, wenn die Blätter an den Bäumen sich verfärben. Das Wasser in den Bäumen zieht sich zurück in die Äste, den Stamm und die Wurzeln. Die Blätter



Key Factors: **Practice** and **Feedback**

- **Skill Acquisition Theory** (DeKeyser 2005)
 - Teaching provides declarative knowledge, then **practice** is needed for automated, proceduralized skills.
 - Goal: fluent ability that does not bind attention
- **Feedback** is one of the most effective factors in supporting learning (Hattie & Timperley 2007).



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⇒ Intelligent tutoring system: FeedBook (Rudzewitz et al. 2017; Meurers et al. 2019)



From printed workbook to AI-based FeedBook

Grammar check: Problems

Everyone has got problems. What could these people do differently?

0. Gillian is sad. Her mother never has any time for her.

If Mrs Collins had more time for Gillian, Gillian wouldn't be so sad.

1. Mrs Collins feels bad. She should listen more to Gillian.

If she listens more to Gillian, she feels better

2. Gwynn is very disappointed. Gillian doesn't like Wildings School as much as his sister did.

If Gillian like Wilding School as much as her sister did

**AUSGANGS-
PUNKT**



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If Gillian like Wilding School as much as I

**AUSGANGS-
PUNKT**

2

Welcome to Wales

CYP 2 Grammar check: Problems

Everyone has got problems. What could these people do differently? Use conditional clauses in your answers.

0. Gillian is sad. Her mother never has any time for her.

If Mrs. Collins had more time for Gillian, Gillian wouldn't be so sad. ✓ ?

1. Mrs Collins feels bad. She should listen more to Gillian.

If she listens more to Gillian, she feels better.

2. Gwynn is very disappointed. Gillian doesn't like Wilding

3. George and Rajiv feel bad because they don't have a pres

ZIEL



Feedback für "If she listens more to Gillian, she..."

With conditional clauses (type 2), we use the simple past in the if-clause, not the simple present.

Hilfreich?

☐ Ja ☐ Nein

OK

FeedBook: Feedback on language forms

B 1 Off to Greece again

Mr Lambraki is checking flights to Greece. Read the information he has found on the two airlines and use the adjectives below to compare them.

• LiF8R: Comparison of adjectives

expensive (ticket) · early (departure) · attractive (shopping on board) · good (choice of food offered on board) · healthy (food and drinks) · suitable (airport) · cheap (tickets for shuttle bus) · friendly (service on board) · easy (online booking)

Midair	Air-Con
• London – Athens from 39 pounds • departure 7.00 am • non-stop • small choice of duty free articles for shopping on board • low-calorie and vegetarian food available¹ • from Gatwick only 28 miles from London • tickets for shuttle bus are 10 euros	• London – Athens from 57 pounds • departure 12.15 pm • via Berlin • all international brands for shopping on board • snacks: crisps and chocolate bars • from Stansted only 40 miles from London • tickets for shuttle bus are 10 euros

1.

The tickets at Air-Con are expensiver than at Midair.



2.



FeedBook: Feedback on language forms

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Feedback für "The tickets at Air-Con are expensiv..."

When an adjective has three or more syllables, we form the comparative with 'more' and the superlative with 'most'.



Hilfreich?

☐ Ja

☐ Nein

OK

1.

The tickets at Air-Con are expensiver than at Midair.

2.

FeedBook: Feedback on language meaning and forms

2

Welcome to Wales



B1 Gillian's diary

Read Gillian's diary entry and complete these sentences.

Friday 23rd September

We'll drive to the north coast tomorrow and have a look at two boarding schools with Gwynn. His sister went to Wildings and he says it would be great for me. If they had a football team, it wouldn't be so bad, but it's all so girly-girly with horses and ballet dancing and everything, yuk! I don't want to go to the school in Llandysul either. It still feels like Gwynn and Mum just want me to go to boarding school because of the new baby. Miss my pals like crazy, miss London and my old school. If my friends were here, boarding school would actually be fun. Being the new girl at school without any friends will be horrible. ☹️ And it's all Gwynn's fault! The village where we live now is the worst. 20 minutes to the nearest supermarket. If there was a shopping

centre, I could at least go shopping. But there's nothing, no shops, no cinema, no nothing ... only sheep!

My room is really nice and big though and we have a fab garden which is great for playing football. If I made some friends in the village, we could have a great time there. I met Gruffudd, the boy from next door, this afternoon. He seems nice. He started talking to me in Welsh and I couldn't understand ANYTHING. He then spoke English and told me he plays rugby. Well, it's not football but I might have to learn to like it. They all love rugby here.

Aargh, if I had some credit on my phone, I could call Caroline. Hope I get some pocket money tomorrow.

1. Gwynn thinks Wildings School would be great for Gillian because

it is great

FeedBook: Feedback on language meaning and forms

2

Welcome to Wales

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Feedback für "it is great"

There seems to be important information missing in your answer. Please have a look at the highlighted passage in the text.



Hilfreich?

☐ Ja ☐ Nein

OK

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FeedBook: Feedback on language meaning and forms

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Feedback für "his sister goes there"

We are talking about something that happened in the past. Please use the simple past, not the simple present.



Hilfreich?

☐ Ja ☐ Nein

OK

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FeedBook: Feedback on language meaning and forms

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What does the FeedBook offer?

- immediate, supportive feedback that guides students towards understanding



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- immediate, supportive feedback that guides students towards understanding
- Automatic analysis with AI methods instead of manual coding for each activity or submission.
 - 188 different feedback types to tenses, comparatives, relative & reflexive pronouns, gerunds, passives, conditionals, (in)direct speech.
 - covers all language means of the 7th grade English curriculum
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 - covers all language means of the 7th grade English curriculum
 - Each new task entered by the editor is immediately interactive.
 - Is this effective in a real-life school context?
 - First randomized trial (RCT) with Intelligent Language Tutoring System in Germany (Meurers et al. 2019).
 - regular English classes, but FeedBook replaces printed workbook and within-class randomization: children receive specific feedback on different grammar topics
- ⇒ 63% higher learning gains for specific feedback condition (Cohen's $d = 0.56$)



A clear win-win situation

- Students
 - + receive individualized support while practicing → 63% learning improvement
 - + at their level → automatic internal differentiation
 - + regardless of family characteristics → educational equity



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 - + different types of feedback, exercise types, learning targets given individual learner differences
- Textbook authors and curricular designers
 - + learner & activity analytics enable systematic, empirically-based improvement of materials & curriculum



Learner model: What do I know & what should I work on?

Lernermodell betrachten

Hier werden Statistiken zum Lernverhalten angezeigt. Bitte unten auf eine Kategorie klicken um mehr zu erfahren.

future tense



present tense



past tense



reported speech



conditionals



comparatives



relatives



reflexives



gerunds



passive

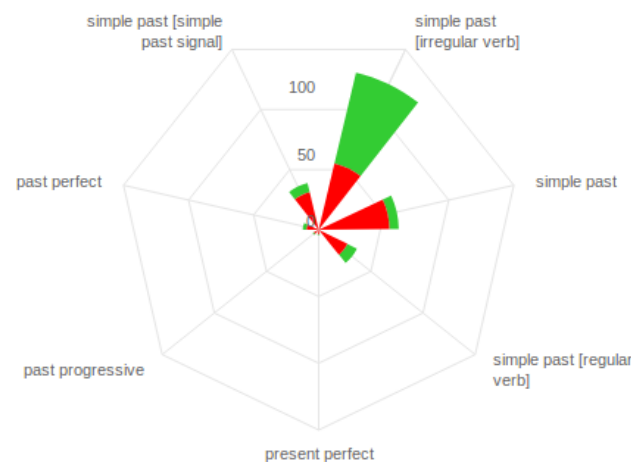




Learner model: How about the past tense?

past tense

Richtig vs. Fehler



● falsch
● richtig

Highcharts.com

simple past
irregular verb

Hervorragend. Weiter so! ★★★★★

simple past



Learner Model: What should I work on?

simple past

Bitte üben! ★★☆☆

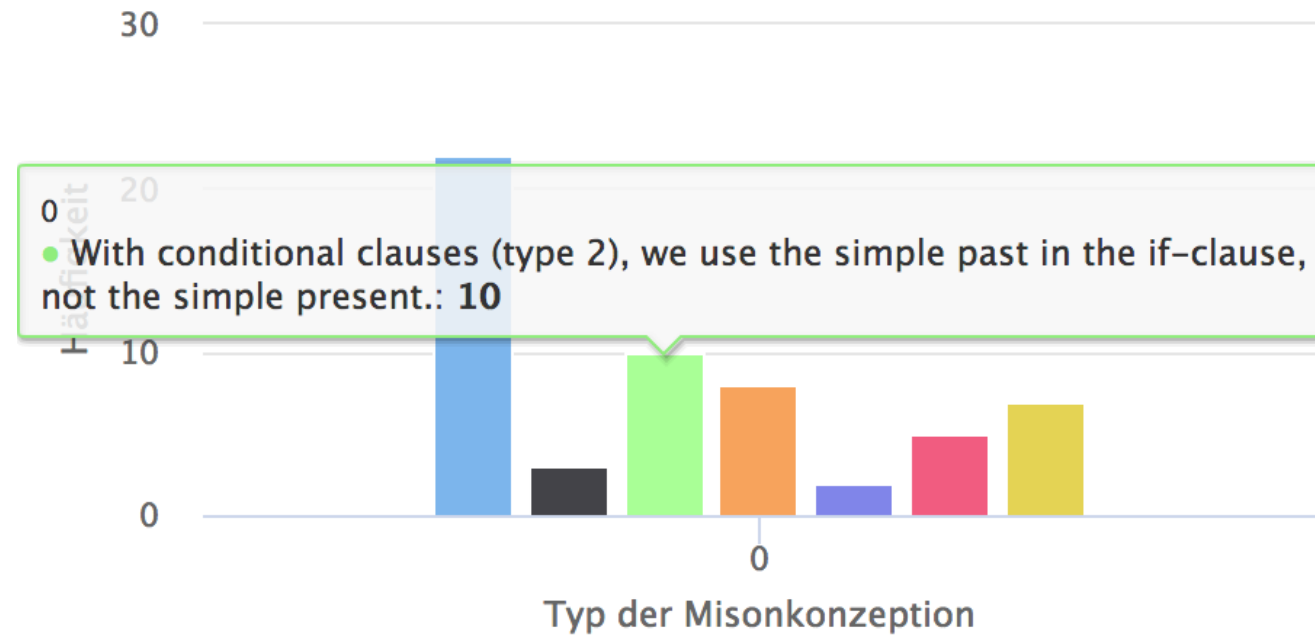
Vorschläge für Übungen

Empfohlene Übungen:

💡 Moving trouble 1 Theme 1 AP 18 b S.25	💡 PRESENTING FACTS 1 Theme 3 AP 11 S.89	💡 NO PARTY FOR FAY 1 Theme 4 AP 8 S.118	👁️ AN INSTAGRAM STAR QUILTS 1 Theme 4 AP 35 S.141
💡	💡	💡	💡

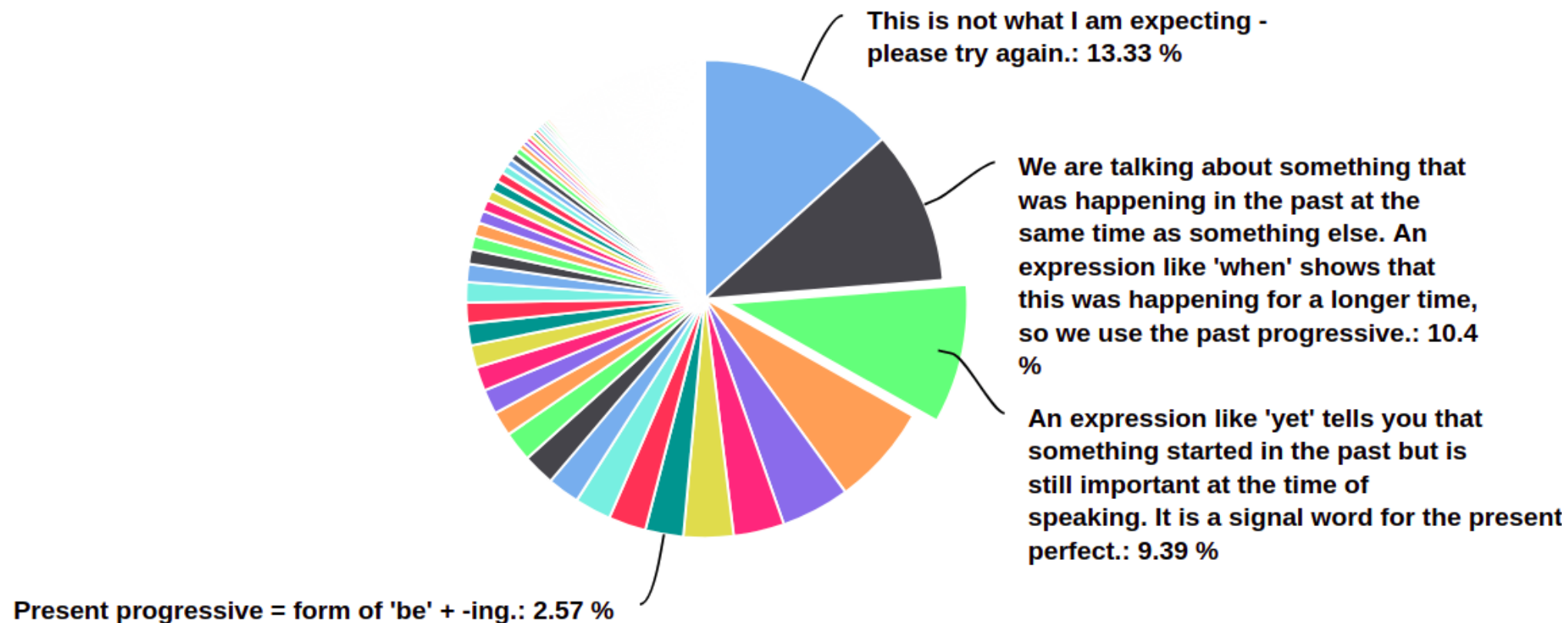


Learner Model: What are my most common errors?





Activity model identifies typical student misconceptions





Activity model: Is this activity effective for learning?

C3 What was ... doing while Gillian was doing something else?

Write down what Gillian's friends were doing while she was running away from home. Use the past progressive in both parts of the sentence.

• LiF1 Re: Past progressive



buy Arsenal tickets

feed Patch

watch TV

sit on the bus

1. buy Arsenal tickets/sit on the bus

Charlie was buying Arsenal tickets while Gillian was sitting on the bus.



2. feed Patch/sit on the bus

George was feeding Patch while Gillian was sitting on the bus.



3. watch TV/sit on the bus

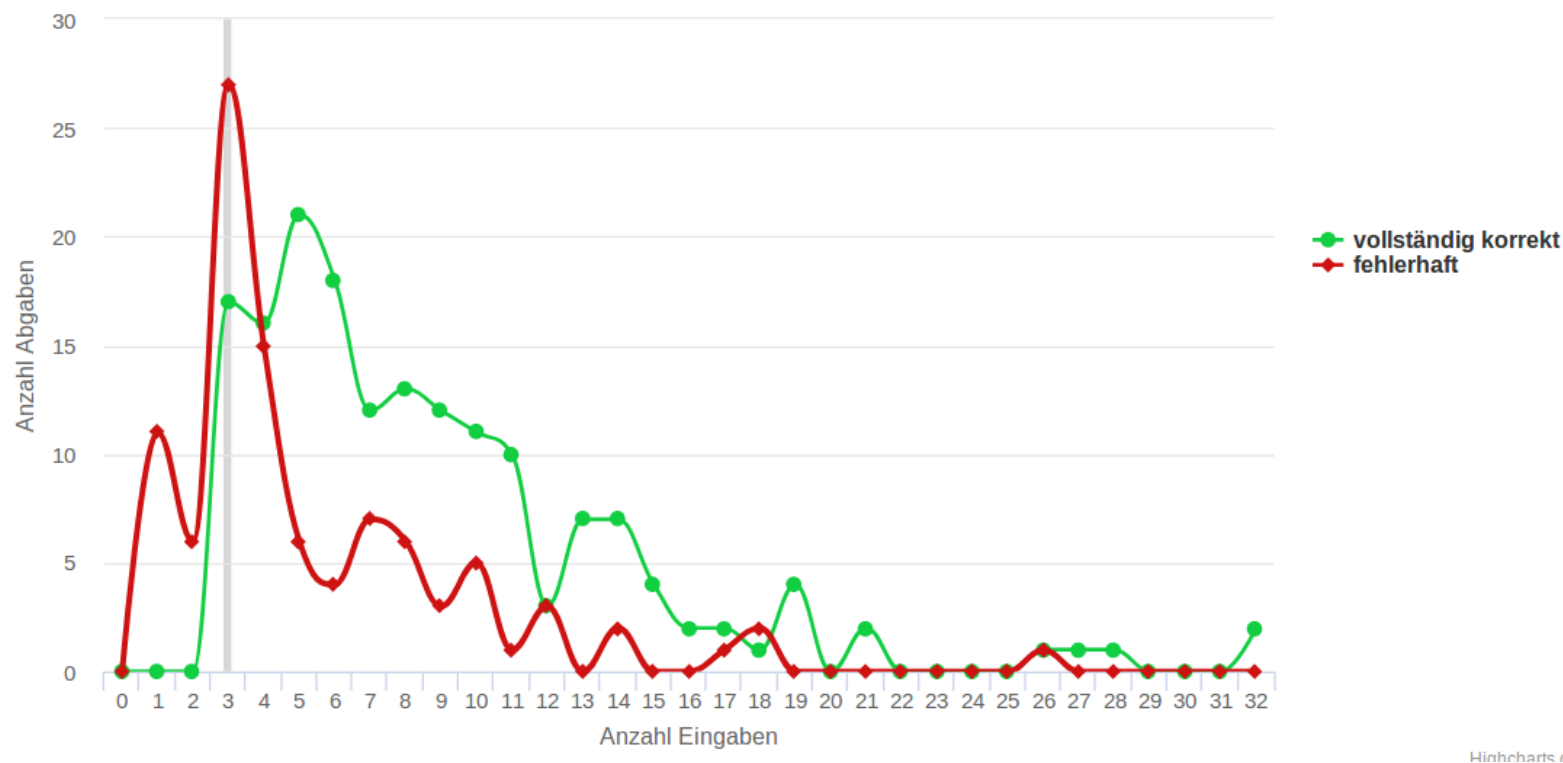




Activity model: Yes, this activity is effective for this population

Theme 1 C, SubTask 3 [short answers] anzeigen

267 Abgaben (167 vollständig korrekt, 100 fehlerhaft)



Integration of individual practice & teacher-orchestrated task-based class?

- Organize exercises so they empower learners to participate in the functional tasks.
 - improves acceptance of practice as pre-task activities in a task-based curriculum
 - fosters intrinsic motivation of students

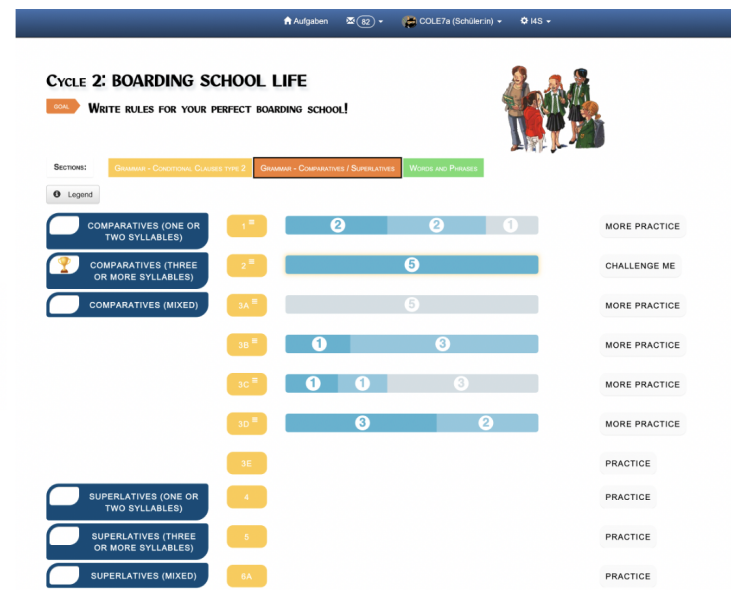
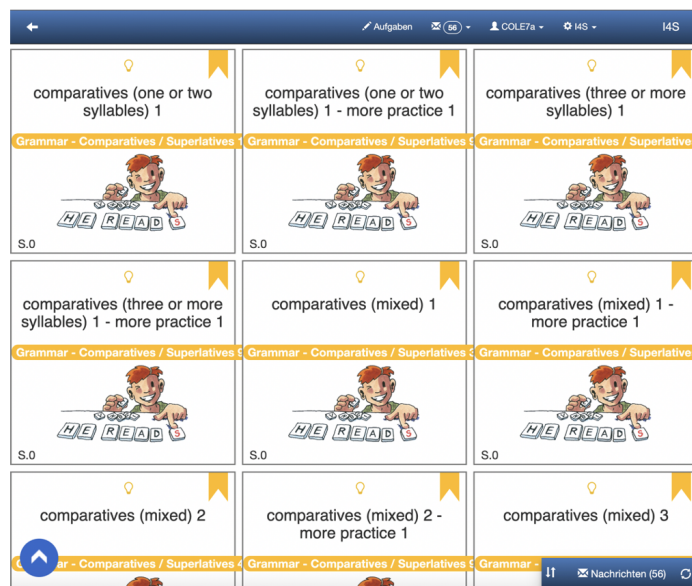
The screenshot shows a grid of 9 exercise cards. Each card has a title, a description, and a cartoon character. The exercises are categorized by syllable count and type (comparatives, superlatives, mixed). The cards are arranged in a 3x3 grid. The top row contains three cards for 'comparatives (one or two syllables) 1'. The middle row contains three cards for 'comparatives (three or more syllables) 1 - more practice 1', 'comparatives (mixed) 1', and 'comparatives (mixed) 1 - more practice 1'. The bottom row contains three cards for 'comparatives (mixed) 2', 'comparatives (mixed) 2 - more practice 1', and 'comparatives (mixed) 3'. Each card has a 'Grammar - Comparatives / Superlatives' label and a 'S.O.' icon.



The screenshot shows a task-based activity interface titled 'CYCLE 2: BOARDING SCHOOL LIFE'. The main heading is 'WRITE RULES FOR YOUR PERFECT BOARDING SCHOOL!'. Below this, there are sections for 'Grammar - Comparatives / Superlatives' and 'Words and Phrases'. The interface includes a 'Legend' section with icons for 'COMPARATIVES (ONE OR TWO SYLLABLES)', 'COMPARATIVES (THREE OR MORE SYLLABLES)', and 'COMPARATIVES (MIXED)'. The main area displays a list of exercises with icons and numbers, and a 'PRACTICE' button for each. The exercises are categorized by syllable count and type (comparatives, superlatives, mixed). The bottom row contains three cards for 'comparatives (mixed) 2', 'comparatives (mixed) 2 - more practice 1', and 'comparatives (mixed) 3'.

Integration of individual practice & teacher-orchestrated task-based class?

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 - improves acceptance of practice as pre-task activities in a task-based curriculum
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- RCT with 847 students: higher learning gains for task-based dashboard (Parrisius et al. in prep).



Task-oriented vocabulary practice (Santhi Ponnusamy & Meurers 2021)

- How can we support learners in reading any texts they are interested in?
- To read and understand a text, about 98% of words must be known.
 - Special editions of texts for foreign language learners are lexically annotated.



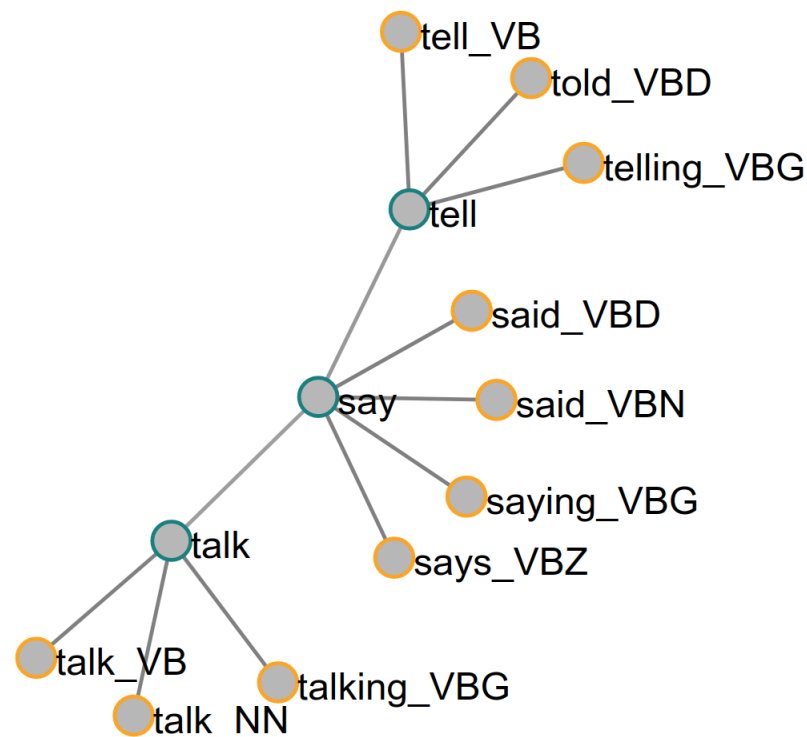
Task-oriented vocabulary practice (Santhi Ponnusamy & Meurers 2021)

- How can we support learners in reading any texts they are interested in?
- To read and understand a text, about 98% of words must be known.
 - Special editions of texts for foreign language learners are lexically annotated.
- Treat vocabulary learning like a pre-task activity for the task of reading a book.
- Goal: systematically introduce learners to the lexical material they need
 - automatically derive the structured, semantically organized vocabulary space to organize learning efficiently
 - support individual learner models, with preactivation using proficiency level
 - contextualize lexical learning using sentences from the book of interest



Generating the lexical graph for a book

- Given a book, the graph is automatically derived from the semantic vector representation (GloVE) of the word families.





Learning activity generation

- Vocabulary practice and testing uses generated multi-gap activities (Zesch & Melamud 2014).
 - Sentences taken from book, ranked using GDEX (Kilgarrieff et al. 2008).
 - Distractors automatically selected from graph based on semantic similarity range.

Choose a word which satisfies all the blanks

Robert looked at ned and **scowled** at his silence.

He leaned back against his cushions and **scowled** at her, as if challenging her to dispute his version of events.

Arya **scowled** , wondering what her sister was doing here, why she looked so happy.



Recording learning in the learner model

- The learner model is an overlay on the book's graph representation.



- When learner completes activities, node activation changes & propagates through graph.
→ support faster, systematic learning of words relevant for understanding the book



Key Factors: **Interaction and Output**

- **Interaction** is central for language development (Vygotsky 1986; Lantoff & Appel 1994)
 - Learning results from interacting with a learner in their **Zone of Proximal Development (ZPD)**
 - Partner **scaffolds** learner development.
- **Output** hypothesis (Swain 2005)
 - only language production requires full specification
 - since understanding of input can rely on “good enough” processing

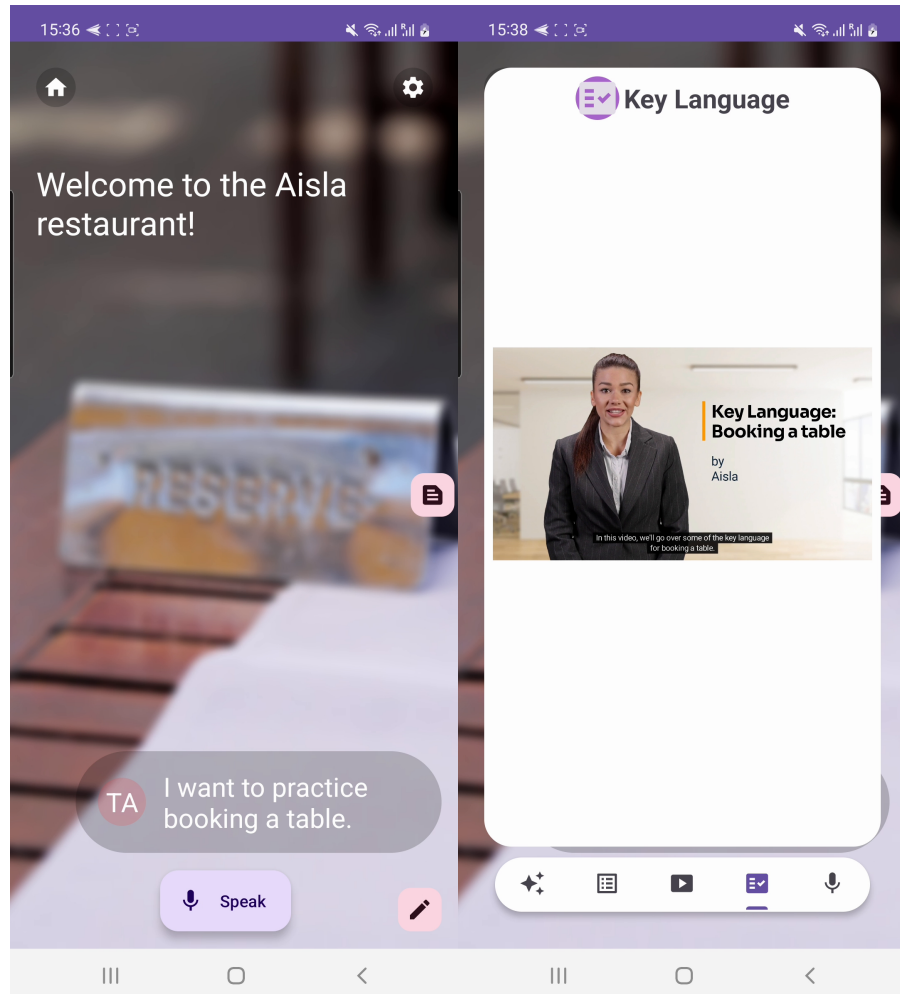


Interaction in dialogue with spoken language: AISLA (Chen et al. 2022)



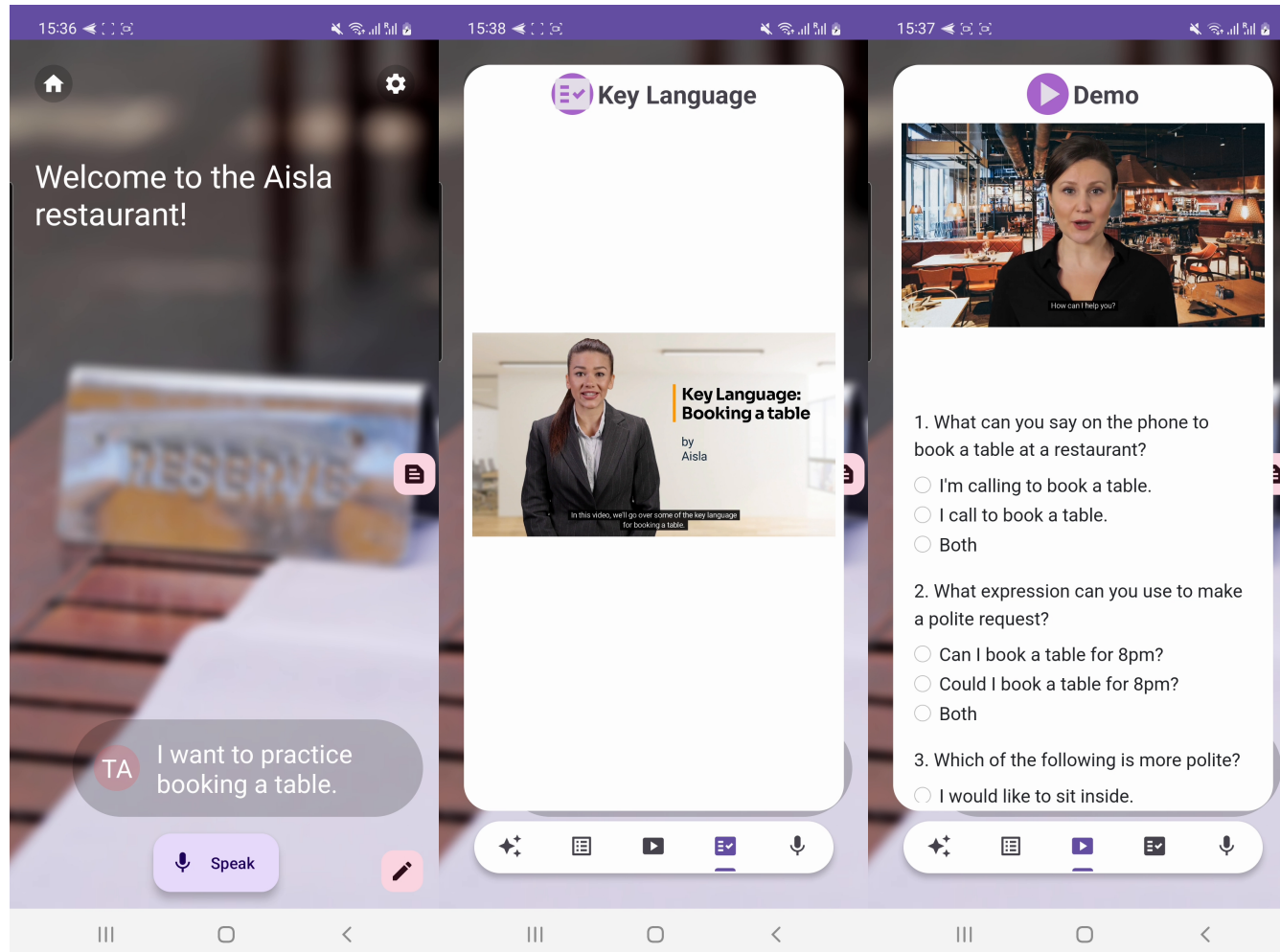


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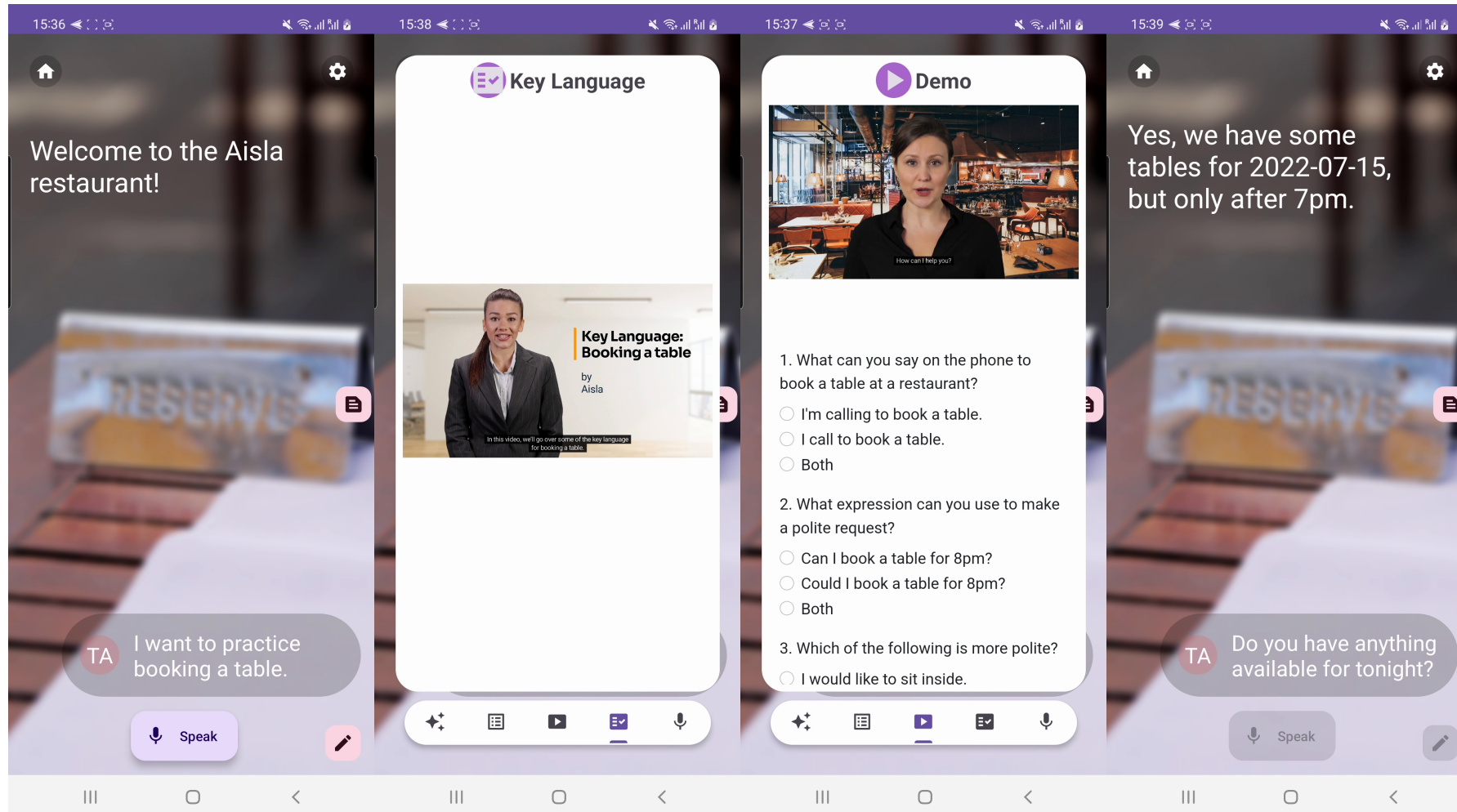


Interaction in dialogue with spoken language: AISLA (Chen et al. 2022)





Interaction in dialogue with spoken language: AISLA (Chen et al. 2022)





Interaction in dialogue with spoken language: AISLA (Chen et al. 2022)

The screenshot displays the AISLA app interface, which is designed for practicing spoken language through dialogue. The app is shown on a mobile device screen, with a status bar at the top indicating the time as 15:36 and various system icons.

The main interface is divided into several sections:

- Welcome to the Aisla restaurant!**: A greeting message at the top left.
- Key Language**: A section titled "Key Language" by Aisla, featuring a video of a woman speaking. Below the video, there are three numbered questions for practice:
 - What can you say on the phone to book a table at a restaurant?
 - ☐ I'm calling to book a table.
 - ☐ I call to book a table.
 - ☐ Both
 - What expression can you use to make a polite request?
 - ☐ Can I book a table for 8pm?
 - ☐ Could I book a table for 8pm?
 - ☐ Both
 - Which of the following is more polite?
 - ☐ I would like to sit inside.

Below the questions, there is a "Speak" button with a microphone icon. At the bottom of the screen, there are navigation icons for home, back, and search.

On the right side of the screen, there is a chat window titled "Jake's Tavern, How can I help you?". It contains a text input field with the sentence "I **wants** to book a table" and a "Try again" button. Below the input field, there is a feedback message: "* Possible agreement error – use the base form here." and a "Try again" button.



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 - adaptive practice with scaffolding feedback
 - interaction and output



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- Such tools require AI methods to
 - analyze and generate language
 - model learners, activities and curricular learning goals
- Integrating such AI-based tools into educational practice can support the empirical evaluation of tools & underlying research in authentic, ecologically valid contexts to
 - effectively support students with scaffolding feedback (Meurers et al. 2019)
 - better inform teachers about the learning progress and reduce their work load
 - improve materials and curricula
 - advance our understanding of second language acquisition



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