

Leveraging cognitive linguistic approaches to grammar teaching with multimedia animations

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Abstract

The present paper reports on a study which aims to explore the potential of using multimedia animations to make grammar principles of cognitive linguistic explanations more transparent to learners. Forty-nine students of German received instruction on the German passive voice. A first group (CA) worked with a cognitive linguistic explanation of the German passive by means of multimedia animations and performed tasks that aimed to foster the relevant conceptualization processes. Another group (TA) was presented with a form-based explanation of the German passive mainly focusing on the syntactic features. The results show that the CA group significantly outperformed the TA group, especially in the tasks where the passive was tested in larger discursive contexts and made use of the different types of passive sentences in a more appropriate way.

Keywords: cognitive grammar, metaphorization, foreign language learning, multimedia learning, grammar teaching

1 Introduction

Grammar is viewed by many teachers and learners as the biggest challenge of foreign language learning, not only because of its abstractness, but often because of its conceptual inaccessibility. This may explain why learners perceive grammar as tedious, monotonous or dry (Loewen et al., 2009). The Cognitive Linguistic approach (Lakoff, 1987; Lakoff and Johnson, 1980; Langacker, 2008; Talmy, 2000) is a fruitful way to describe grammar as a meaningful and conceptually motivated system that is in line with general principles of cognition such as salience, specificity, perspective, metaphorization as well as conceptual archetypes arising from embodied experiences in language, such as motion, force and space. Although the potential benefits of visual, cognitive linguistic explanations of grammatical principles in the context of second language (L2) teaching have been amply described

(see for example Achard, 2004; Suñer, 2013; De Knop and Perrez, 2014; De Knop and Dirven, 2008), empirical research has just begun to provide evidence for these descriptions' added value, especially those based on insights from Cognitive Grammar (see for example Bielak and Pawlak, 2011; Bielak, Pawlak, and Mystkowska-Wiertelak, 2013; Buescher and Strauss, 2015; Jacobsen, 2015; Liamkina, 2005; Lysinger, 2009; Masuda, 2013; Reif, 2012; Suñer & Roche, 2019; Tyler, 2008; Tyler, Mueller, and Ho 2011). The results of these studies are sometimes inconclusive, since they do not always show an overall positive impact on L2 learning. They also neglect to look into features that could have affected the success of a cognitive linguistic approach such as the mode of presentation (e.g. multimedia animations) or integration into a task-based setting (Roche & Suñer, 2016; Jacobsen, 2015). The current study examines to what extent cognitive linguistic explanations supplemented by multimedia animations can be implemented most effectively and help make some grammar principles more transparent to learners compared to form-based approaches as they can be found in many textbooks.

We will first discuss previous research on the usefulness of cognitive linguistic approaches to grammar teaching and present the theoretical underpinnings of an animated cognitive linguistic approach to teaching the German passive as well as the potential for the use of multimedia animations in the classroom. Then, we present the results of our study of animated cognitive linguistic instruction to English-speaking learners of German. Lastly, we discuss the results and discuss pedagogical implications for the implementation of multimedia animations in the foreign language classroom.

2 Literature Review

Over the past few years, the application of insights from cognitive linguistic approaches, and especially from Cognitive Grammar (Langacker, 1987), to foreign language teaching has received much attention. Earlier studies have focused mainly on the development of cognitive linguistic approaches to different areas of grammar and the formulation of general implications for the context of L2 learning, but they neglect to empirically evaluate their efficacy in real classroom settings (see for example Suñer, 2013; Bellavia, 2007; De Knop and Perrez, 2014; De Knop and Dirven 2008). A second group with still relatively few studies, however, developed cognitive linguistic approaches to

grammar teaching and tested their effectiveness empirically (Niemeier, 2017: 64). Many of these studies failed either to prove the superiority of cognitive linguistic approaches to grammar teaching when compared to textbook, form-based approaches or they could not make strong claims because of methodological problems (Bielak and Pawlak, 2011; Bielak et al. 2013; Kohl-Dietrich, Juchem-Grundmann, and Schnotz, 2016; Reif 2012; Tyler, 2008; Tyler et al., 2011). For instance, the intervention study by Bielak and Pawlak (2011) looked at whether a pedagogical approach grounded in cognitive linguistics could be used to teach the English progressive more effectively than the traditional approach commonly used in textbooks. The materials used the concept of a keyhole to elucidate the meaning of the progressive aspect as a way to zoom in on a single component within a processual event, whereas the non-progressive aspect was presented as the maximal frame of view that shows both the beginning and the end of a processual event. The analysis of the results shows that the cognitive linguistic group slightly outperformed the group with the traditional approach and the control group, but the differences were not statistically significant (see also the study by Reif, 2012). Another study by Bielak et al. (2013) tested using a cognitive grammar approach to teaching the active and passive voice in English. The results indicate that although the experimental group working with the cognitive linguistic approach achieved significant gains between the pre- and the posttest, they did not significantly outperform the group that was presented with the traditional approach. According to the authors, a reason for these unexpected results in both studies might be that the learners were not sufficiently acquainted with a cognitive linguistic approach to grammar. In a more recent study Kohl-Dietrich et al. (2016) investigated the teaching of the English phrasal verbs by using concepts such as radial categories and conceptual metaphors. The results revealed that the experimental group that worked on the conceptual motivation of phrasal verbs did not significantly outperform the control group on the retention test, but they achieved significantly better results on a test measuring the transfer to novel phrasal verbs.

By contrast, just a few studies of this second group demonstrate the effectiveness of applying insights from cognitive grammar to foreign language teaching, suggesting in some cases that other factors such as the nature of the classroom setting or the presentation mode might play an important role. The intervention study by Jacobsen (2015) showed that the group that combined a cognitive

linguistic explanation and a task-based classroom setting performed significantly better on the tests on the English conditionals than the group with a task-based setting and the control group. To the best of our knowledge, this is the only study that shows that the integration of a cognitive linguistic approach and task-based teaching offers an intriguing venue. However, as the study did not have a fully crossed factorial design including both variables, the findings should be treated with caution.

Another aspect that has proven to modulate the effect of cognitive linguistic approaches was the use of multimedia animations. Scheller (2009; see also Roche and Scheller, 2008) investigates the efficacy of presenting a cognitive linguistic approach to the two-way prepositions in German by means of multimedia animations. The fully crossed factorial design of the study included the approach (CL vs. textbook) and the presentation mode (animated vs. static pictures) as independent variables. The results show that such dynamic forms of visualization are well suited to support cognitive linguistic grammar explanations, since they can represent the relevant dynamic aspects of grammar, force, movement, energy transfer, etc., more robustly than static pictures. Interestingly, this was only the case for the group working with the animated cognitive linguistic explanation, which shows that only the combination of both conditions (CL and animations) leads to significantly better learning outcomes. Moreover, the study by Kanaplianik (2016) on the German modal verbs has stressed the importance of using everyday life concepts to explain the underlying concepts of grammar without having to adopt a myriad of linguistic terms. Finally, a study by Yasuda (2010) demonstrated that being aware of the metaphorical extensions of phrasal verbs can significantly improve the acquisition and production of the adverb particles, which contrasts with the findings from the study by Kohl-Dietrich et al. (2016) mentioned earlier. A possible explanation for these contradictory findings might be that the testing instruments used in both studies differ substantially. In the study by Yasuda (2010), fill in the blank exercises were used to measure the learning outcomes, whereas Kohl-Dietrich et al. (2016) used a wider range of task types and test formats allowing for a more fine-grained analysis of the learning outcomes. As progressive as all of these empirical studies are, learning outcomes were, in most cases, measured by means of tests that covered only a few dimensions of language ability (meta-knowledge, forms, accuracy in written texts) in the grammatical construction under consideration. In the future, empirical research should be expanded to include different task types and testing techniques

in order to provide a deeper analysis of the effects of cognitive linguistic approaches on the learning process (Reif, 2012).

In summary, the conclusions that can be drawn from those studies that successfully tested the effectiveness of cognitive linguistic approaches to grammar teaching are as follows (Roche & Suñer, 2016: 90; Williams, Abraham, and Negueruela-Azarola, 2013): First, to be successful cognitive linguistic explanations need to be supported by presentation modes that adequately illustrate the relevant aspects and actively engage learners in a process of meaningful learning. In this vein, multimedia animations are best suited to present linguistic and sensory-motor aspects of cognitive linguistic explanations in an integrated way that allows for more accurate mental models (Seel, 2003) and initiates mental simulation of grammatical concepts. Second, cognitive linguistic explanations need to be properly geared towards the learners' cultural knowledge, by means of so-called pedagogical metaphors, which use learner's everyday life experiences to make conceptual aspects of grammar more transparent, e.g. using a billiard game to elucidate the different participants in transitive events. Third, assuming that conceptual development does not occur solely by presenting learners with sophisticated learning materials such as multimedia animations based on cognitive linguistic approaches, adequate learning activities promoting the internalization of functional meanings are needed (Lantolf, 2007; Vygotsky, 1986; Williams et al., 2013).

3 A Cognitive Linguistic Approach to the German Passive

Cognitive linguistic approaches to language teaching offer an alternative to compensate for the widespread overemphasis on formal aspects, since they stress the importance of the conceptual motivation of grammar. In this sense, the framework of Cognitive Grammar (Langacker, 2008) has been found to be especially productive, due to its orientation towards general cognitive processes and its resulting high degree of plausibility (see also Roche & Suñer, 2016). In the first part of this section, we outline a cognitive grammar analysis of the passive voice, which is based on Arnett's (2004) and Langacker's (2004) work. In the second part of the section, we present how the perspective shift of the passive can be made more transparent to learners by using pedagogical metaphors supplemented by animations (see also Roche & Suñer, 2016).

According to Arnett (2004 for German) and Langacker (1982, 2004 for English), passive constructions are characterized by two parameters: profile/base and figure/ground. Langacker claims that the difference between profile and base is that events are construed in relation to a cognitive domain. For example, we understand the concept of ‘chair leg’ in relation to the entire chair, the chair leg being the prominent portion of the conceptual base (Langacker, 2008: 66). Like a part of an object, an event can have a profiled portion. Langacker (2004) and Arnett (2004) use an action chain to model the conceptual basis of a transitive event. Langacker (2004: 355-356) characterizes the action chain as “forceful interactions, each involving the transmission of energy [...] from one participant to the next.”. The participants in the action chain can be linked to conceptual archetypes that are based on repeated patterns of embodied experience with discrete objects, for example the movement of objects, the use of force, the internal or external change in objects, which are construed and represented in language as a metaphorization of objects in an abstract domain (Langacker, 2000: 24). According to Langacker (2008), the active and the passive can be described as two different representations of the same event structure because they highlight different participants in the action chain. This is shown in Figure 1.

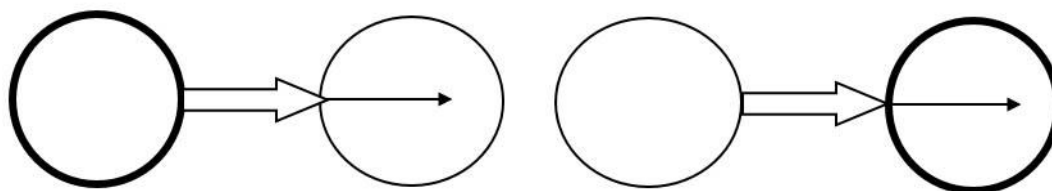


Figure 1: Active and passive action chain

In the active, the agent is the profile (figure) of the construction (shown in bold), since it initiates the energy transfer to the patient. The passive focuses on the patient energy sink (shown in bold) and its resultant change by the transfer of energy. Therefore, the speaker has the choice of how to represent prototypically transitive events because of the underlying cognitive understanding of the principle of figure/ground (Wertheimer, 1967), which allows the speaker to place a specific participant in the foreground and thus assign a higher salience in the construction (Suñer, 2013). In other words, the participant that is the focal point of the clause is the figure and the other participants that the figure is

in relation to are the ground. The fact that the figure can be different in the same event structure shows that the passive is not derived from the active, but rather engenders a different perspective of the action chain (Langacker, 2004: 78).

The German language, like English, allows a different focus on the change of state of the patient: The statal passive focuses on the end state of the patient after the process of change and the processual passive focuses on the actual change (Langacker, 1982; Arnett, 2004: 50). For example, in the following sentence, *Die Festplatte ist bereits repariert*. 'The hard drive has already been repaired.', the repair by the computer technician is assumed and in the background. It is a statal passive because the result of the process is highlighted and in the foreground. In the sentence, *Die Festplatte wird repariert*. 'The hard drive is being repaired.' the focus is on the process, more specifically the change between state A and state B, and not the end state, so this is a processual passive (Cornelis, 1997: 89). To summarize, we can state that the active and the processual passive and statal passive are three different representations of the action chain that show that difference by the conceptual profiling of certain participants in the context of other participants in the background (figure/ground) (Arnett, 2004; Cornelis, 1997; Langacker, 2004, 2008; Rapp, 1997).

Although such a cognitive linguistic explanation of the passive and active voice offers great potential for the visualization of its conceptual motivation, the action-chain model might only be a first step for learners to conceptualize the passive. We posit that cognitive linguistic schemas can be made more transparent by using pedagogical metaphors which serve as a bridge between abstract cognitive linguistic notions and the perspective of the learners. In order to make grammatical principles more transparent, conceptual metaphors from everyday life are used (Roche & Suñer, 2016). In the case of the passive, the conceptual basis of the clause and the salience of the foregrounded elements (figure/ground) can be illustrated by using the billiard ball model, which is literally shown in Figure 1, (Arnett, 2004; Langacker, 2004) and the spotlight model (spotlight on the area of primary focal prominence) as a pedagogical metaphor. The billiard ball model represents transitive event structure in a manner that is familiar to students. The billiard player (agent) initiates an action which results in an energy transfer through the cue stick (instrument) to the billiard ball (patient). The physical movement of the ball from one place to the other is the change of state. In addition to the transitive scene, the

spotlight shows the different salience of the participants by highlighting the figure/ground aspect of the scene. In the active, the spotlight is on the agent, in the processual passive the spotlight is on the change of state and in the statal passive, the spotlight is on the end state. The student can visualize the conceptual nature of the construction with the various salient participants set in the context of the background. This understanding takes place without the need for additional grammatical terminology or a lengthy explanation of why these constructions are related. The following screenshots of the animations in Figure 2 show the implementation of the above pedagogical metaphor:

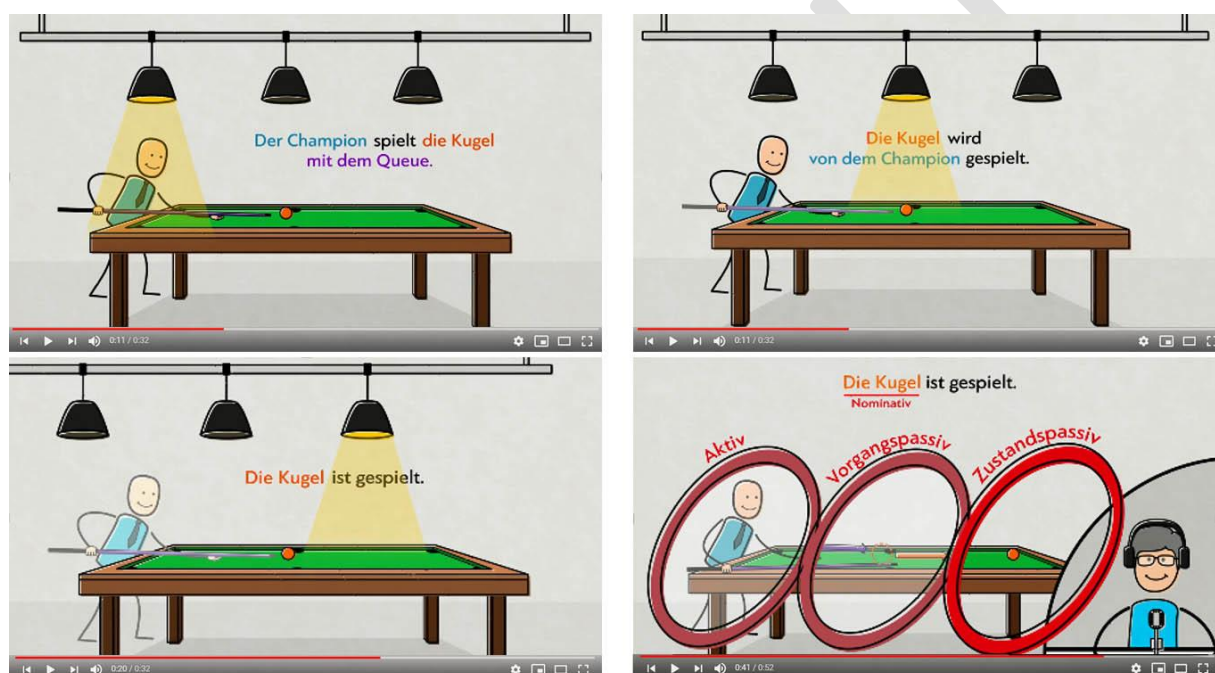


Figure 2. Screenshots of the animated pedagogical metaphors of billiard and the spotlight

In the first screenshot of Figure 1 (above left), *Der Champion spielt die Kugel mit dem Queue.* ‘The player hits the cue ball with the cue stick’, the focus on the agent in the active clause is shown by the spotlight on the player. In the second screenshot (above right), *Die Kugel wird vom dem Chanpion gespielt.* ‘The cue ball is being played by the player’, the spotlight has moved from the player to the transfer of energy to the patient, which will cause the billiard ball to undergo a change of state. The third screenshot (below left), *Die Kugel ist gespielt.* ‘The cue ball was played.’ shows the placement of the spotlight on the end state of the billiard ball. In this clause, the agent and the instrument remain in

the background. In the final screenshot (below right), the difference between the active, processual passive and the statal passive is shown as individual moments or conceptualizations of the same event. After viewing the drawings, the learner should have an integrated mental representation of the three construction types. In each screenshot, the participants are all integral parts of the event and its conception. The participants that are not profiled or do not appear in the clause at the surface level (speech) are backgrounded, but not excluded from conceptualization. Although this set of example sentences shows a change of state in the form of physical movement (caused motion, Langacker, 2004), similar pedagogical metaphors can be applied to more abstract domains and other change of state categorizations such as caused change of state and caused experience (Langacker, 2004: 68).

The presentation of these pedagogical metaphors in the form of multimedia animations offers great potential from a psychological perspective, as they provide an integrated presentation of linguistic and sensory-motor aspects of the underlying concepts of energy transfer and focus shifting. In this vein, psycholinguistic studies on metaphor comprehension have consistently shown that using mental simulation to evoke the concrete meaning of metaphoric expressions facilitates comprehension (Wilson and Gibbs, 2007, see also Johansson Falck and Gibbs, 2012). From a pedagogical perspective, the advantage of using animations over static pictures (see animation principle by Lowe and Schnotz, 2014) lies in that they visualize dynamic phenomena that are practically impossible to realize in the classroom (Betrancourt, 2005) and support learners' perceptions of how changes in the presented scene go along with conceptual changes. According to the cognitive load theory (Sweller, Ayres, and Kalyuga, 2011), it can be argued that animations will reduce the intrinsic cognitive load associated with the complexity of the phenomenon being learned on the one hand, and increase the germane cognitive load associated with an enhanced learning process on the other. Consequently, we expect that the use of multimedia animations for the presentation of pedagogical metaphors can facilitate mental simulation of the scenes described in the sentences (Grass, 2013) and, thus, lead to an increased understanding and more appropriate use of the passive and active voices.

Based on these insights, the current study sought to answer the following research questions:

1. To what extent do cognitive linguistic explanations supplemented by animations support the learning of passive constructions?

2. To what extent can cognitive linguistic explanations supplemented by animations support the appropriate use of the different aspects of passive constructions?

4 The Study

In this section, we describe the methodology of a classroom-based study in which the effectiveness of an animated cognitive linguistic approach to teaching the passive and active voice in German is examined.

4.1 Research Design and Participants

The study has a single-factor design and was carried out at the University of California (UC) Davis at the end of the first year of instruction. A total of forty-nine students took part in the study, which was the total enrollment for four sections of German. Sections 1 and 2 were the textbook approach group (TA; n=28) and sections 3 and 4 were the cognitive linguistic approach group (CA; n=21). All students were 18-22 years old and studying at a 4-year public university. In the TA group, there were 27 students who reported that English was their dominant language (none spoke another language or had lived outside the US) and one student who spoke Japanese had lived in the US for four years. The cognitive linguistic approach group had 21 participants of which 16 reported to be English dominant. One student who claimed to be most comfortable speaking English also indicated that she spoke Mandarin. Four students were from China and one was from Costa Rica and all were studying as regularly enrolled students at UC Davis, but had been in the US for less than 3 years.

Students in both groups had either begun German as true beginners in the fall or been placed in by WebCape (a computer-adaptive placement exam from Brigham Young University used nationwide for multiple languages). Since Webcape contains items on passive, learners would not have been placed in the beginners' course, if they completed those items correctly. None of the students reported that they used any German outside of class. All these sources of information as well as the observation of learners' productions led us to conclude that none of the students had prior knowledge on the German passive voice before the treatment, so no further pretesting was carried out.

In order to analyze to what extent both groups of L2 learners differed from native speakers with regard to the use of active and passive sentences in written text production after the treatment, seventeen native German speakers that were living in a German-speaking country at the time of the study were asked to write an essay following the same instructions as the L2 learners. Given the fact that the texts produced by the native speakers were comparable to those from the L2 learners in terms of task instruction, communicative situation, and text type, we took the native speakers' texts as a baseline for the analysis of different features of the passive use instead of a general corpus (see Lee and Deakin, 2016). The inclusion of such a control group of native speakers is a wide-spread practice in SLA research (see for example Boxell & Felser, 2017).

4.2 Teaching Materials and Procedures

The study targeted the effectiveness of using animated pedagogical metaphors to explain grammar, so the treatment phase was learner-centered and designed so that the students could have relevant communicative input and from that draw appropriate conclusions. Therefore, in addition to the animations, authentic texts were used and the exercises were designed to trigger the passive in meaningful situations, such as writing a recipe. Furthermore, the students' interaction with the animations was often collaborative and interactive, not just teacher-fronted. Special emphasis was put on activities that support conceptualization processes (Williams et al., 2013).

Following Scheller (2012) and Roche and Scheller (2008) the treatment in the experimental group was structured around the following five phases:

- a) Activation phase: In this phase, the students work with a text in which different stages of shipping a package by DHL are described. This process can be described with many occurrences of the passive, so it serves the purpose of activating the schema for the passive and its morphology, i.e. participle, verb conjugations, prepositional phrase. In this task, the students first answered questions to the text and then marked and discussed the differences between active and passive morphology and meaning.
- b) Orientation phase: After the activation of the passive schema and morphology for the statal and processual passive, the students are asked to discriminate among the various types of verbal clauses

that can represent the scene in the animation. At first, the animated scenes are presented without corresponding sentences, so that the students see the underlying conceptual base. In the next step, the various animations are shown with the corresponding sentences that denote a physical movement as a change of state (caused motion, Langacker, 2004). Prototypical scenes that take place in the spatial domain are used because they are most likely easier for the students to understand at this initial stage. Already with the first animation, the students can guess at the basic pedagogical metaphor represented by naming the participants present (or absent) in the clause. This is followed by asking the students to link sentences to their corresponding animation. The animations shown underscore the fact that three verbal phrases involved here, active, statal and processual passive, all have the same underlying transitive event structure, but realize it in three different ways.

- c) Systematization phase: In this phase, the students discuss their sentence pairing with the whole class and the role of the spotlight in foregrounding or backgrounding participants in the verbal complex. By focusing their attention on the role of the pedagogical metaphor we avoid the perception that the three constructions are ad hoc and unrelated, but instead are interconnected in that they express an event from three different perspectives.
- d) Exploration phase: In the penultimate phase, the students practice the use of the pedagogical metaphors with additional sentences that represent scenes that are less prototypical, for example, a caused change of state 'The car was repaired by the mechanic' or a caused experience 'The overworked professor was woken up by the obnoxious border collie'. Following this activity, the students are asked to make their own drawings and write sentences in the active, statal and processual passive. When the students are done, they share their drawings and sentences with the whole class.
- e) Skill using phase: In the last phase, the students have the opportunity to use the passive in an open-ended activity in which they write down a recipe of their choice and send it to a friend.

The TA group used the same materials and followed the same teaching phases as the treatment group, but the approach to the passive followed the explanation, examples, and exercises provided in

the textbook *Deutsch Na Klar* (Di Donato, Clyde, & Vansant, 2015). The form-based approach used in this textbook sets out to present syntactic features of the passive, whereas the semantic aspects are treated only with regard to the single word-specific meanings.

4.3 Data Collection

In order to assess the use of the passive and active competence, a test was administered after the treatment phase. The test, which was developed for this study, was based on the assumption that the passive and active voice, like every other symbolic structure in the language, consists of formal and semantic and discourse/pragmatic features (Croft, 2007: 472; Langacker, 2008) which, in the case of German, can be theoretically defined with Wegener (1998: 144-146) as follows: from a formal perspective, grammatical competence with respect to a verbal phrase is the correct formulation of the verbal structure (auxiliary verb, participle, subject-verb agreement) as well as using the correct case marking for the participants in the verbal phrase. A semantic view of grammatical competence is to first recognize the relative salience of the participants and then conceptualize the entire scene even if all of the participants are not present in the clause. A functional view of grammatical competence of a verbal phrase is the appropriate pragmatic use or usages in written or oral communication, which is assumed to reflect the intended meaning and certain constructional specifications according to the communicative context (Langacker, 2008: 39). With this in mind, the test administered to the students aimed to ensure a proper elicitation of the full range of aspects concerning the active and passive voice (see Table 1, see also Reif, 2012).

Table 1. Summary of tasks on the posttest

No.	Task type	Test format	Task description	Assessed performance
1	Fixed response	Multiple Choice Test	Mark the correct sentence	Formulation of the verbal structure (auxiliary verb, participle, subject-verb agreement) and the use of the correct case marking for the participants in the verbal phrase.
2	Open response	Explanation	Explain the differences between sentences in the active, statal passive and processual passive	Recognition of the relative salience of the participants and conceptualization of the scene with varying number of participants.

3	Fixed response	Gap fill test	Fill-in the correct verb form in active and passive sentences within a text	Appropriate pragmatic use or usages in oral communication.
4	Open response	Structured text production	Write a short text on how to organize a party to celebrate the end of the quarter (approx. 180 words)	Appropriate pragmatic use or usages in written communication.

In the first task (5 items), the students were tested on the formal aspects of the verbal phrase by a multiple-choice test. In the second task (4 items), the students were asked to differentiate between the active and passive either by explaining it in writing or by drawing it. The task aims to test how well the learners can explain the semantic aspects of the verbal phrase and if they understand the underlying grammatical metaphor and the role of participants that are not mentioned in the clause. In contrast to tasks 1 and 2, task 3 (12 items) is aimed at assessing the language ability of students regarding the discourse/pragmatic aspects of the passive voice in communication. For this task, the learners need to produce the correct form of the passive in a cloze text. The texts show four different situations such as a car repair shop, the post office, a hotel, etc. The use of the statal or processual passive is inferred from the context of the conversation on the sentence level, for example, by the use of adverbs or conjunctions, and on the text or discourse level by using schema or general knowledge. Lastly, the fourth task asked the students to write a short text to a prompt that asked them to describe a process. The purpose of the task was to test the language ability regarding the passive voice in the communicative-functional realm. The comparison with the baseline data from the native speakers' group allowed us to observe whether L2 learners make an appropriate use of the different passive constructions and whether some of the aspects are being over- or underused. To this end, the average proportion of sentences for each type of voice and the average proportion of passive sentences with different usage of role arguments was considered for the analysis.

After the treatment phase, the students answered a questionnaire about the animations used to explain the grammar, the exercises used to supplement the explanation and the design of the animations.

4.4 Data Analysis

The four tasks were weighted at 25% within the test, since all tasks covered dimensions that were equally relevant to the assessment of the passive competence. So students could receive a total score of 20 points for the test. In order to ensure a proper assessment of the tests, two external raters with a broad expertise in assessing grammar acquisition were brought in and trained in advance with a subset of the data (5%) for each of the different tasks. Due to the different formats of the tasks, we used different measures to calculate the interrater reliability. For those tasks with categorical data Cohen's Kappa was used (Tasks 1 and 3), whereas a Pearson product-moment correlation was run for tasks with continuous data (tasks 2 and 4). Task 1 (MC-test) was assessed by the external raters by using a sample answer sheet which had been previously reviewed by three native speakers. In task 2 (explanation task), answers were assessed with regard to whether they referred to the semantic aspects (1 point) or just relied on formal differences between the sentence pairs (0 points). As some students made use of the pedagogical metaphors to explain the semantic aspects, both drawings and written answers were accepted as correct if they correctly addressed the semantic aspects. If the answers did not cover all semantic aspects (e.g. reference to a figure/ground change, but no mention that the instrument was left out), only 0.5 points were credited. A Pearson product-moment correlation was run to test the interrater reliability, indicating that the judgments of the raters concerning the appropriateness of the explanation had an excellent agreement ($r = .989, p < .000$). In task 3 two independent raters assessed the correctness of the answers, which accepted in some cases more than one possible answer for each gap in the text. The raters agreed on 97% of the answers, which indicates an excellent agreement according to Cohen's Kappa ($k = 0.883, p < .000$). For task 4, the essays of students were assessed by two independent raters on the basis of a rubric covering formal accuracy, semantic adequateness and discourse-functional appropriateness (see description of sub-dimensions of the passive competence in the section on data collection). Even if each criterion can be scored subjectively, the analytic approach was chosen instead of holistic assessment, since it achieves better reliability and enables criteria driven discussion of the scores between the assessors in case of disagreement (Johnson, Penny, and Gordon, 2001). There was a strong, positive correlation between both raters according to Pearson ($r = .992, p < .000$), which indicates an excellent agreement.

Disagreements were discussed until consensus was reached on final coding. Finally, the essays both from the L2 learners and the native speakers were analyzed according to the following categories: Average proportion of sentences for each type of voice (processual passive, statal passive and active), average proportion of passive sentences with different usage of role arguments (patient-only, patient-agent, patient-instrument or agent-patient-instrument) and average sentence length within each essay. All essays were scored by one of the two raters with regard to the type of voice and the role arguments. The second rater double-checked the scores for a subset of the data. Both raters were in good agreement according to Cohen's Kappa ($r = .905, p < .000$).

5 Results

The descriptive statistics of the test on passive and active are shown in Table 2 and expressed in mean scores for each task separately. A visual inspection of the histograms and Q-Q plots revealed that the data gathered were normally distributed across the groups, which was confirmed by corresponding Shapiro-Wilk tests ($p > 0.5$). Accordingly, we conducted the parametric two-tailed t-test for independent samples in order to analyze whether the differences between the groups were significant. The results of the t-tests and the respective standardized effect size (Cohen's d) are also reported in Table 2. For all inferential statistics the significance level was set at $\alpha < 0.05$. In order to interpret the effect size, we followed the ranges indicated by Cohen (1988), which are: $d \geq 0.2$ for small effects, $d \geq 0.5$ for medium effects and $d \geq 0.8$ for large effects.

Table 2. Mean scores in the posttest (overall and individual tasks) with the respective p values and effect size (Cohen's d)

	Textbook approach (TA) Group (n=28)	Cognitive approach (CA) Group (n=21)	Sig.	Effect size (Cohen's d)
Total score	$M = 8.75$ $SD = 2.89$	$M = 12.45$ $SD = 2.95$	<0.000	1.269
Task 1 (formal aspects, multiple choice test)	$M = 1.86$ $SD = 1.15$	$M = 2.48$ $SD = 1.47$	0.104	0.478

Task 2 (semantic aspects, sentence pair analysis)	$M = 1.65$ $SD = 0.94$	$M = 3.40$ $SD = 1.20$	0.000	1.653
Task 3 (functional aspects, fill in the blank)	$M = 3.86$ $SD = 1.01$	$M = 4.44$ $SD = 1.11$	0.019	0.550
Task 4 (functional aspects, written essay)	$M = 1.38$ $SD = 1.11$	$M = 2.14$ $SD = 1.39$	0.047	0.614

Regarding the performance of the participants on the posttest on the active and passive voice the total mean scores show that the cognitive linguistic approach group (CA) outperformed the group with the textbook approach (TA), which indicates that the cognitive linguistic explanations supplemented by animations led to a greater increase of student's performance regarding the use of passive and active voice than the more form-based approach to the passive used in the textbook. As expected, the t-test shows that this difference was highly significant ($t(47) = 4.379, p < .000$). However, the analysis of the results of each task separately reveals that the difference between both groups does not occur to the same extent in the dimensions assessed in the test. Whereas the cognitive linguistic approach group achieved considerably better results for the tasks relating to semantic and functional aspects of the passive, both groups performed similarly on the task concerned with the formal aspects. As a next step, t-tests were conducted in order to determine whether the differences were significant. The results show that the differences between the mean scores of the groups in the task on semantic aspects ($t(47) = 5.528, p < .000$) and the tasks on functional aspects (Task 3: $t(47) = 2.423, p = .019$; Task 4: $t(47) = 2.056, p = .047$) were significant. In contrast, the t-test reveals that the difference between the groups in the task on formal aspects of the passive was not significant ($t(47) = 1.599, p = 0.104$), even if the CA group achieved slightly better results than the TA group. Overall, the results reveal low performance on task 1 when compared to tasks 2 and 3. These results suggest that the cognitive linguistic explanations supplemented by animations did not significantly facilitate learning the formal aspects of the passive and active voice when compared to the semantic and functional aspects.

We also looked into whether the different aspects of the use of passive and active constructions were best supported by cognitive linguistic explanations supplemented by animations.

To this end, we compared the text production in task 4 (essay) of both groups of L2 learners with a group of L1 speakers (n=17) that performed exactly the same task and was considered as baseline for the appropriate use of those aspects from passive and active voice. The weighted average proportions for each type of passive sentence are displayed in Table 3. The data were analyzed first by means of a visual inspection on the basis of histograms and Q-Q plots, which showed that they were not normally distributed across the three groups. The corresponding Shapiro-Wilk tests ($p > 0.5$) provided inferential statistical evidence. Accordingly, the non-parametric Kruskal-Wallis test was used for the analysis of between-group differences. For the post hoc pairwise comparisons we used the Mann-Whitney U Test with Bonferroni correction for multiple testing. The effect size measure used both for the omnibus tests and the post hoc comparisons was η^2 , which was interpreted according to the ranges suggested by Cohen (1988): $d \geq 0.01$ for small effects, $d \geq 0.06$ for medium effects and $d \geq 0.140$ for large effects.

Table 3. Average proportion of passive sentences with different role arguments in task 4 (essay)

	Textbook approach (TA) Group (n=28)	Cognitive approach (CA) Group (n=21)	L1 Speakers' group (n=17)
Patient-only sentences	$M = 2.11$ $SD = 2.69$	$M = 3.90$ $SD = 3.41$	$M = 2.64$ $SD = 1.71$
Agent-patient sentences	$M = 1.82$ $SD = 2.70$	$M = 1.39$ $SD = 2.09$	$M = 0.42$ $SD = 0.53$
Agent-patient-instrument sentences	$M = 0.00$ $SD = 0.00$	$M = 0.00$ $SD = 0.00$	$M = 0.07$ $SD = 0.27$
Patient-instrument sentences	$M = 0.00$ $SD = 0.00$	$M = 0.05$ $SD = 0.22$	$M = 0.06$ $SD = 0.18$

With regard to the role arguments used in passive sentences, all groups showed a similar pattern across the different types of passive constructions with the *patient-only passive sentences* used most often, followed by the *agent-patient passive sentences*, the *agent-patient-instrument sentences* and the *patient-instrument sentences* (see Figure 2). If we look into the between-group differences, we

can observe that the CA group overused patient-only sentences when compared to the L1 speakers' group, while the TA group used these sentences slightly less frequently. However, no statistically significant differences were found between the groups ($\chi^2(2) = 4.969, p = .083, \eta^2 = 0.380$). With regard to the *agent-patient sentences*, both TA and CA groups overused this type of passive construction when compared to the L1 speaker group, although these differences were not statistically significant ($\chi^2(2) = 1.452, p = .484, \eta^2 = 0.032$). As far as the *agent-patient-instrument passive sentences* are concerned, both groups of L2 learners (CA and TA) showed a similar pattern in that they did not use this type of sentence. In contrast, L1 speakers made use of these sentences, though to a very low degree. The differences between the groups were not significant ($\chi^2(2) = 2.882, p = .237, \eta^2 = 0.278$). Regarding the *patient-instrument passive sentences*, the pattern across the groups was slightly different than for the previous sentences types. Whereas the CA group and L1 speakers group made minimal use of this sentence type, the TA group did not really use it. The Kruskal-Wallis test revealed that the differences were not significant ($\chi^2(2) = 3.230, p = .199, \eta^2 = 0.161$).

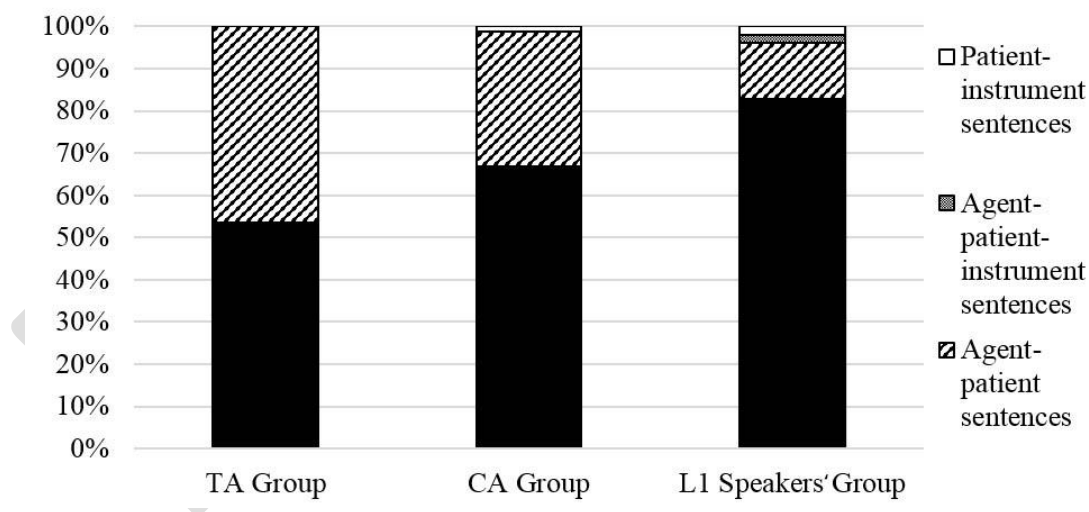


Figure 2. Proportion (in percentage) of passive sentences with different role arguments in task 4 (essay) for each group

As a next step, we looked into the distribution of the different types of passive sentences (statal and processual) and active sentences across the groups (see Table 4). The statistical analysis

was carried out by using non-parametric tests (Kruskal-Wallis and Mann-Whitney U Test) with a Bonferroni adjustment for multiple testing.

Table 4. Average proportion of statal, processual and active sentences in task 4 (essay)

	Textbook approach (TA) Group (n=28)	Cognitive approach (CA) Group (n=21)	L1 Speakers' Group (n=17)
Statal passive sentences	<i>M</i> = 0.026 <i>SD</i> = 0.135	<i>M</i> = 0.27 <i>SD</i> = 0.52	<i>M</i> = 0.32 <i>SD</i> = 0.43
Processual passive sentences	<i>M</i> = 3.96 <i>SD</i> = 3.48	<i>M</i> = 5.11 <i>SD</i> = 3.70	<i>M</i> = 2.99 <i>SD</i> = 1.96
Active sentences	<i>M</i> = 5.09 <i>SD</i> = 3.74	<i>M</i> = 4.24 <i>SD</i> = 3.61	<i>M</i> = 6.61 <i>SD</i> = 2.02

The results showed that statal passive sentences were the least used and made up an average of 3.2% or less of all transitive sentences in the essays. The L1 speakers used them more frequently (3.2%), followed by the CA group (2.7%) and the TA group (0.2%). The between-group differences were found to be statistically significant with a very large effect size ($\chi^2(2) = 12.442$, $p = .002$, $\eta^2 = 0.166$). The post hoc pairwise comparisons revealed a significant difference between the TA group and the L1 speakers' group ($U = -15.116$, $p = .001$, $\eta^2 = 0.605$), whereas no further significant differences were found in the other pairwise group comparisons (CA group vs. L1 speakers' group $U = 2.661$, $p = .308$, $\eta^2 = 0.701$; TA group vs. CA group $U = -7.631$, $p = .182$, $\eta^2 = 0.683$). Regarding the distribution of processual passive sentences and active sentences, we can observe that the CA group used more processual passive sentences (51.1%) than active sentences (42.3%) in their essays (see Figure 3). The opposite is true for the other two groups, who made use of active sentences much more frequently (TA group = 50.8%, L1 speakers' group = 66.1%) than processual passive sentences (TA group = 39.6%, L1 speakers' group = 29.9%). Although this is a different pattern, no between-group differences were found for the use of processual passive sentences ($\chi^2(2) = 3.208$, $p = .201$, $\eta^2 = 0.019$) or for the active sentences ($\chi^2(2) = 4.586$, $p = .101$, $\eta^2 = 0.041$).

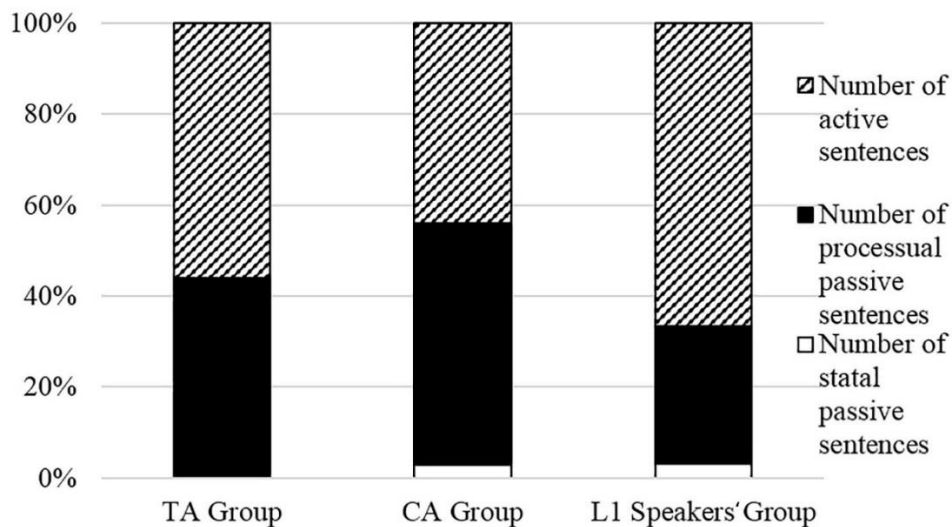


Figure 3. Proportion (in percentage) of statal, processual and active sentences in task 4 (essay) for each group

Finally, we looked into how learners estimated the usefulness of the treatments (CA and TA). We found that the experimental group rated the treatment significantly better than the TA group ($U = 2.108$, $p = .035$, $\eta^2 = 0.71$). The importance accorded to the technology in language learning is not correlated with the test performance ($r(44) = -.133$, $p = .390$). The test performance was not correlated either with the ratings of the animation design ($r(21) = .023$, $p = .921$) or the helpfulness of the explanations ($r(21) = .158$, $p = .495$).

6 Discussion

The first research question concerned the effectiveness of a cognitive linguistic approach to teaching the passive and active voice in German supplemented by the use of animations. The results from the language performance tests showed that the cognitive linguistic approach substantially aided learning the different dimensions of the passive and active voice in the experimental group when compared with the textbook approach. This is in line with the findings from previous studies (Jacobsen, 2015; Roche and Scheller, 2008; Kanaplianik, 2016; Scheller, 2009; Yasuda, 2010), which successfully showed the added value of cognitive linguistic approaches. The analysis of each task of the test, however, showed that the increase in learning is dependent on the different dimensions of the

construct (formal, semantic and discourse-pragmatic aspects). Whereas the CA group significantly outperformed the TA group for the tasks relating to semantic and functional aspects of the passive, the difference between the mean scores of both groups on the task concerned with the formal aspects was not significant, even if the CA group achieved slightly better results than the TA group. It is also worth mentioning that the greatest difference between both groups was found in the results on the task relating to semantic aspects of passive and active voice. This task consisted of explaining the relationship between two sentences differing from one another in terms of the role arguments and the voice used in the sentence. In fact, most students in the CA group perceived the sentences as form-meaning pairs and made use of the pedagogical metaphors presented in the animations in order to comment on aspects such as deagentivization. A small minority of students in this group, however, focused on the formal aspects and left the meaning difference completely out of their explanation (e.g. by just describing the presence or absence of role arguments in the sentence), exhibiting low performance similar to the TA group. Thus, not every student in the CA group successfully adopted the pedagogical metaphors in the animations as a learner strategy, which supports the idea that using an alternative pedagogical method in one specific area of grammar might not be enough to show learners the metalinguistic purpose of such pedagogical metaphors. This observation is in agreement with the conclusions of the studies by Bielak and Pawlak (2011) and Reif (2012), who argue for a comprehensive approach to grammar with an increased exposure to cognitive linguistic notions and thereby the simplification and optimization of grammar teaching. Taken together, the cognitive linguistic explanations supplemented by animations led to a richer understanding and a better mastery of the different aspects of the passive and active voice when compared to the textbook approach, even if not every student benefited.

The second question asked which aspects of the use of passive constructions can be best supported by cognitive linguistic explanations supplemented by animations. The results show on the one hand that the L2 learners in both groups differed in many ways from the L1 speakers in the use of the role arguments in the passive sentences and the distribution of the different types of sentences in the essays. On the other hand, we also found similar patterns across all three groups such as the overall preferential use of only-patient passive sentences over the other types. The most remarkable difference

remains the fact that the TA group failed to use statal passive sentences when compared to both the CA group and the native speakers' group. In other words, students in the CA group were able not only to shift the perspective of the same event from the agent to the patient, but also give a more detailed picture of what kind of change of state the patient underwent. It can thus be reasonably assumed that the integration of active, processual and statal passive into the same event facilitates a better understanding of the perspective shift and provides the learner with a more manageable mental model which enhances text production.

Although the results obtained in this intervention study are promising, methodological limitations do not allow strong conclusions about the effectiveness of using animations to leverage cognitive linguistic approaches. In order to make such a claim, a group would be needed that works with a cognitive linguistic approach without animations. In this case, we would expect that the group with the animated pedagogical metaphors would outperform the other groups on the semantic and communicative-functional aspects, but not on the formal aspects because these were taught in both groups. But more importantly the results do not allow us to assume that the combination of both aspects leads to better results, since we did not have a fully crossed factorial design (2x2 groups) with the type of approach and the use of animations as independent variables. Also, we cannot exclude that both groups differed in their prior knowledge on passive before the treatment, although we carefully checked all learner data available (placement test, learner texts, linguistic biography, etc.). Furthermore, it would be appropriate to test the duration of the students' learning by offering a delayed posttest at 3-4 weeks or even longer after the treatment (see Kanaplianik, 2016). However, the relatively wide range of test formats used and the differentiated definition of the test construct allowed us to explore the effect of the treatment at a finer level of granularity when compared to previous studies on the effectiveness of grammar animations (e.g. Kanaplianik, 2016; Scheller, 2009; Tyler et al., 2011).

7 Conclusions

The present study attempted to evaluate the effectiveness of an animated cognitive linguistic approach that aims to make the meaning of grammar more transparent by drawing on situations and experiences

from everyday life which students can better relate to. In this context, the use of multimedia animations appears to be a highly valuable presentation mode that increases the comprehensibility of cognitive linguistic explanations and facilitates the creation of form-meaning pairings, since the learner can actively conceptualize the scenes expressed by the respective grammar constructions without having to adopt metalinguistic terms. In this sense, cognitive linguistic approaches supplemented by animations open up new perspectives on how to integrate such a learner-centered grammar instruction and communicative language use and paves the way for further research in this field.

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