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The Linguist's Lair: A fun way of testing linguistic knowledge

Rolf Kreyer
University of Marburg

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🔑 Key points

- **What is this?** This paper describes an online escape-the-room game that helps TEFL students check their linguistic expertise in a fun and engaging way.
- **Why did you make it?** Linguistics can be a demanding and difficult subject for students of TEFL. I created the game to offer my students a motivating and fun way to deepen their understanding of basic linguistic terminology and methods.
- **Who is it for?** This is primarily geared towards students of English linguistics but is also a fun activity for anyone interested in the topic.

Tweet synopsis

Linguistics is often considered demanding and difficult by students of TEFL. The game described here offers students a fun and interesting way to deepen their understanding of basic linguistic terminology and methods. #gametolearn #gamebasedlearning #linguistics #TEFL

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Email address: kreyer@uni-marburg.de

1. Introduction – "I just want to be a teacher!"

The typical German study program for future teachers of Teaching English as a Foreign Language (TEFL) consists of four major subject areas, namely literary studies, cultural studies, language practice and linguistics. The first three are familiar to students from their own experience at school. For instance, most will know the difference between author and narrator or they will most likely be aware of the basics of analyzing a poem or a drama. Similarly, they will have explored cultural aspects like migration in London or the electoral system of the USA, and, obviously, they will have learnt the English language. Linguistics, in contrast, is the odd one out, as it does not figure as a topic in the English-as-a-foreign-language (EFL) classroom. It is true that students will get into contact with some very basic linguistic concepts, but only insofar as they support the language learning process: they might learn about the difference between form and function, as in the distinction between 'verb' and 'predicate', but they will not discuss this difference as one of the design features of language. They will understand that there are different ways of negating a word through different prefixes (e.g. ***un****happy* but ***im****possible*), but they will not explore morphology (the study of the forms that words take) and basic concepts like derivational and inflectional morphemes (*happy - **un**happy* as opposed to *happy - happi**er***). Students might learn to read phonetic transcription when they are taught how to use a dictionary, but they will not explore how sounds are articulated, what role sounds play in the language system or why linguists distinguish phonemes (the abstract idea of a sound) from (allo-)phones (the sounds we can actually hear). Linguistics, then, supports the process of learning a foreign language, but it does not figure as a topic in its own right.

On top of that, linguistics, with its many abstract concepts (e.g. 'phoneme' and 'morpheme') and its rigorous and typically empirical methodology (e.g. the statistical analysis of enormous amounts of authentic language data in corpus linguistics), is often not as easily accessible as the other areas of TEFL programs. As a consequence, students may sometimes feel quite reluctant to engage with linguistics, and 'Why do I need to know all this, I just want to be a teacher' is a complaint that many linguistic professors may have been faced with (Kreyer & Güldenring 2016). At the same time, linguistics is an indispensable part of any TEFL program and it has a lot to offer when it comes to effective language teaching (see Kreyer 2023 for details).

What is needed, then, are ways to make linguistics a fun and rewarding experience. Digital game-based learning in general and (digital) escape room games in particular seem to be promising in that respect, as is shown in various studies. For instance, Nadeem et al. (2023, p. 1) report "that digital game-based learning has a more positive impact on [undergraduate] student engagement and motivation compared to traditional online activities. Chen et al. (2025, p. 1171), in a study on civics education of junior high school students found that ´[t]he escape room game made the learning process more varied, triggered students' interest, and improved their learning motivation." The same seems to hold true for primary school children, too. A study on 528 elementary school students revealed "a strong connection between the students' perceptions of the gameful experience learning via the digital escape room and motivation" (Vidergor, 2021, p. 11). In their systematic review of 68 peer-reviewed studies on educational escape rooms, Fotaris and Mastoras (2019, p. 235) report on a "positive impact on student motivation [. …Their] analysis indicates that educational escape rooms can provide an enjoyable experience that immerses students as active participants in the learning environment." However, studies also exist that were not able to show an effect of game-based learning and motivation. Wouters et al. (2013, p. 249), for instance claims that serious games, in their study, "were not more motivating [...] than conventional instruction methods." Antón-Solanas et al. arrive at a similarly careful conclusion when they state that while "digital escape rooms, **can be effective** [emphasis added] in fostering specific skills, [...] they should be designed

carefully, and used as a complement, rather than a substitute, of other educational activities" (2022, p. 1). It is with this in mind that that the escape-the-room game *The Linguist's Lair* (Kreyer, 2020b; https://uni-marburg.de/ODIVU7) was developed.The present paper will describe the game and will discuss aspects of game design that were implemented to make the game the best possible experience for students. It will conclude with a description of how students rate the game.

What is needed are ways to make linguistics a fun and rewarding experience. It is in this spirit that the escape-the-room game *The Linguist's Lair* was developed.

2. *The Linguist's Lair*

The Linguist's Lair (https://uni-marburg.de/ODIVU7) is a serious game in the sense of Abt (1970, p. 9) since it has "an explicit and carefully thought-out educational purpose" and an example of digital game based learning (DGBL) in the sense of Van Eyck (2009, p. 198) since it plays a central role in a learning environment and is itself a digital game. With regard to digital game types, *The Linguist's Lair* is a classical point-and-click adventure much in the spirit of games like *The Secret of Monkey Island* (Gilbert, 1990), *Day of the Tentacle* (Schafer & Grossman, 1993), *Indiana Jones and the Fate of Atlantis* (Barwood & Falstein, 1992) or *Myst* (Miller et al., 1993). The game accompanies my lecture series 'Introduction to English Linguistics' and is designed as a highly motivational tool that allows students to test the linguistic expertise they have gained in the lecture series in a fun way. It was developed and implemented by me. I am not a programmer and not a professional game designer. Rather, I would define myself as a jack-of-all-trades who, for instance, teaches himself a little programming if he needs it. I emphasise this point as I think it is important that we as teachers start to empower ourselves. Modern authoring tools are so powerful that they enable us to make our visions reality, we just need to lose possible fears or anxieties. The authoring tool used for this project was Active Presenter (AP). AP is similar to Microsoft Powerpoint (PPT) in that it is slide-based and provides many of the functions that PPT provides as well. In addition, AP offers a set of interactive elements and question types (similar to what can be found in learning management systems (LMS)). Most importantly for the creation of *The Linguist's Lair*, AP allows storing and manipulating variables and the inclusion of Javascript code to create more advanced effects and interactions. AP can be downloaded in a free trial version from here. This version provides all the features of the licensed version, the only restriction being a watermark that shows when the project is exported/published.

The background images were taken with my mobile camera and post-edited on my smartphone with the app *Paper Camera* (unfortunately, the app does not seem to be available anymore). Any additional editing of images and creation of assets were done with GIMP 2.10.36.

Being a typical point-and-click adventure, the game provides all of the relevant functionalities. It has navigation, an inventory, a help function, and a hotspot display. At the start of the game, the player is taken through a tutorial, which explains these functionalities. The goal of the game is to escape from the rooms of a linguistic professor who locked the player in after they wanted to steal information about the final exam of the introduction to linguistics lecture. The player has to solve a mix of linguistics-related, as well as typical adventure type, puzzles to escape.

The game is browser-based and, being accessible through the open educational resources of Marburg University, does not require anything other than a stable internet connection. While the OER nature of the game makes for easy accessibility, it comes with the downside that progress will not be saved. However,

when the player has successfully concluded one of the five parts of the game, they will find a code that they can enter in the start screen of the game to give them direct access to the next part. It is recommended to play the game on a PC or laptop, as touch devices can lead to problems, especially when it comes to interacting with the game world.

2.1 The narrative

According to Botturi and Babzahed (2020, p. 44) the narrative has various functions: it supports immersiveness, promotes engagement, assigns an active role to the player and suggests the game type. *The Linguist's Lair* tries to do just that: It is the last day before the final exam of the Introduction to Linguistics lecture. The player wants to see their professor to clarify some points regarding the exam so they go to see him. Unfortunately, the professor is not in his office, but the door is unlocked and the player decides to go in. On the desk they find a couple of papers. In a desperate attempt to find some information on the final exam, the player takes a closer look. Suddenly, they hear something behind them, but before they can even turn they already find themselves in a sleeperhold, and they are soon unconscious. After they come to consciousness, they find they are alone in the professor's office with all doors locked. The office has changed (see Figure 1): the player now finds a chess board on the desk that had not been there before, something seems to be written on the door, and the answering machine indicates that there is some message … They start to explore and investigate to find a way out of the office.

Figure 1: The starting point of *The Linguist's Lair*.

2.2 Pedagogical considerations

As pointed out in the introduction, The Linguist's Lair is an attempt to make linguistics a (more) fun experience for students. In line with Antón-Solanas et al. (2021, p. 1) suggestion that digital escape games should "be used as a complement, rather than a substitute, of other educational activities", the game is meant as an additional testing resource to review five major linguistic topics covered in my lecture series 'Introduction to English Linguistics': the study of speech sounds (phonetics/phonology); the study of the internal structure of words (morphology); the study of the structure of phrases; clauses

and sentences (syntax); and the study of decontextualized and contextualized meaning communicated through language (semantics and pragmatics, respectively).

One of the most significant benefits of the game is the increase in motivation that it can provide (see section 3 on student feedback for details). Linguistic exercises like reading phonetic transcription, the morphological analysis of words, or the syntactic analysis of sentences are no longer only exercises that students do because their professor has said so, but they become exercises that fulfill a practical purpose in the game world, as is shown in Figure 2 below.

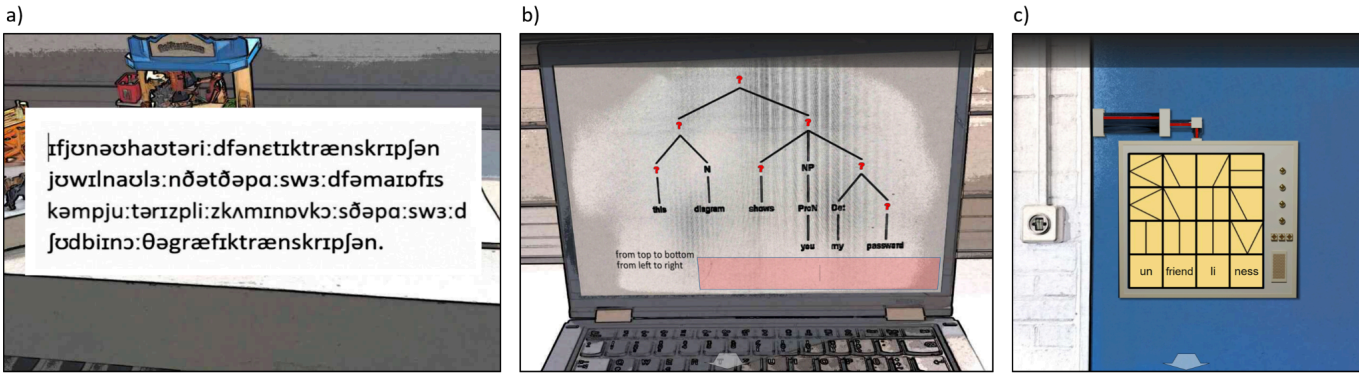


Figure 2: Three linguistic riddles.

The note in Figure 2a) is written in phonetic symbols. Deciphering the 'text' no longer is a boring exercise but helps the player to get access to the professor's computer. Similarly, the syntactic tree in Figure 2b) provides the password for the laptop. The player merely has to name the nodes of the syntactic tree to get access. Figure 2c) shows a keypad where pressing on a key will rotate different line symbols. The player has to find that configuration which describes the internal structure of the word unfriendliness, i.e. *friend – friendly – unfriendly – unfriendliness*. Again, this morphological analysis is not an end in itself, but it brings the player closer to opening the door and discovering what is behind that door. Solving puzzles in *The Linguist's Lair*, in general, becomes an instance of situated learning. Students have to apply their knowledge and competences to engage in meaningful ways with the game world.

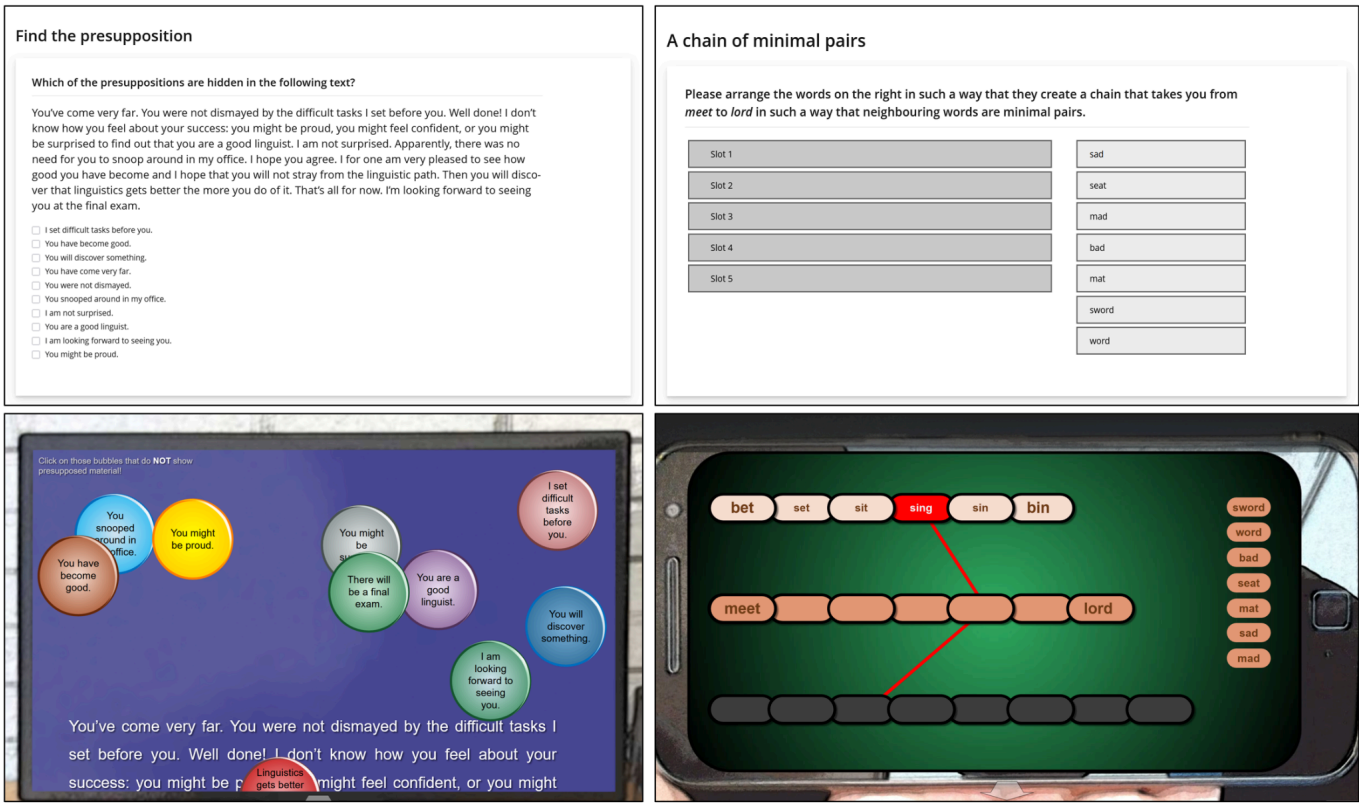


Figure 3: A new way of presenting LMS-style tasks.

Figure 3 compares the game's implementation of two typical learning tasks with their LMS counterparts. The multiple-choice question on the left with its check boxes has become a little in-game game where the player has to shoot the correct balloons instead of checking boxes. The bland item-arranging task on the right looks a lot better in the game, where it has turned into a mobile game with sound and video effects. In addition, the game in the bottom right corner is a succession of three item-arranging tasks which provide a password when the final task has been concluded. This could not be implemented in a similar fashion in an LMS. Both tasks (and many more) are presented in a much more appealing fashion. Following Keller (1987) this design contributes to student motivation in that it is much better suited "to produce a satisfactory level of attention throughout a period of instruction" (3; also see the more detailed discussion of Keller's (1987, 2010) ARCS model below).

In addition, *The Linguist's Lair* provides an opportunity to let the player experience fundamental linguistic concepts, such as 'homophony' or 'deictic center'. As for homophony, i.e. the fact that two non-identical strings of letters sound the same, consider Figure 4. The password for one of the office computers in the game is 'Eyenou'. The player can find this password as part of a puzzle chain. From an experience perspective, the password prompt immerses the player in a moment of phonetic recognition: in speech, *I know you* and *Eyenou* would both be an equally correct answer to "You shall not pass! Unless you know me!"

Figure 4: Experiencing homophony.

As another example to illustrate this point, let us consider the linguistic concept 'deictic center, a central concept in pragmatics'. Without going into too much detail, the deictic center is the point of reference from which an utterance has to be interpreted. For instance, 'in front of me'

would usually describe a different location depending on the person uttering this phrase. *The Linguist's Lair* does not explain what the deictic center is, but it lets the player experience the relevance of the deictic center through the riddle that is shown in the Figure 5 below.

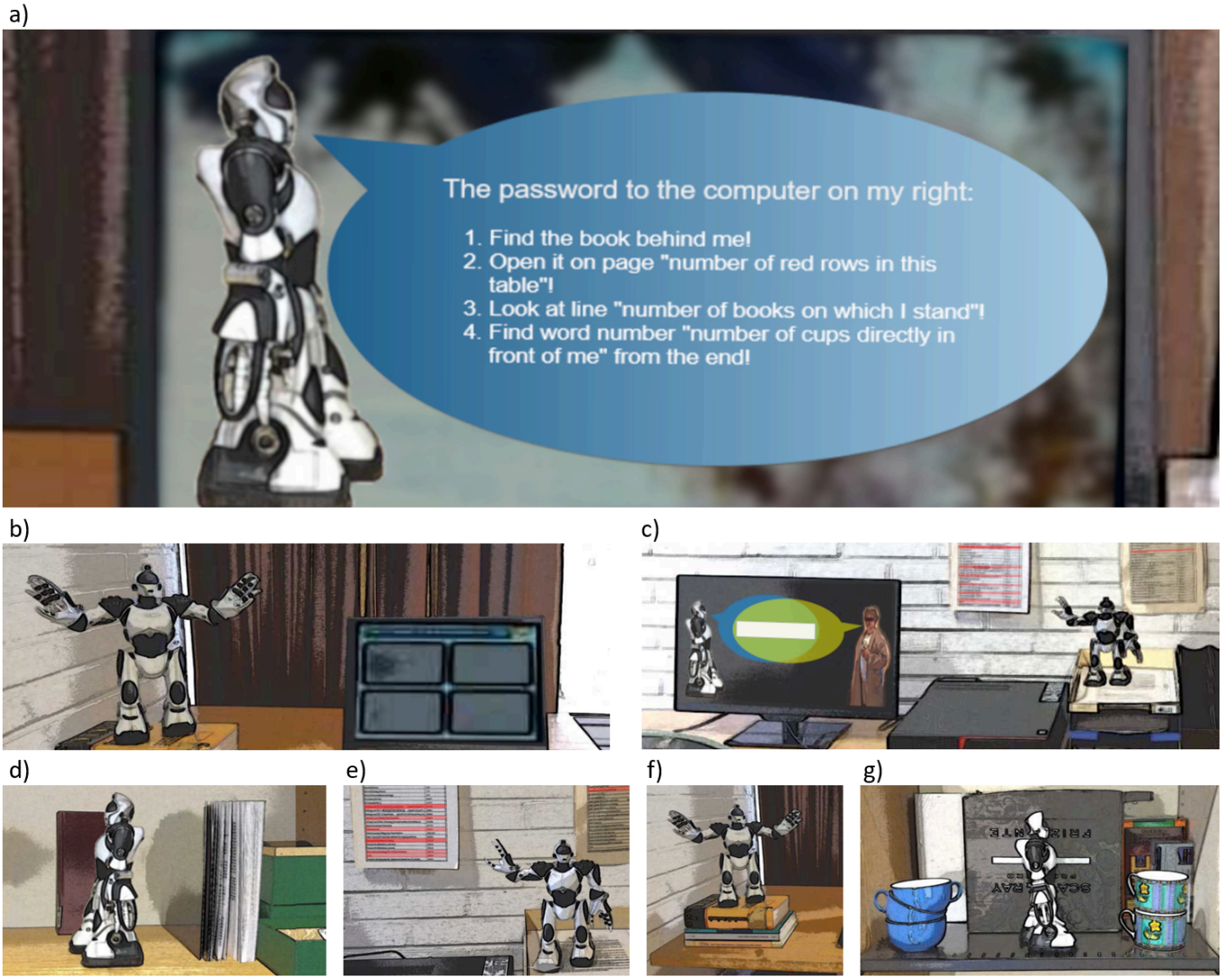
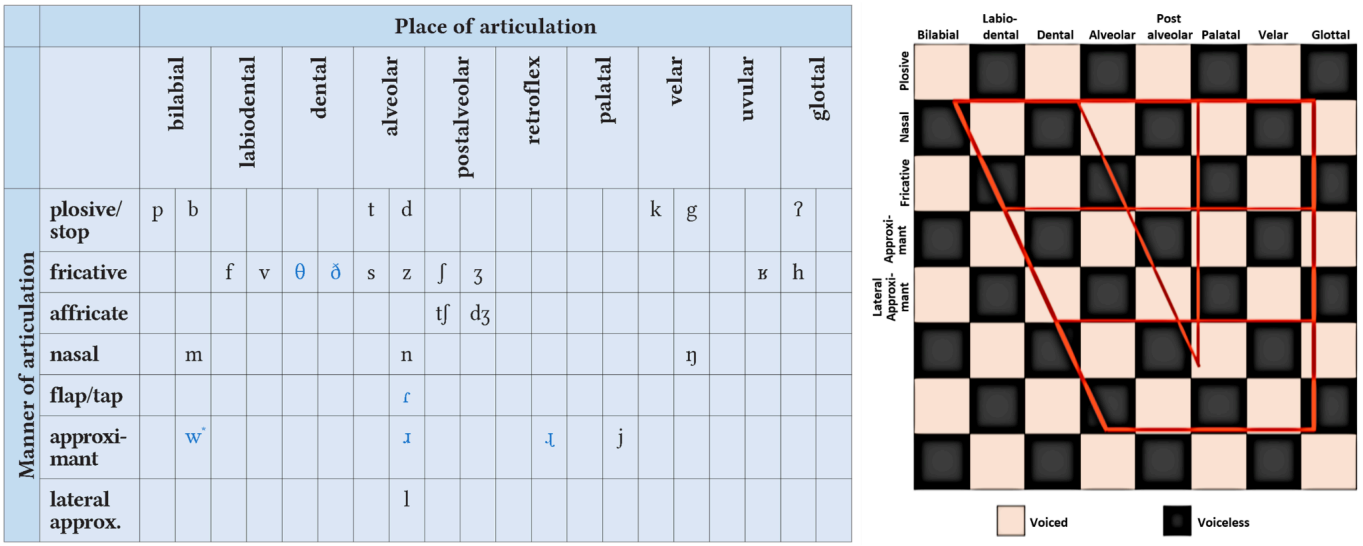


Figure 5: Experiencing the deictic center.

The deictic center already becomes relevant when the player wants to identify which computer the password is meant for, as the two images in the middle row of Figure 5 make apparent. The hint "The password for the computer on my right" (Figure 5a) will be wrongly interpreted as the laptop if the player takes his own point of view, not the robot's - the laptop is on the right of the robot from the player's point of view (Figure 5b). Only if the player assumes the deictic center of the robot will they correctly identify the PC as the relevant computer (Figure 5c). Some of the four hints that the robot provides are unproblematic, some are not. For example, hints 3 and 4, "number of books on which I stand" and "number of cups directly in front of me," can only be interpreted one way (Figures 5f and g). The other two hints demand that the player put themselves in the position of the robot, i.e. they need to occupy the robot's deictic center. If they fail to do so, they fail to solve the riddle. For instance, "Find the book behind me!" will, in this case, lead players to pick up the dark red book instead of the book on the right-hand side, i.e. the one behind the robot from the robot's perspective (Figure 5d). Similarly, the second hint "number of rows in red in this table" can only be understood if the player is aware of the pointing gesture that the robot makes in Figure 5e.

Finally, and maybe most importantly, the game provides the opportunity to present linguistic content in such a way that it really checks the player's understanding instead of validating that they have just learnt something by heart, i.e. it demands deep instead of surface learning. Take a look at Figure 6 below.



		Place of articulation																			
		bilabial		labiodental		dental		alveolar		postalveolar		retroflex		palatal		velar		uvular		glottal	
Manner of articulation	plosive/ stop	p	b					t	d							k	g			ʔ	
	fricative			f	v	θ	ð	s	z	ʃ	ʒ								ʁ	h	
	affricate									tʃ	dʒ										
	nasal		m						n								ŋ				
	flap/tap								ɾ												
	approxi-mant		w						ɹ				ɻ		j						
	lateral approx.								l												

Figure 6: The usual representation of the English consonants and how they are represented in the game.

The left-hand side shows a typical representation of the English consonants in a table format (Kreyer 2023, p. 46), and the right-hand side shows a reinterpretation of the same information in the form of a chess board. The two representations are similar in that they both show the place of articulation in the columns and the manner of articulation in the rows. However, the variable voiced-voiceless is depicted differently. In the table on the left, if a field contains two sounds the one on the left is voiceless, the one on the right is voiced. The English language, for instance, has two bilabial plosives, namely the voiceless [p] and the voiced [b]. The chessboard dispenses with this convention by representing voicedness and voicelessness by light and dark squares. The player has to know the exact articulatory description of each consonant, they cannot guess by trying to remember an image of a table but they have to understand what that table represents. It is only through deep learning and conceptual understanding that they will be able to apply their knowledge about the phonetic transcription of the English consonants in the creative way that the game demands.

All in all, the game makes use of many opportunities to present linguistic concepts and tasks in a variety of appealing and novel ways, thereby increasing the students' motivation to review linguistic content. The next section will discuss aspects of game design that were implemented to increase motivation even further.

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2.3 Aspects of game design

The game was designed with a particular focus on two theories on motivation, namely Self-Determination Theory (Deci & Ryan, 1985, 2000; Ryan & Deci, 2000, 2017) and the concept of the flow channel developed by Mihaly Csikszentmihalyi (e.g. 1975). The game also is in line with principles of Keller's (1987, 2010) **A**ttention-**R**elevance-**C**onfidence-**S**atisfaction (ARCS) model.

◺◺◱ TEACHING TIP

Even though the game itself is single-player, it helps to let your students play the game in groups of threes or fours. It will reduce individual frustration, and it will have the additional benefit of students explaining things to their fellow students, which will lead to a yet deeper understanding of the subject.

Self-determination theory (SDT) maintains that human behavior is largely driven by an attempt to satisfy a human's need for "feeling competence, autonomy, and relatedness" (Ryan & Deci, 2017, p. 5). The first two are particularly relevant when it comes to intrinsic motivation, as it can be "facilitated by supports for competence and autonomy" (17). As we will see below, many of the game mechanisms are geared towards increasing competence as well as autonomy. The Linguist's Lair is a single-player game and, therefore, relatedness is not embedded in the game mechanics. However, playing the game simultaneously in groups of 3 or 4 (as I suggest my students should do) can help to experience relatedness.

The flow-channel concept is maybe the best-known theory when it comes to motivation. The concept was introduced into motivational theory by Mihaly Csikszentmihaly (1975) in his seminal publication *Beyond Boredom and Anxiety*. In a paper from the same year, he describes the concept as follows:

> *Flow denotes the holistic sensation present when we act with total involvement. It is the kind of feeling after which one nostalgically says: "that was fun," or "that was enjoyable." It is the state in which action follows upon action according to an internal logic which seems to need no conscious intervention on our part. We experience it as a unified flowing from one moment to the next, in which we feel in control of our actions, and in which there is little distinction between self and environment; between stimulus and response; or between past, present, and future. (Csikszentmihaly 1975/2014, p. 136-137).*

A prerequisite for entering the state of flow is a balance of the challenges that an individual encounters when engaging in a task and the skills the individual has at their disposal to solve this task.. If the skills are superior to the challenges, the individual will experience boredom, if the challenges are too demanding, the individual might feel frustration or anxiety. Typically, this relation is depicted as shown in Figure 7a) below.

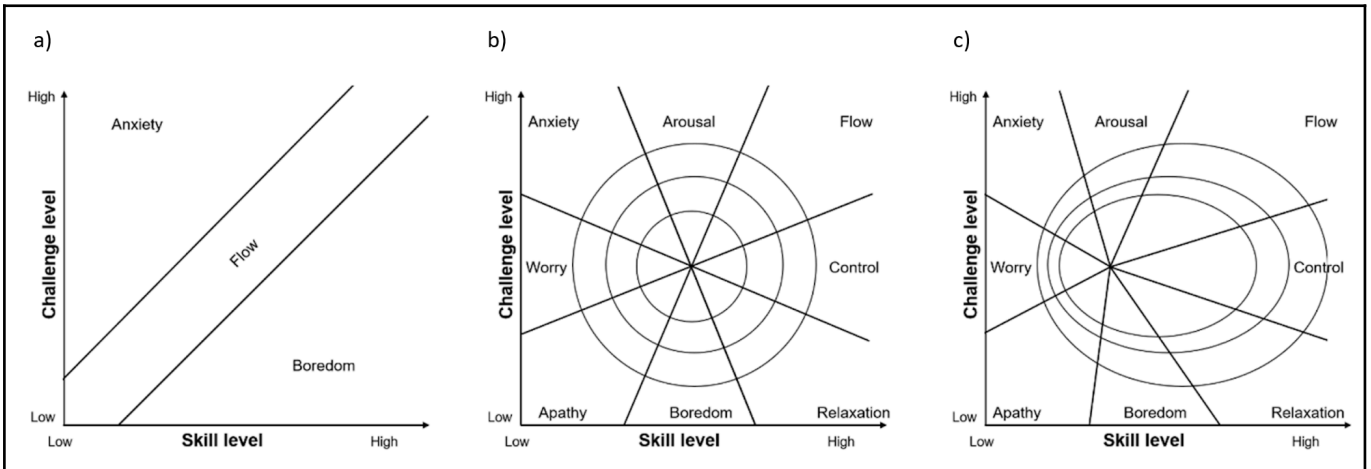

Figure 7: Three versions of the flow model. a) an adaptation of the original model as suggested in Csikszentmihalyi (1975/2014, p. 212). b) adapted from Nakamura & Csikszentmihalyi (2002/2014, p. 248). c) an adaptation by the author.

However, Marczewski (2012) points out that this so frequently employed conceptualisation of flow is actually an outdated version of Csikszentmihalyi's concept. Anxiety, Boredom and Flow, according to a more recent flow model (Figure 7b), are only three of eight possible states that can occur in dependence from challenges and skills, as shown in the center of the figure above. If both skill and challenge level are low, the resulting state would be that of apathy, which turns into worry if the challenge level is increased. As in the simplified model, anxiety is the result of a low skill level in sight of a high challenge level. With an increase in skills a change in challenges will either result in boredom (challenge level low) or arousal (challenge level high). If the skill level is high, arguably all of the resulting mental states are positive, moving from relaxation to control and flow with an increase in the challenge level.

One of the main points Marczewski (2012) makes is that a perfect balance of challenge level and skill level is only desirable if both are high as otherwise, the resulting user experience would be largely that of apathy – "not a state we want for our users!" Flow, according to Nakamura and Csikszentmihalyi (2002/2014) "is experienced when perceived challenges and skills are **above** [emphasis added] the actor's average levels " (p. 248) . Another important addition to the original flow model is the inclusion of the concentric circles that we see in Figure 7b): "Intensity of experience increases with distance from the actor's average levels of challenge and skills" (p. 248). If skill and challenge level are only slightly above average levels, the flow experience will not be as intense as it will be if challenges are high but are met with adequate skills.

Figure 7c) shows my own adaptation of the central model. It depicts another aspect that I regard as important when it comes to flow and motivation, namely the subjective skill level. Whether a person enters a state of flow or is, say, trapped in a state of anxiety or worry not only depends on their actual level of skill but also on their perceived level of skill. This is what Figure 7c) expresses. The meeting point of the different emotional states has been moved to the left, and so have the borders of anxiety and arousal.

What does that mean? If a person rates their subjective skill level higher, this person will enter the more positive states of the flow level sooner, In addition, the concentric circles in the central model have now become ellipses indicating that there is less room for anxiety, worry and arousal but more room for flow, control and relaxation (note that the potential for apathy and boredom remains more or less similar). In a sense, this adaptation of Nakamura & Csikszentmihalyi (2002/2014) makes a point that Csikszentmihalyi et al. (2005/2014, p. 232) themselves emphasize more clearly. One precondition for flow, according to them, is "a balance between perceived challenges and perceived skills. […] what counts […] is the *perception* of the demands and abilities, not necessarily their objective presence" (p. 232). I think it is important to stress this point when it comes to game design, particularly learning games, as the designer should as much as possible provide the player with opportunities to raise their perceived level of skills. In self-determination-theoretical terms, we want the player to feel more competent, resulting in a higher readiness to deal with more challenging tasks. The player feels ready to tackle demanding problems while at the same time experiencing flow and control. A high subjective level of competence, then, will provide the player with a more enjoyable experience even if the challenge level is quite high.

In addition to this challenge/skills balance, Csikszentmihalyi et al. (2005/2014, p. 232) formulate two further preconditions for flow, namely a clear set of goals and clear and immediate feedback. Clear goals "add direction and purpose to behavior", they have "a capacity to structure experience by channeling attention". Clear and immediate feedback "informs the individual how well he or she is progressing in the activity, and dictates whether to adjust or maintain the present course of action. It leaves the individual

with little doubt about what to do next." (p. 232) In addition to these three features and in alignment with SDT, the game aims for maximum player autonomy (even though, of course, autonomy has to be restricted in a more or less linear game).

In contrast to the FLOW theory, Keller's (1987) ARCS model appears to be a lesser known model of motivation. Although his concern is with the development of "a systematic, as opposed to intuitive, approach to designing motivating **instructions** [emphasis added]" (p. 2), the four categories that he suggests can be applied to serious games, too.

With regard to the first of these four categories, attention, Keller emphasises that "getting attention is not enough. A real challenge is to sustain it, to produce a satisfactory level of attention throughout a period of instruction" (3). Relevance, the second category, addresses the issue discussed in the introduction of this paper - "Why do I have to learn all this?" For Keller, perceived relevance can come from the content, but it can also "come from the way something is taught" (3). We will see below that the game tries to create relevant experiences both, through content and presentation. Thirdly, and in line with SDT and FLOW, Keller stresses the relevance of confidence since it "can influence a student's persistence and accomplishment" (3). Pivotal to building confidence in students "is to help the learner form the impression that some level of success is possible if effort is exerted" (5). Finally, satisfaction is about "mak[ing] people feel good about their accomplishments" while at the same time making sure that "the development of intrinsic satisfaction" (6) is encouraged.

The following will explore how considerations of game design try to do justice to the criteria discussed above.

2.3.1 A mix of linguistic and non-linguistic puzzles and parallel puzzle chains

As linguistics is often perceived as quite demanding by most students, it provides a lot of opportunity for frustration, possibly resulting in a feeling of incompetence. One way of addressing this issue is to provide a good mix of linguistic and non-linguistic puzzles, with a higher frequency of the latter. Instead of giving way to despair in sight of a demanding linguistic puzzle, the player will usually find a variety of simple general puzzles to provide them with "success opportunities" (Keller, 2010, p. 519) which will give them a feeling of progress and, hence, boost their feeling of competence. In addition, puzzle chains will usually start with a series of non-linguistic puzzles so that players will be given a lot of opportunity for progress and competence before they encounter linguistic problems. In addition, multiple entry points to a puzzle chain will promote a sense of "personal control" (51). Figure 8 below shows a representative example of a riddle chain with a good ratio of non-linguistic (white) and linguistic puzzles (grey).

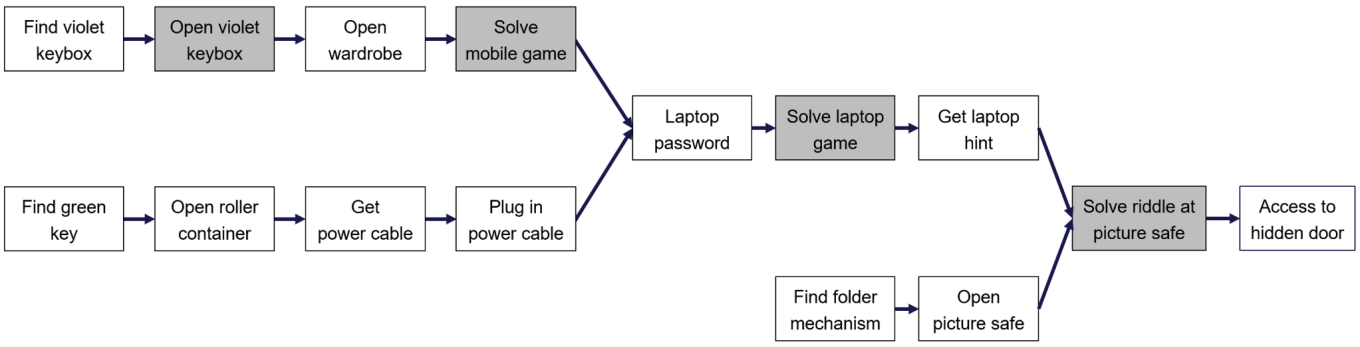

Figure 8: An example of a riddle chain in *The Linguist's Lair*. Note how the ratio of non-linguistic to linguistic riddles is roughly 2:1. In addition, the entry points to the different branches of the riddle chain are non-linguistic riddles.

Figure 9 shows some in-game pictures related to the part of the riddle chain that leads from ‘Find green key’ to ‘Get laptop hint’ in Figure 8. Figure 9a shows the starting point of the riddle chain. Here the player will recognize a green keyhole in the roller container below the desk. Hidden in a book on the shelf above the desktop computer, the player will find a green key (9b), which opens the roller container (9c) where the player will find the power cable for the laptop (9d). On further exploration of the room, the player will find a laptop (9e) which obviously does not have power. After plugging in the power cable (9e), the initial laptop screen (9f) provides a hint that the player has to relate to the mobile game (9g), the endpoint of the upper half of the puzzle chain shown in Figure 8 (Find violet keybox → Solve mobile game). This puzzle will provide the password for the laptop computer (9h) which, after solving the game in 9i, will provide a hint necessary to solve the picture safe riddle.

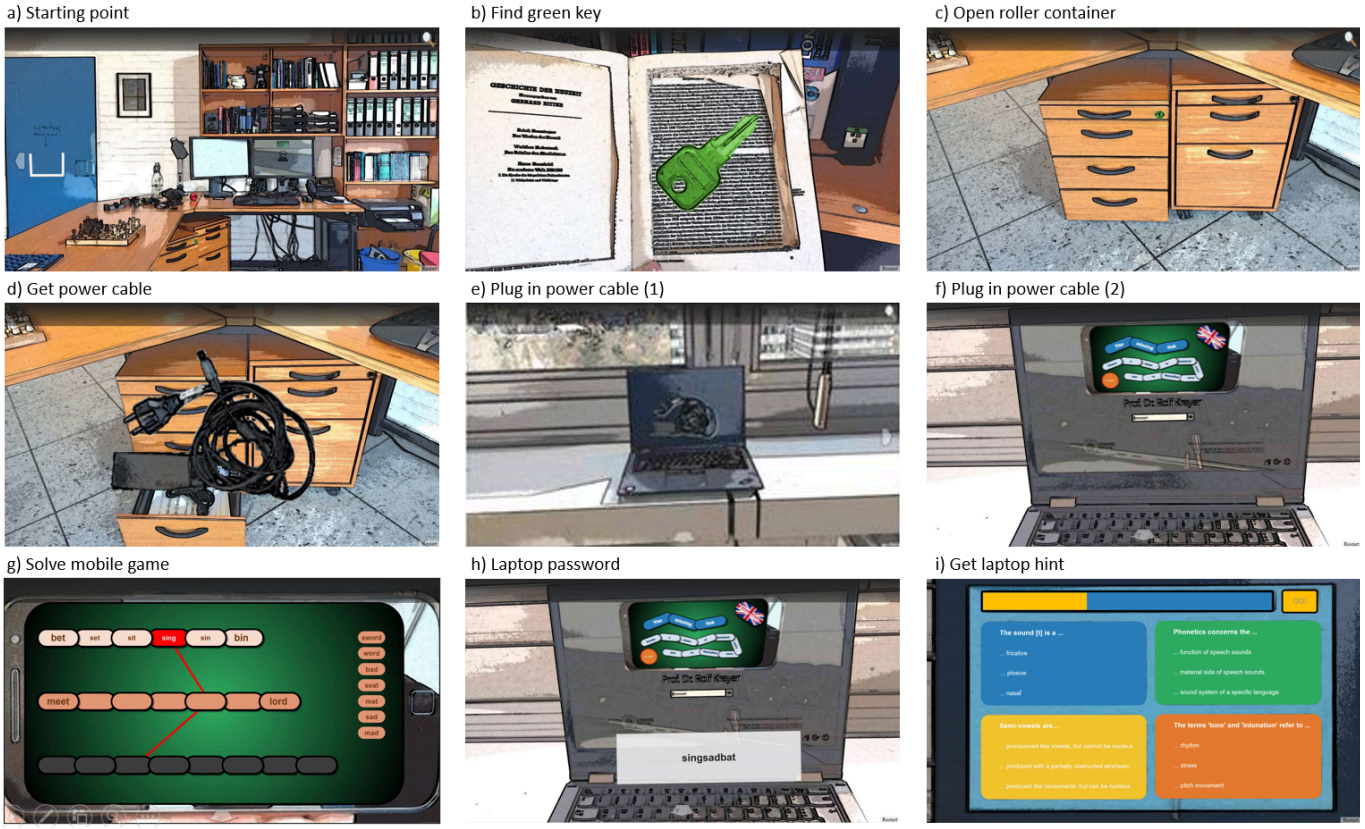

Figure 9: In-game pictures related to the part of the riddle chain in Figure 8 that leads from ‘Find green key’ to ‘Get laptop hint’.

Even though there are some degrees of freedom when it comes to how riddle chains are solved, all riddles are essential and have to be solved at some point. To minimise frustration on the part of the player, the game provides three mechanisms that tries to boost players’ subjective and actual competence. These will be described in section 2.3.3. Before that, however, we will take a clearer look at the design of the game world itself.

Puzzle chains will usually start with a series of non-linguistic puzzles so that players will be given a lot of opportunity for progress and competence before they encounter linguistic problems.

2.3.2 Providing clear goals and arousing curiosity

The relevance of clear goals has been emphasised in the discussion of flow above. Similarly, Botturi and Babazadeh (2020, p. 45) point to the fact that "puzzles should be clear, i.e., they should look like items that require a solution". However, the importance of clear goals or puzzles does not mean that the game world cannot be somewhat vague or mysterious at the same time. Dai et al. (2025), in their meta-analysis on gamification and learning, for instance, find that "the positive impact of the gamification approach on learning outcomes was greatest when the element of "mystery" was introduced [...], i.e., the combination of "rules/goals + challenge + mystery" (p. 17).

The Linguist's Lair provides all three of these aspects, albeit to varying degrees. Firstly, goals can be completely clear in the sense that they do not leave any room for vagueness. At all times it is obvious for the player what they have to do to achieve a certain effect, i.e. such goals are an example of "effective rules within a fixed space and time in a game" (p. 5), the defining feature of Dai et al.'s (2025) **rules/goals** dimension. For example, a laptop that does not have any power establishes a clear goal in this sense, i.e. finding a power cable that can be connected to the laptop. Another example is the green key hole in the roller container shown on the start screen of the game. Again, the goal is clear – find a green key. There is no need for the game to point that out to the player. In contrast, imagine the game world without the color – it would be a lot less enticing or inviting. Similarly, compare the two versions of the same in-play situation in Figure 10. Figure 10a) is taken from a pilot version of the game, the picture on the right is from the final version. In both versions of the game, logging into the computer and clicking the right button will result in a sheet of paper that is printed out. In the pilot version, however, the player had no need to try and log in to the computer – other than "Let's see what we can find here". The final version, in contrast, will invite the player to pull the paper out of the printer, which will lead to the feedback "It's stuck!", this way creating a motivation for the player to log in to the computer. The game world provides a clear **challenge** – get the paper out of the printer! – but it is not entirely clear how this can be achieved.

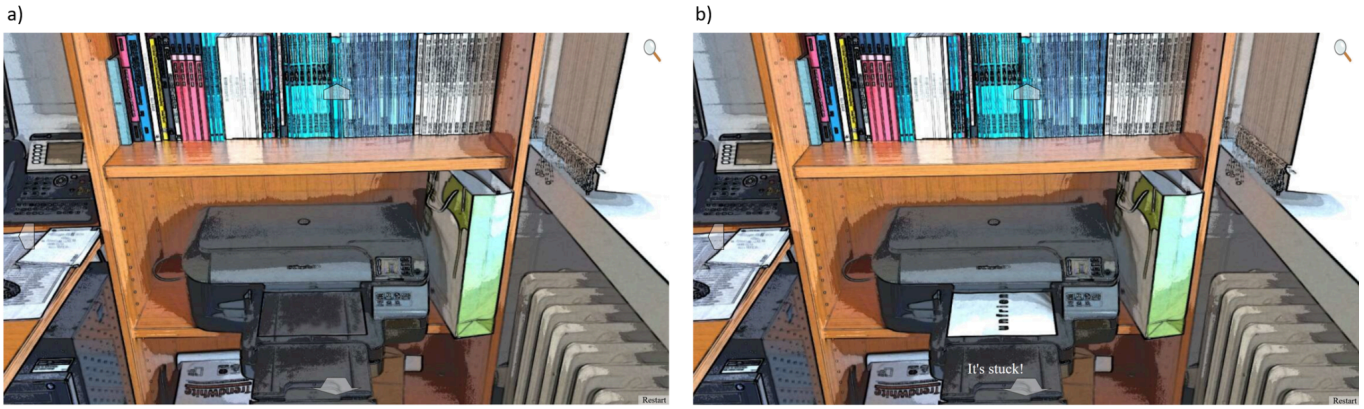

Figure 10: An early (left) and the final (right) version of a printer that provides a relevant cue.

The three images in Figure 11 below show elements of the game world that are different. They do provide a clear call to action, but the goals remain **mysterious**. As a consequence, such elements invite the player to explore the game world. For example, for any player with some knowledge of the linguistic sub-discipline of pragmatics, the four words on the keypad in Figure 11c) (Quality, Relation, Quantity, Manner) will trigger the well-known maxims of conversation by H. Paul Grice and, in particular, how these are violated in authentic discourse. To make use of this keypad, the player will know that they have to search for instances of discourse that they can somehow relate to the keypad. The other two riddles shown in Figure 11 b) and c) function in a similar way in that they, too, demand additional information/elements to know what the exact final goal is. The immediate goal is clear, namely finding

further information that helps the player make sense of the riddle, but at the same time it remains somewhat elusive as the player has no idea what that further information might actually be.

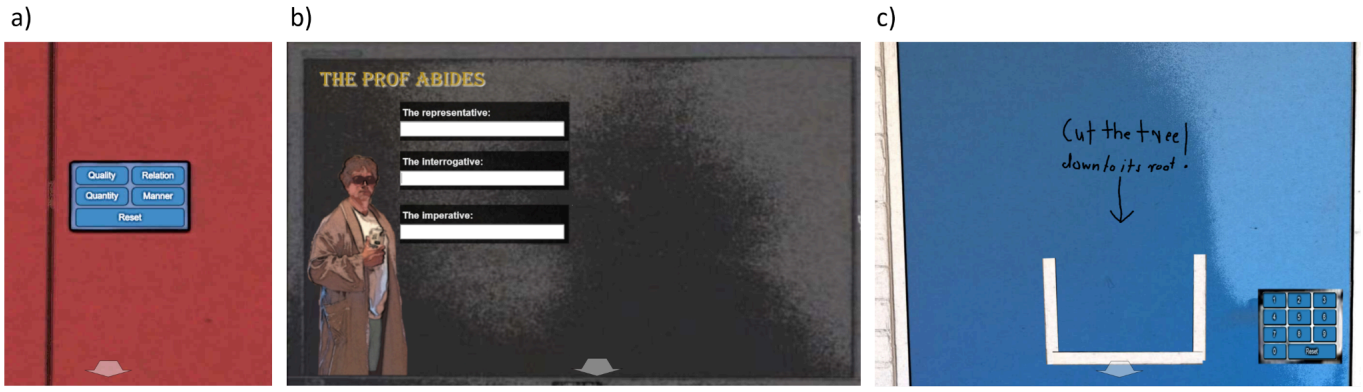

Figure 11: Examples of a game world that invite players to explore.

In addition, *The Linguist's Lair* makes use of game-world elements that are completely vague and mysterious to begin with. When the player enters the pragmatics room, they will see five robot figures spread throughout the room (see Figure 12). The mere fact that the same figure occurs five times in the room will make the player want to know what is going on – their curiosity is aroused. This curiosity is satisfied once the player has beaten the game on the laptop that we can see in the top left picture (also see the discussion of Figure 5 above). All in all, the game world aims at "stimulating and sustaining learners' curiosities and interests" (Keller, 2010, p. 44).

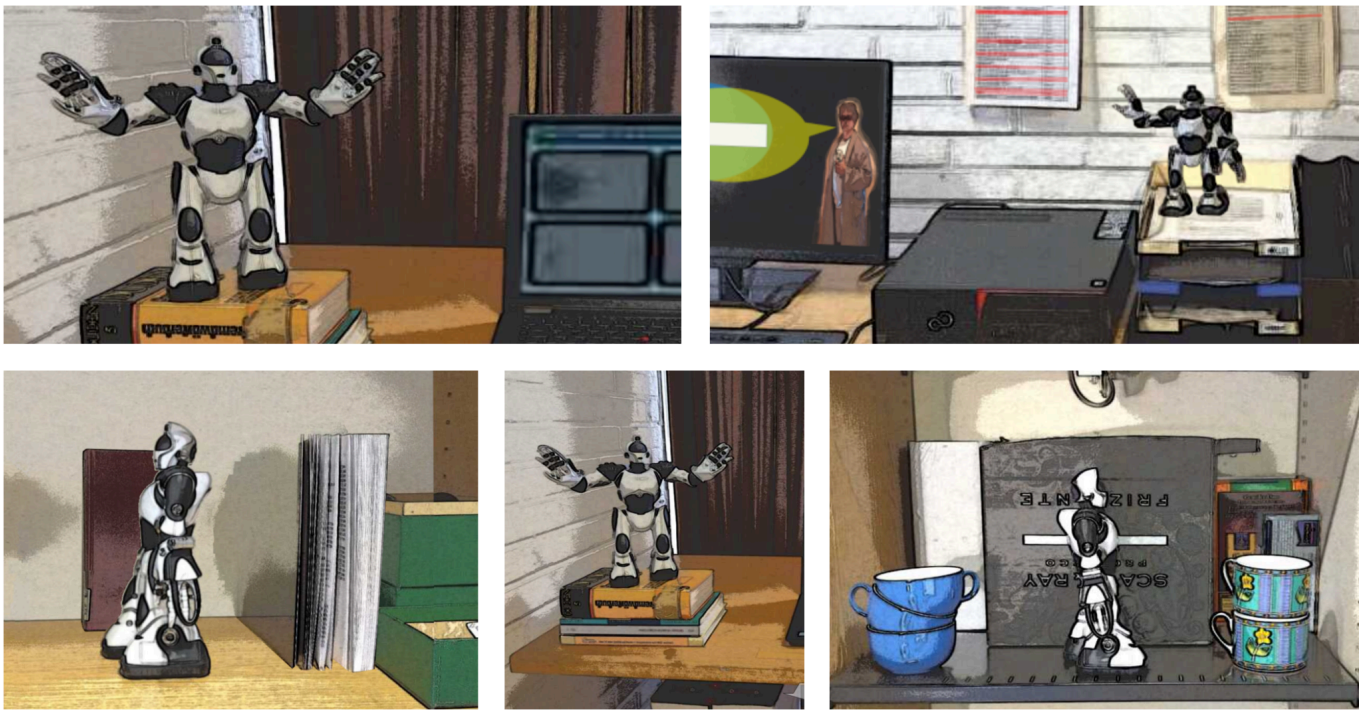

Figure 12: Arousing curiosity.

The importance of clear goals does not mean that the game world cannot be somewhat vague or mysterious at the same time.

2.3.3 Increasing subjective competence

We have already discussed two game design elements that contribute to a subjective feeling of competence on the part of the player: 1) a balanced mix of linguistic and non-linguistic puzzles to allow those players who struggle with linguistics to still experience success, and 2) multiple entry points to a puzzle chain to provide players with a feeling of progress even if they might be stuck at some other point in the game. Three other game design elements aim to increase the players' subjective feeling of competence.

Firstly, at any point in the game the player can access a tablet computer (see Figure 13a) that they have acquired in the course of the tutorial that runs at the beginning of the game. The tablet provides the opportunity to close knowledge gaps and to get support in solving the non-linguistic puzzles (see Figure 13b). It contains the complete slides of the lecture "Introduction to Linguistics" (see Figure 13c), of which the game is a part, and notes on the non-linguistic puzzles. The latter, basically, are a representation of the puzzle chains. The player can take a look at each step of these chains, but they first have to answer a basic linguistic question to get access to these steps (see Figure 13d). The tablet was chosen as it provides helpful support without any loss of immersion.

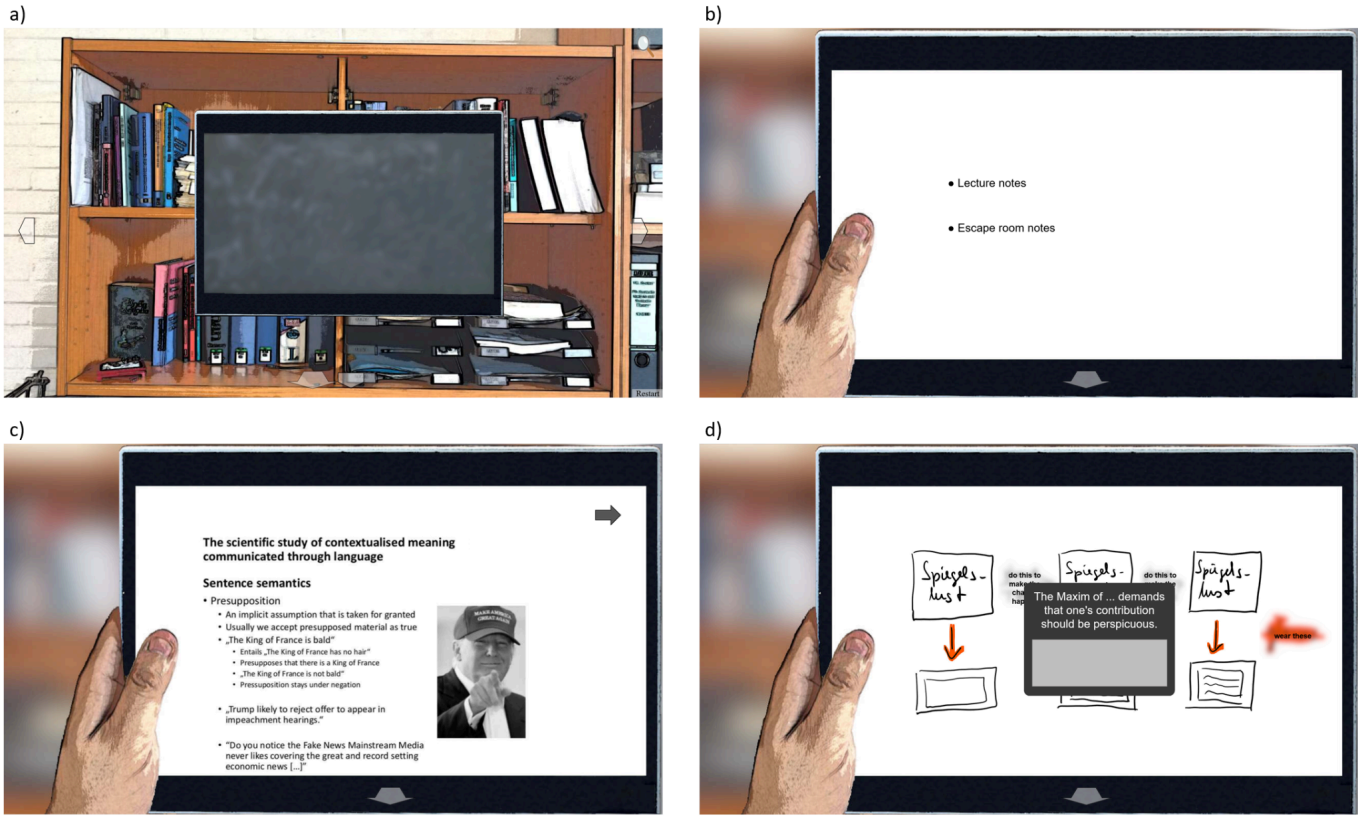

Figure 13: Immersive support in *The Linguist's Lair*.

Secondly, the game provides recurring puzzle elements in the different rooms. That is, after their first encounter with a particular puzzle type, the players will recognize the same puzzle type later in the game. They will know that they have solved it before and they will feel confident that they can do it again. From an SDT perspective, any successfully solved previous occurrence of the same puzzle type serves as positive reinforcement and feedback, resulting in increased intrinsic motivation (Deci, 1971). For instance, above I mentioned colored key holes. This is a feature that can be found in all of the rooms. For instance, with the exception of the first (the green) key, all keys are locked in a box. They can only be opened after solving a long-menu type of question about a basic concept of the sub-discipline that the

room is about. The key box shown in Figure 14a), for example, can only be opened after showing basic knowledge about minimal pairs, namely, "A minimal pair is a combination of **two words** that differ in only one **sound**. Minimal pairs are used to identify **phonemes**, the smallest units that distinguish meaning." Each of the four fields contains three possible choices so that, should the player completely lack basic knowledge, they could obtain the key on the basis of trial and error. Another element that recurs in the game is a laptop game where the player has to solve four random single-choice questions within 30 seconds (on the right of the figure above). The next question will only be accessible once the previous question has been answered correctly. Any wrong answer will restart the game. Again, the idea is that the second time the player encounters this laptop game, they will be more confident as they have already solved one of these games.

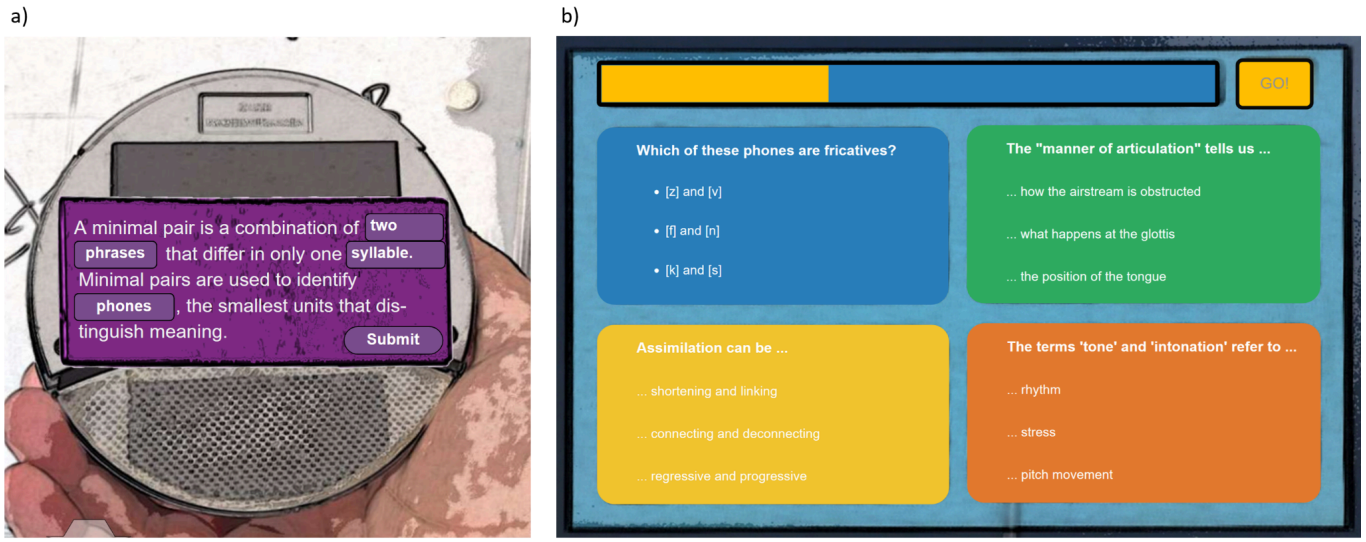

Figure 14: Two examples of recurring game elements.

The final mechanism to boost confidence has already been discussed in the context of flow, namely clear and immediate feedback. Csikszentmihalyi et al. (2005/2012) see the main function of feedback in "inform[ing] the individual how well he or she is progressing in the activity, and dictates whether to adjust or maintain the present course of action. It leaves the individual with little doubt about what to do next" (p. 232). Deci (1971, p. 105), in a series of experiments, found that when "positive feedback was used, intrinsic motivation tended to increase". Botturi and Babazadeh (2020, p. 45) maintain that "puzzles should [...] provide a clear feedback when solutions (correct or incorrect) are tested." Generally speaking, immediate feedback of the above kind gives the player the feeling of being an effective force in the game world. The player can change their environment, giving them a feeling of power and significance, thereby boosting their subjective competence. This is in line with Breien and Wasson (2021, p. 105), who list "objects in the world that may be altered, combined, or configured to overcome challenges and reach objectives" as one of four characteristics of narrative DGBL that have "positive effects on engagement, motivation and learning" (p. 104). As much as possible, therefore, *The Linguist's Lair* will make the player's progress visible, especially in those cases where they change the game world. An example is provided in Figure 15.

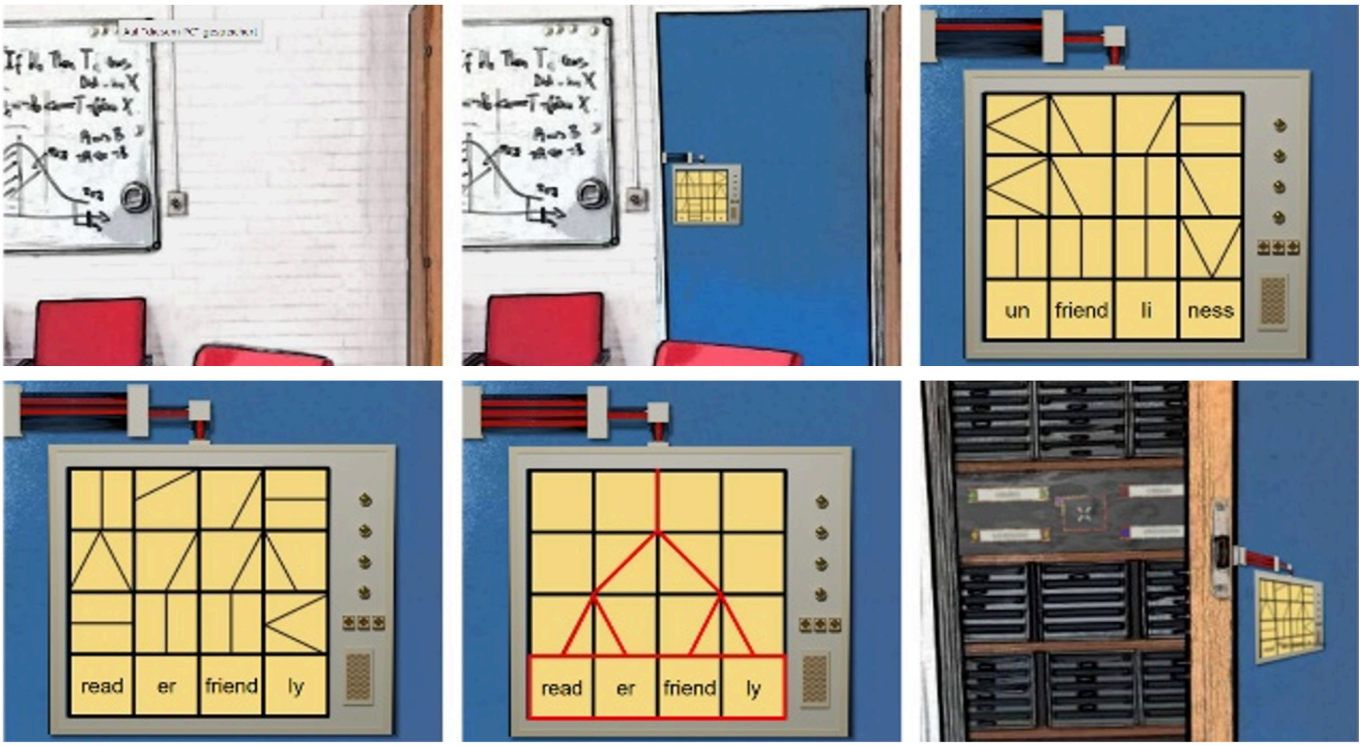

Figure 15: Making progress visible in *The Linguist's Lair*.

Activating the mechanism that reveals the hidden door is the first visible change that the player will create. They will then have to provide the correct morphological analysis of three complex words. Again, progress is made visible after each correct analysis through activation shown in one of three conductor lines. Only when all three are active will the door open and provide access to the next room.

The Linguist's Lair was designed in such a way as to minimise student frustration when tackling demanding linguistic content while at the same time maximising students' intrinsic motivation to 'do linguistics' and their subjective feeling of competence. In particular, it was assumed that a game that 1), provides opportunities to close knowledge gaps, that 2) makes use of recurring puzzle types and that 3) allows students to experience themselves as powerful actors in the game world would contribute to the creation of flow and a sense of confidence vis-à-vis a difficult discipline. The next section will take a look at how students of linguistics rated the game experience.

Three ways of providing the player with a feeling of competence: 1) the possibility to close knowledge gaps, 2) recurring puzzle types, 3) providing the player with a sense of power by making them change the game world.

3. Student feedback

This section reports on a short survey among students of English linguistics (both teaching degree and English language and linguistics). The results portrayed below will have to be taken with a (probably large) grain of salt for various reasons. First, the survey was part of an application for the excellency-in-teaching award of the federal state of Hesse in Germany and students were made aware of this. What is more, the phrasing in the invitation e-mail did have a tone that suggests that I am looking for supportive feedback:

Dear all,

good news: yesterday I heard that the university wants to send in 'The Linguist's Lair' as one proposal for the Hesse Award for Excellency in Teaching! Yay :-)
The Fachschaft told me that many students send them feedback - so, thank you very much for that!!!
To complete the application I need to also add an evaluation. I've uploaded a survey on ILIAS which should not take longer than 10 minutes to do. If you could find that time somewhere within the next five days, that'd be great. I will have to close the survey monday night, so that I can integrate the results in the application form.
The presentation of the survey results will consist of two parts: the first half will be a presentation of those questions which do not contain any freely formulated text. The second part will consist of general feedback which you can give as an answer to the last question. This would be comments like the ones that some of you already sent me via email or the Fachschaft in their feedback box. It'd be great if you could also find the time for a comment in the last question.
By the way, you do not need to have finished the game to complete the survey.
You can find the survey in the materials folder.
Thank you very, very much for your support.

Best wishes,

Rolf Kreyer

P.S.: I'll upload the results of the survey once I've compiled them.

Second, while the survey was conducted anonymously via the university LMS, students were not explicitly made aware of this. Third, the survey was conducted before the final exam and we can, of course, not rule out that some of the students wanted to provide me with a more supportive feedback lest I take vengeance in the final exam. Fourth, the survey was conducted in the beginning of 2021, when COVID had its strongest effects on student life. An educational escape room like *The Linguist's Lair* was a most welcome addition to other, typically less elaborate, forms of studying.The sentiment expressed by one of the students probably is representative of what many have felt: "At times like this (Corona, etc.), studying can be extremely boring. Lockdown means students have to stay home and watch online lectures. The game is a refreshing change in what has become a very monotonous student life."

With the above caveats in mind, let us take a look at the results. The survey was intended to get an idea of whether students generally liked the game and to what extent the game was able to change or improve students' attitude towards linguistics. In addition, the survey tried to find out whether the pedagogical and game-design considerations described in section 2 had the desired effect.

Figure 16 indicates that the overarching goal of providing students with a fun and accessible way to work with linguistic content has been reached. All informants either thought the game was 'excellent' or 'quite good' and, generally, students seemed to get a lot out of the game. 95% rated it as an excellent addition to the lecture and for almost three-quarters of the informants the game served as a motivation to explore linguistics. Almost two-thirds stated that the game helped them understand things better and all informants agreed that the game was useful additional practice. The vast majority (86%) thought it was a lot of fun.

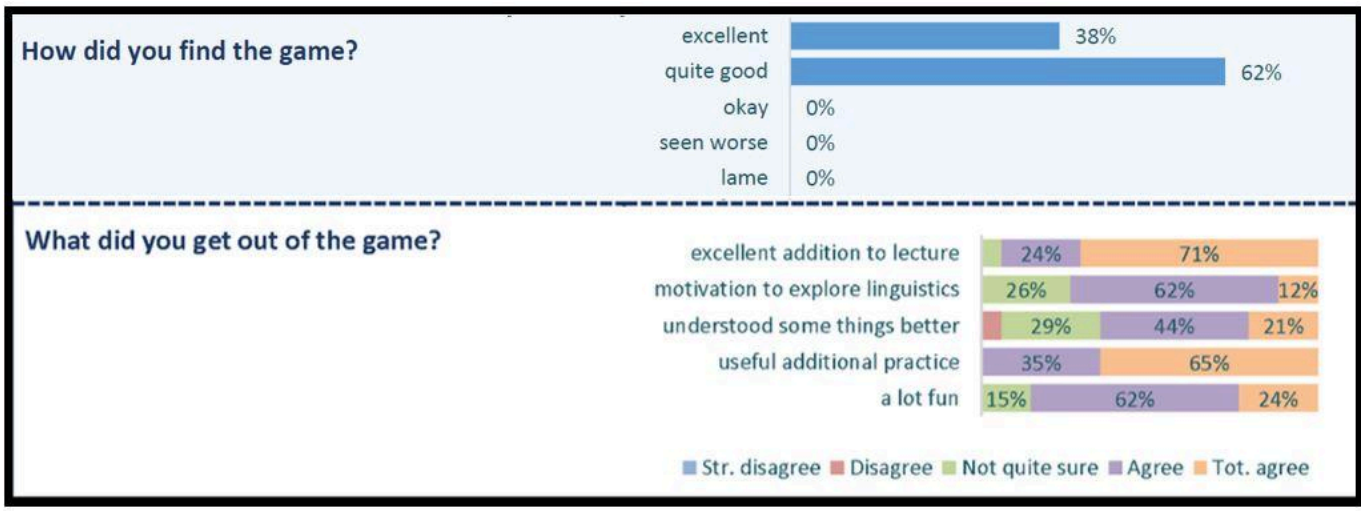

Figure 16: General feedback on The Linguist's Lair.

As for the riddles and puzzles (see Figure 17), the majority agrees or totally agrees that riddles were interesting and varied sufficiently (88%) and that there was a good balance between non-linguistic and linguistic puzzles (82%).

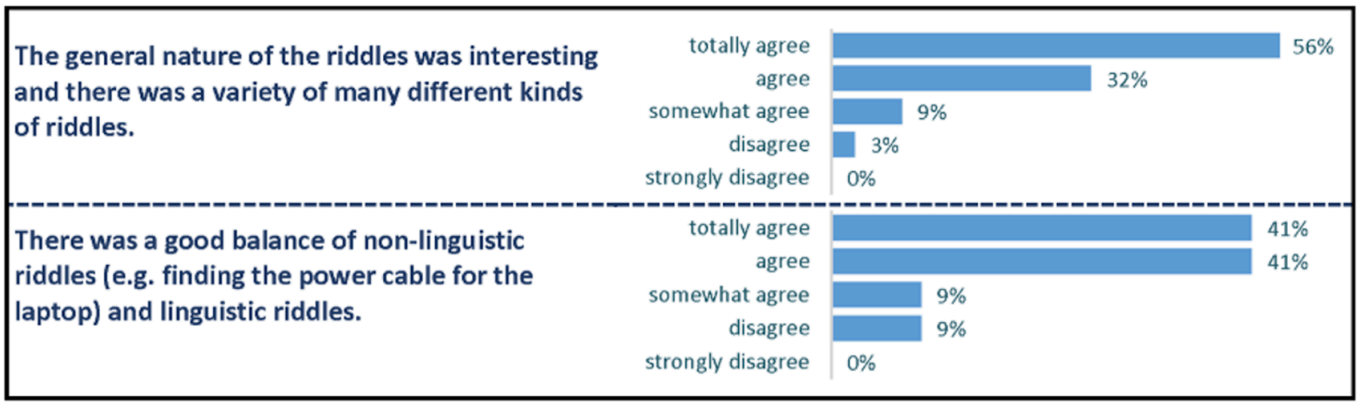

Figure 17: General feedback on the riddles.

The optional commentaries that some students provided (please note that these are the original comments that show all mistakes and errors) are particularly insightful, even though, of course, not representative (and contradicting at times). For example, one comment shows that (at least for this/these student/s) the recurring puzzle types achieved the desired effect:

> *After the third room, we knew how to solve the riddle. It was mostly the same pattern. But that is not bad at all. It was good because we knew were to start. I knew that you just have a limited amount of different tasks.*

Even though informants usually agreed that the balance between different riddle types was good, we also found critical voices. One student, for instance, criticised that the balance tipped in favor of the linguistic ones towards the end of the game:

> *With every progression there were more linguistic riddles. So i would agree in the beginning of the game but at a later stage, there are fewer non-linguistic riddles.*

Another student seems to be of the exact opposite opinion:

> *It was refreshing [sic] to have "non-linguistic riddles" at the start. Sort of demonstrating that this wasn't just tedious linguistics. But they started to distract from the main point quite fast.*

The rates for the perceived difficulty of the game (figure on the right) show that balancing on the whole was as intended with the difficulty being somewhere in the okay to difficult range. In addition, the fact that the linguistic riddles were by-and-large regarded as one 'unit' more difficult than the non-linguistic ones indicates that the non-linguistic puzzles (i.e. mostly 'difficult' and 'okay' as opposed to 'easy' and 'far too easy') fulfilled the intended effect, namely to serve as comparatively easy entry points to puzzle chains that contain more demanding linguistic puzzles. Another interesting fact that can be gleaned from this figure is that, primarily, help in solving the puzzles either came from co-players (53% agreement) and from in-game-hints and in-game lecture notes (55% and 52%, respectively). The lecture videos themselves, which are not part of the game, with an agreement of 29% (and no 'Totally agree') were comparatively rarely used to solve knowledge gaps. This shows that to a large extent players relied on the support structures provided through the game itself, thereby maintaining immersion.

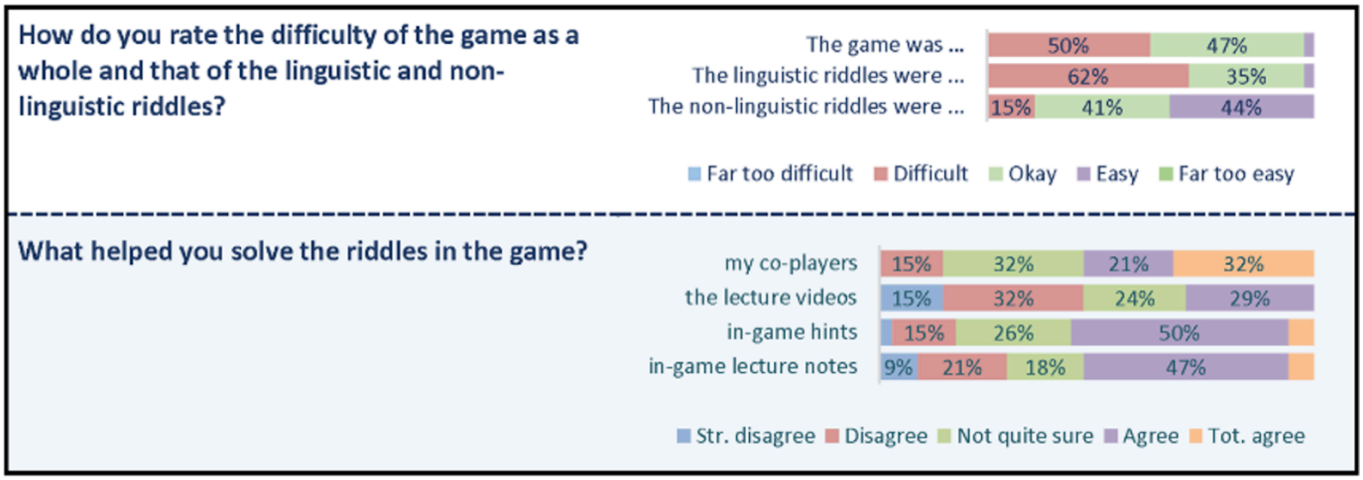

Figure 17: Difficulty of and assistance for the riddles.

Generally, the approach taken with *The Linguist's Lair* and the way the game was designed, appear to make the game a valuable resource for students, as the following comments show.

> *I always liked escape room games. I Just like to fiddle around and to pass something through trial & error. It encourages me to spend time and thought on something and the concept of a Escape Room Game combined with stuff I do in school is kinda interesting and also exciting.*

> *I am a huge fan of games, especially boardgames. But with this it came along with an excellent opportunity of practice and therefore gaining confidence in the skills I already had and an overview about what I still need to practice. The game helps to me to reflect on what we did in the lectures and tutorial!*

> *At times like this (Corona, etc.), studying can be extremely boring. Lockdown means students have to stay home and watch online lectures. The game is a refreshing change in what has become a very monotonous student life. Also, it was just a new and great way to teach linguistics. I have learned a lot.*

> *After starting it once, i really wanted to finish it, because it was genuinly fun probably started the game because I felt like I should give it a go but then I was really suprised how much I liked this different way of practice and now I only use it out of pleasure!*

> *I really enjoyed playing the game with some friends of mine. It was great fun and also good practise to see if I really understood the themes of the lectures.*
>
> *Really cool and really really good work!!! Thanks for all the effort you put into this!*
>
> *Dear Professor Kreyer, thank you, for all the work you have put into the escape room! I very much enjoyed and am still enjoying the game. I truly is an excellent addition to the lectures which allows revising, practicing and learning to be super fun yet challenging.*

A handful of students even sent emails to provide feedback on the game before the 'official' evaluation. One particularly beautiful and encouraging email will conclude this section.

> *Dear Mr. Kreyer,*
> *today some of us tried out your escape room.*
> *First of all we want to say that it was outstanding! Even though it took us about three hours to get to the black-light task (that was where we got stuck and paused) it never got annoying or boring. We want to thank you for all the hard work you put into it and it really is a great experience. We are looking forward to the next lecture and to continue working on the escape room. :-)*
> *Cheerio, your escape room adventurers*

4. By way of conclusion – "a complete success"

As I hope to have shown, *The Linguist's Lair* was a success in many ways or maybe in all ways, as the student's comment in the heading shows. However, in addition to the student perspective, I would also like to briefly comment on another aspect, namely the success it was for me personally. Success in the sense that I had **a lot of fun** creating the game.

Primarily, this refers to finding and implementing creative ways of testing (and teaching) linguistic competence. Being creative in that sense not only is beneficial for the students who play the game but also for me. Rarely did I have that much fun in designing learning materials. But even beyond 'translating' linguistic tasks into fun and creative escape-room tasks, the game allowed me to bring to fruition some of my own personal playfulness. In this spirit, I would like to conclude with a little game.

Even though I would not consider myself a movie enthusiast, there are some movies that I really like and am very enthusiastic about. When creating the game, it was one of the most fun aspects for me to put references to four of my favorite movies in the game. They are shown in Figure 19 below. The first is a message on the answering machine. It goes like this (imagine a dark and menacing voice):

> *I don't know who you are, I don't know what you want. If you are looking for the exam questions, I can tell you I don't have them. But what I do have is a very particular set of skills, skills acquired over a very long career, skills that make me a nightmare for people like you. If you manage to get out of my rooms, that will be the end of it. I will not come looking for you, I will not pursue you. But if you're trying to cheat, I will look for you, I will find you and I will fail you!*

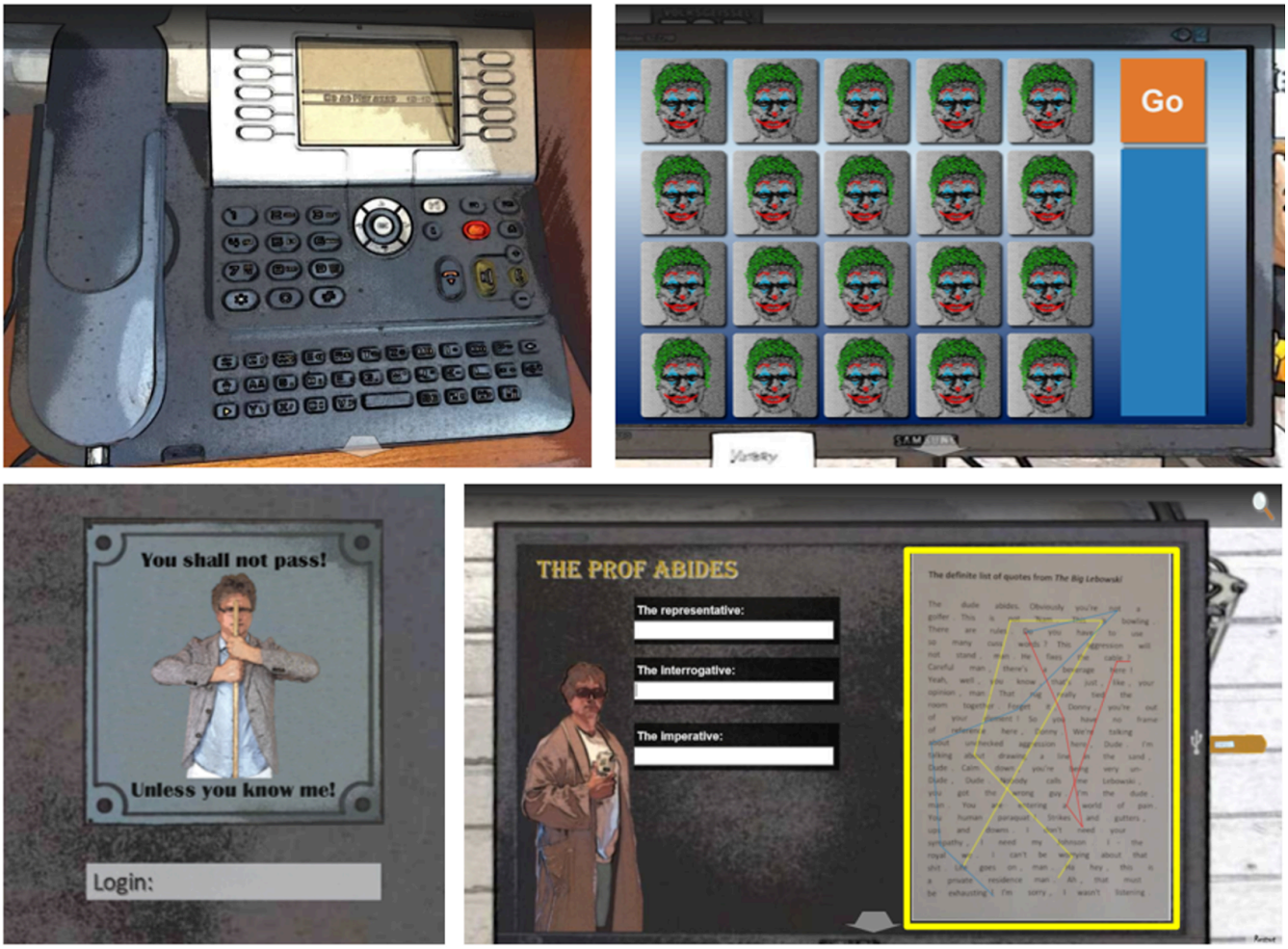

Figure 19: Having fun.

The other cues are visual only. Can you identify all four movies? The solution is provided at the end of the reference section.

Rarely did I have that much fun in designing learning materials. But even beyond ‘translating’ linguistic tasks into fun and creative escape-room tasks, the game allowed me to bring to fruition some of my own personal playfulness.

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