

RADBOUD UNIVERSITEIT NIJMEGEN  
FACULTEIT DER LETTEREN



Radboud Universiteit Nijmegen

**Incidental morphosyntactic learning  
in a second language during conversation**  
*The acquisition of stem allomorphy in German strong  
verbs by adult native speakers of Dutch*

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Masterproef aangeboden binnen de opleiding  
Master Taalwetenschappen  
Academisch jaar 2016-2017

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08 februari 2017



## Abstract

While second language acquisition (SLA) through immersion in second language environments is very common, our knowledge about the underlying mechanisms of uninstructed SLA is restricted. In recent years there has been a growing body of psycholinguistic research investigating explicit and implicit L2 knowledge, learning and training (DeKeyser, 2003; R. Ellis, 2005, 2009; Williams, 2009). However, comparative studies have often been biased toward advantages for explicit instruction and learning (Morgan-Short, Steinhauer, Sanz, & Ullman, 2012; Norris & Ortega, 2000) and many studies tend to use a (semi-)artificial language paradigm (e.g., DeKeyser, 1995; Leung & Williams, 2011, 2012, 2014; Rebuschat & Williams, 2012; Williams, 2005), which may by its very nature alter the cognitive mechanisms thought to operate in implicit learning. The generalizability of the findings to L2 learning in natural contexts remains questionable (Robinson, 2010).

Our study aims to address this research gap by investigating the acquisition of a morphosyntactic aspect in a natural language (verb-stem allomorphy in German strong verbs) in a communicative, yet experimentally controlled context (also see De Vos, Schriefers, & Lemhöfer, in preparation; De Vos, Schriefers, & Lemhöfer, submitted). A meaning-based conversational task was used to measure learning from native speaker (NS) input. We compared the learning outcomes of advanced L2 German learners (L1 Dutch) in an implicit ( $n = 10$ ) and an explicit ( $n = 10$ ) instruction condition. In the implicit condition, a cover story concealed the study's intentions; in the explicit condition, learners were aware of the research topic, i.e. learning of the obligatory stem-vowel change in German strong verbs from native speaker input during conversation.

In both conditions, the participant and the experimenter (L1 German) engaged in a scripted dialogue and produced, in turn, semantically plausible sentences. These were based on a set of pictures and contained either a stemvowel-changing or non-stemvowel-changing verb. Participants produced all critical items twice; between both production moments, the experimenter produced two sentences containing the correct verb forms, but only for half of the critical items. Learning was measured in terms of participants' improvement in accuracy on critical items after being exposed to correct native speaker input, as compared to accuracy scores on items for which no correct input was provided.

Comparable amounts of learning were found for both groups, as reflected by an improvement on critical items after exposure, while no improvement was observed in the absence of correct input. A retrospective interview revealed that participants in the implicit group had noticed the presence of strong verbs, but were not aware of the study's learning purpose, suggesting that they engaged in incidental learning processes. The absence of significant group differences at the level of learning suggests that explicit instruction did not have an apparent added value (for comparison, also see Andringa, de Glopper, & Hacquebord, 2011).

In sum, the findings illustrate that the principles of morphosyntactic learning can occur during conversation – incidentally or intentionally. Moreover, as the introduction of a certain degree of naturalness in the experimental design was successful, this method may represent a fruitful approach for future studies investigating implicit or incidental learning of other morphosyntactic aspects.

## Acknowledgements

First of all, I would like to thank my supervisors Kristin Lemhöfer and Johanna de Vos for their excellent guidance during the coming into being of this thesis. I enjoyed working with you a lot, and I was happy to be welcomed by your amazing and fun research group, even if I could not come to Nijmegen very often over the last couple of months. Thank you for your patience, for your time, for your advice, for all the things that I learned from you, and for the very fluent communication. I know that I sent plenty of e-mails – sometimes even five short messages instead of a single one – but still, surprisingly, you seemed to keep track of it and I received replies in very short time delays. Furthermore, I am aware of how lucky I was for having not only one but two excellent supervisors, both of them providing me with feedback on a regular basis. Developing and writing this thesis was a very intense and interesting experience during which I gained a lot of knowledge and improved my skills in conducting experimental research. I would specially like to thank Johanna for sharing a lot of tips and tricks which helped me make a good start as a linguistics researcher, and for getting me in touch with Kristin when I was looking for a thesis project. Thank you, Kristin, for your willingness to supervise my thesis, despite the fact that most of our communication had to happen from a distance.

I would like to thank Alex Housen and Aline Godfroid for having made this thesis project possible. Thank you for your advice, and for the confidence you have in me. And thank you for holding me back whenever my plans and ideas get a little too creative and oversized. I think that I will learn a lot of things from both of you in the future.

Furthermore, I would like to thank all the members of the *Research Master Language & Communication* at Radboud University Nijmegen. It was an honor to be part of the program, which was of excellent quality and which convinced me to pursue my way in linguistic research. It was a privilege to have almost as many program advisors as fellow students. I would like to thank Martijn Goudbeek and Roeland van Hout for teaching me a lot of statistics in very little time, and Mirjam Ernestus for being my tutor and giving me loads of precious advice.

There are many more people left to thank, and I prefer doing this in their native languages. I hope that I won't forget anybody, but just in case: I would like to thank all people who encouraged and supported me.

Ik zou Bert Cornillie en Ad Backus willen bedanken, twee personen die voor mij een voorbeeldfunctie hebben, die ik voor hun houding als onderzoekers en voor hun respectvolle en motiverende omgang met studenten bewonder, van wie ik veel heb geleerd en bij wie ik steeds terecht kon (en hopelijk nog steeds kan) met vragen en twijfels. Bedankt Bert, je hebt me tijdens mijn studies aan de KU Leuven goed op weg geholpen in de taalwetenschap en je hebt me steeds vertrouwen in mezelf gegeven en mij daardoor gemotiveerd om mijn studies voort te zetten. Quedamos en contacto. En bedankt Ad, ik heb het je al vaak gezegd, maar je hebt tijdens mijn studies aan de RU een belangrijke rol gespeeld en me vaak geholpen bij het nemen van belangrijke beslissingen. Jullie hebben van mij alle twee nog een fles wijn te goed, ik ben het niet vergeten.

Ik zou bij deze gelegenheid ook Jean-Christophe Verstraete willen bedanken; hij heeft me enkele jaren geleden aangeraden om een Master aan de RU Nijmegen te gaan doen. Dat heb ik toen niet onmiddellijk gedaan, maar het idee is wel in mijn hoofd blijven rondspoken tot ik op een dag dan toch de knoop heb doorgehakt. Vandaag ben ik erg blij dat ik die beslissing toen heb



genomen.

I would also like to thank my Nijmegen buddies Ana and Jakob, who were doing their Masters at the same time as I and who became close friends. Thanks for your support and encouraging words, and for all the interesting discussions and fun moments we shared.

Ich möchte Antje Stöhr dafür bedanken, mir so kurzfristig beim Entwerfen der *Phonemic discrimination task* zu helfen. Weiter möchte ich mich darüber hinaus auch noch einmal für das interessante Praktikum beim BRC bedanken; es war für mich wirklich sehr interessant und bereichernd, und auch ein gewisser Meilenstein auf meinem Weg in der Sprachforschung. Vor allem auch vielen Dank für das Vertrauen, das du in mich hattest, und deine Ermutigungen, mich für eine Doktorantenstelle zu bewerben.

Het is niet de eerste en niet de laatste keer dat ik mijn familie wil bedanken voor hun onvoorwaardelijke steun en goede raad. Zij zijn steeds de eersten om mij op te vangen op momenten die iets minder gemakkelijk zijn, maar ook de eersten om de leuke momenten en kleine overwinningen met mij te vieren. Ik zou vooral mijn moeder willen bedanken voor haar steun, advies en haar geduld.

Vielen Dank an die besten Brüder der Welt. Danke Johannes, um mich wenn nötig immer wieder zu guter Laune zu bringen. Danke vor allem an Josef, für deine ganzen wertvollen Ratschläge während Zugfahrten und Skypegesprächen, und für deinen relativierenden Blick. Kurz vor Abgabe sagte ich Josef, „Hab’s fast hinter mir!“, woraufhin er meinte, „hinter uns allen“. Ich glaube, das fasst sehr gut zusammen, wie sehr meine Familie das Entstehen meiner Thesis mit(ü)berlebt hat.

Verder zou ik ook mijn collega’s van de VUB willen bedanken voor hun steun en aanmoediging. Hierbij wil ik vooral mijn kantoorgenootjes Manon en Bastien bedanken voor al hun tips en goede raad in mijn eerste maanden aan de VUB, voor hun waardevolle feedback op het stimulusmateriaal voor deze studie, en om steeds (al dan niet vrijwillig) naar al mijn zorgen en twijfels te luisteren. Ik zou zeggen, let’s have some more cake.

I would like to thank all my colleagues and lecturers from Michigan State University. The four months that I spent at MSU represent a very intense, productive and boosting period for me, in which I learned plenty of things and was able to focus very well on writing up my thesis. I enjoyed the working environment, especially the open office that I shared with many of you and where I felt at home. Thanks to Dustin and Erin, the office morning crew that ensured that I would have a great start of the day. I would also like to thank Patti Spinner for letting me present my thesis project in her class. A huge thank you goes to Jessica and Laura, not only for encouraging and supporting me during the writing process, and for making my stay in Michigan great fun, but also for giving advice about things such as writing literature reviews and about text formatting. Special thanks to Laura for her ‘lit. review revision survival kit’. I wish you good luck in finishing your dissertations, and hope we meet again soon.

Uiteraard ook dank aan al mijn vrienden; vooral ook aan Elise en Nele die steeds voor mij zijn blijven duimen. Ik zou ook Isa willen bedanken; het ontstaansproces van mijn thesis werd begeleid door onze regelmatige klinsessies na het werk, waarbij we steeds konden bijpraten over onze onderzoeksprojecten.

Puis, j’aimerais aussi remercier Raquel Laverdeur pour ses conseils précieux et ses encouragements, et pour me montrer les chemins de sortie dans les moments où je tournais en rond. J’ai trouvé en vous un véritable guide dans mon développement personnel qui porte tant sur ma vie privée que sur ma vie professionnelle.

Uiteraard wil ik van harte alle mensen bedanken die aan mijn pilootstudie of hoofdexperiment hebben deelgenomen, en ook degenen die hebben geholpen om de oproep voor het rekruteren van proefpersonen te verspreiden. Dankzij jullie heb ik een mooie dataset kunnen verzamelen, ondanks het feit dat de zomervakantie voor de deur stond.

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## Chapter 1. Introduction

Although second language acquisition (SLA) in linguistic immersion contexts is a very common phenomenon, we have restricted knowledge about the mechanisms underlying uninstructed SLA, as well as its effects on knowledge development. In the present study, we investigated the acquisition of verb-stem allomorphy in German strong verbs in a communicative, yet controlled context and compared learning outcomes under implicit and explicit instruction conditions.

While the acquisition of a first language (L1) is generally assumed to happen through unconscious learning processes and result in unconscious linguistic knowledge (N. C. Ellis, 2002, 2008a; Reber, 1967; Williams, 2009), the involvement of implicit, or unconscious, processes in second language (L2) learning has been much debated in recent years (e.g., Andringa & Rebuschat, 2015). This debate concerns the learning process, the product of learning, as well as the exposure conditions under which learning takes place. Implicit learning, which we define here as learning without awareness that learning is taking place and of what is being learned (Ortega, 2009; Rebuschat & Williams, 2012; Williams, 2009), is an essential and omnipresent process of human cognition. It represents “the bulk of language acquisition” (N. C. Ellis, 2005, p. 306) and other fundamental human skills, such as social interaction or intuitive decision making (Berry & Dienes, 1993; Reber, 1993; Rebuschat & Williams, 2012). The major part of our knowledge and cognitive processes, including learning, is assumed to lie out of reach of consciousness (N. C. Ellis, 2005).

The concept of implicit learning has been extensively studied in the field of cognitive psychology, where it was first introduced by Arthur Reber (1967), who conducted a series of experiments in which participants were asked to memorize letter strings. What the participants did not know was that the letter strings were organized according to the rules of an artificial grammar, yet they became unconsciously sensitive to the (un)grammaticality of these letter strings. Although Reber used the term *implicit learning* in the area of artificial grammar learning, it was quickly adopted in other experimental paradigms, as for instance motor learning, concept learning, or sequence learning (for reviews, see Berry & Dienes, 1993; Frensch & R nger, 2003; Seger, 1994; Stadler & Frensch, 1998<sup>1</sup>). In all cases, implicit learning becomes visible only through measures of the learners’ behavioral responses – such as changes in reaction time to stimuli or accuracy in a task – but without the participants noticing these changes (R. Ellis, 2009; Godfroid, 2016). As pointed out by Kihlstrom, Dorfman, and Park (2007, p. 535), participants “have learned something new, [yet] they do not know what they know”. Learning is strongly interwoven with memory: “The capacity of learning presupposes an ability to retain the knowledge acquired through experience, while memory stores the background knowledge against which new learning takes place” (Kihlstrom et al., 2007, p. 525). Some of the major topics cognitive psychologists were and are still investigating are the distinction between different types of memory, as well as the underlying neurological structures in the brain. A series of priming studies with amnesic patients led Schacter (1987) to make a distinction between *explicit memory* (conscious memory of past events) and *implicit memory* (unconscious memory), which he believed to rely on separate memory systems in the brain (Schacter & Tulving, 1994). Researchers found that patients with amnesia, take for instance the famous amnesia patient H.M. (e.g., Squire, 2009), have more or less unharmed implicit memory and are able to engage in

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<sup>1</sup> As cited in Kihlstrom, Dorfman, & Park (2007, p. 535).

implicit learning, but to suffer from explicit memory impairment and to be unable to learn explicitly (Kihlstrom et al., 2007).

Although researchers generally agree that SLA involves the development of implicit (automatic, unconscious) knowledge, the mechanisms and processes by means of which this knowledge development takes place are still a matter of debate (R. Ellis, 2005). As pointed out by Williams (2009, p. 343), the study of implicit language learning can be considered “still in its infancy”. A major question in this respect is whether learning without awareness is actually possible, and if so, what linguistic aspects or structures can be learned implicitly (Godfroid, 2016). Examining these issues may bring fundamental insights into SLA, as well as its relation to first language acquisition.

A large body of research has been addressing the comparison of learning under explicit instruction conditions which involve information about grammar rules, and implicit instruction conditions which involve exposure to the target language but no information about grammar rules. Such studies have generally reported advantages for explicit instruction (see the meta-analyses of Norris & Ortega, 2000; and Spada & Tomita, 2010). However, early comparative studies have, through their measurement practices, often been biased toward advantages for explicit instruction and learning (Andringa, de Glopper, & Hacquebord, 2011; R. Ellis, 2009; Morgan-Short, Steinhauer, Sanz, & Ullman, 2012; Norris & Ortega, 2000). For instance, most studies relied only on explicit knowledge measures to evaluate the outcomes of both implicit and explicit learning conditions, which is an inappropriate and insensitive method for assessing the development of implicit knowledge (see section 2.2.2 a).

Moreover, due to inconsistencies at the level of operationalization, studies on implicit learning often refer to studies involving *incidental* ways of learning – that is, learning without the intention to learn, but with a certain degree of awareness of the structure being learned (Williams, 2009). To some extent, the confusion of *incidental* and *implicit* learning (Hulstijn, 2003, 2007) can be attributed to the fact that implicit learning actually *is* learning that takes place incidentally; however, in addition to this, implicit learning requires that participants remain unaware of the linguistic aspect to be learned at the moment of learning (DeKeyser, 2003). This terminological and operationalizational inconsistency points towards a large need for research to adopt appropriate criteria for implicitness, both for distinguishing accurately between implicit and explicit knowledge, as well as between implicit, incidental and explicit learning processes.

Furthermore, most of the recent contributions to research on implicit morphosyntactic learning have been using (semi-)artificial languages (e.g., DeKeyser, 1995; Leung & Williams, 2011, 2012, 2014; Rebuschat & Williams, 2012; Williams, 2005). Although these studies represent a broad and informative body of research, the use of artificial languages may by their very nature alter the cognitive mechanisms thought to operate in implicit learning (e.g., attention; Godfroid, Boers, & Housen, 2013). There are some fundamental differences between artificial and natural languages; for instance, the former consist of very simplified versions of natural language systems, lacking important aspects such as pragmatics (Rogers, Révész, & Rebuschat, 2016), and often, the grammatical aspects to be learned have an increased saliency (Godfroid, 2016). Therefore, the generalizability of the findings to L2 learning in natural contexts remains questionable.

As demonstrated in the previous paragraphs, there is still a need for further investigation of the scope of implicit learning, for more consistent operationalizations of implicit and incidental learning, for more methodologically balanced studies comparing implicit and explicit training

conditions, and for more implicit learning studies using natural languages. The present study aims to address these research gaps by investigating the acquisition of the obligatory stem-vowel change in German strong verbs, a morphosyntactic aspect of a natural language. We used a conversational learning task that consisted of a simulated dialogue situation, enabling us to maintain experimental control while introducing a certain degree of naturalness in our design. We compared the learning outcomes of Dutch native speakers who were advanced learners of German in an implicit ( $n = 10$ ) and an explicit ( $n = 10$ ) instruction condition. In the implicit condition, a cover story was used to conceal the study's goals. We guided participants' attention toward meaning, and we presented no rules to them in the hope that they would learn the linguistic target structure without intending to or even without being aware of the structure. In the explicit condition, participants received identical instructions, but in addition to this, they were informed about the research topic, i.e. learning of the stem-vowel change during conversation. In both conditions, the participant and the experimenter, a balanced Dutch-German bilingual speaker, engaged in a dialogue and produced, in turn, sentences based on a series of pictures that contained a verb which did or did not require a change of its stem vowel in the third person of the singular in present tense (3SG PRES). Learning was measured by comparing the participants' production of vowel-changing verbs in 3SG PRES before and after listening to the experimenter produce sentences containing target-like verb forms. To assess whether the learning process was implicit, incidental, or explicit<sup>2</sup>, we used a retrospective interview to debrief the participants about their awareness of the study's intentions and of the target structure.

Before we discuss the methods (Chapter 3) and results (Chapter 4) of our experiment, we will review past research on implicit and incidental L2 learning that is relevant for understanding and situating the present study (Chapter 2). We will first present the concepts of implicit, incidental and explicit learning (2.1.1) and discuss the role of attention in SLA (2.1.2). Section 2.2 is dedicated to research comparing implicit and explicit instruction conditions. In section 2.3, we will review the relationship between implicit and explicit learning, knowledge and instruction. We will then present prior research on implicit L2 morphosyntax learning (2.4); first, we will present and evaluate studies implementing (semi-)artificial languages, discuss a natural language learning study by Godfroid (2016), and then present German strong verb inflection as a morphophonological learning problem. In section 2.5, we will introduce a series of studies on incidental learning in simulated natural language learning contexts. Section 2.6 explicitly situates the present study in the growing body of implicit learning research and states research questions, as well as hypotheses.

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<sup>2</sup> In the present study, we treat 'explicit learning' and 'intentional learning' as synonyms. For more details, see section 2.1.1.



## Chapter 2. Literature review

### 2.1 Implicit and explicit learning

As the aim of the present study is to compare learning rates under different instruction conditions and to assess the nature of the learning process (implicit, incidental, or explicit/intentional), we first need to point out how the different learning processes are to be defined (section 2.1.1). We will then discuss intentionality and awareness, two central aspects that are being used to differentiate between the different learning processes (section 2.1.2).

#### 2.1.1 Definitions of implicit, explicit, incidental, and intentional learning

Learning can generally be defined as “a relatively permanent change in *knowledge* that occurs as a result of experience [and] that the organism will subsequently use for its own purposes in predicting and controlling events” (Kihlstrom et al., 2007, p. 533). It is implicit when it occurs in the absence of the intention to learn, without awareness that learning is taking place, and without awareness of or controlled attention towards the linguistic structure that has been learned (Ortega, 2009; Rebuschat & Williams, 2012; Williams, 2009). During explicit learning processes, learners have the intention to learn a specific aspect and make use of conscious knowledge and controlled attention towards the structure to be learned at the moment of learning (Ortega, 2009; Rebuschat & Williams, 2012; Williams, 2009). While the implicit learning process is assumed to lead mainly to the development of implicit, unconscious knowledge, explicit learning is expected to lead above all to the development of explicit, conscious knowledge (Rebuschat & Williams, 2012). Within the field of SLA, the term implicit learning was first introduced by Arthur Reber (1967) to refer to a learning process during which participants unconsciously become sensitive to statistical properties of a series of stimuli that are generated by an artificial grammar. According to Reber, his definition of implicit learning is comparable to what Gibson & Gibson (1955, p. 34) referred to as “differentiation”, the component of perceptual learning (i.e., learning to efficiently perceive our surrounding) that enables us to discriminate between stimuli that were first perceived in an indistinguishable way. From a more conversational and usage-based perspective, under natural language learning conditions (immersion contexts and conversations), implicit learning is assumed to take place “during fluent comprehension and production”, while explicit learning occurs rather “in our conscious efforts to negotiate meaning and construct communication” (N. C. Ellis, 2005, p. 306). Such effortful attempts can typically be triggered by communication difficulties or breakdowns – for instance, when a language learner asks his native speaker interlocutor about words or expressions that he or she did not understand. Furthermore, the concept of implicit learning is closely related to the notion of *statistical learning*, which defines learning as the “absorption of statistical regularities in the environment through implicit learning mechanisms” (Williams, 2009, p. 328). In other words, learners unconsciously become sensitive to distributional patterns in the input.

Incidental learning – a closely related but different concept – is learning something without having the intention to learn (Rogers et al., 2016). Ortega (2009, p. 94) describes it as “learning without intention, while doing something else”. Its counterpart, intentional learning, is often equated with explicit learning; both terms refer to learning processes that occur with the intention to learn (DeKeyser, 2003; Rogers et al., 2016). As pointed out by Hulstijn (2003, 2007), it is

important to distinguish between incidental and implicit learning, as both terms are often confounded. A main reason is that implicit learning is a form of incidental learning. However, in addition to the lack of intentionality, implicit learning requires that learners remain completely unaware of the linguistic aspect they are supposed to learn (DeKeyser, 2003; Hama & Leow, 2010; Leow & Hama, 2013; Rogers et al., 2016; Williams, 2009).

### **2.1.2 Learning without attention? The role of awareness and intentionality in SLA**

As demonstrated thus far, the key criteria for defining implicit, explicit, incidental, and intentional language learning are the absence or presence of the intention to learn and of the awareness of what is being learned at the moment of learning (e.g., Rebuschat & Williams, 2012). As pointed out by Ortega (2009), intentionality and awareness are two key features of attention, an essential part of human cognition that makes it possible for us to “structure the huge amount of information that enters through our senses” (Verhoef, Roelofs, & Chwilla, 2009, p. 1832). Attention is also assumed to play a crucial role in learning, as it can raise the level of activation in working memory for certain aspects of the input, enabling them to enter long-term memory (Ortega, 2009, p. 93). Investigating whether learning without intention and/or awareness is possible is thus part of the broader, debated questions in the field of SLA of whether adult language learning without attention is possible, and which kind of attention (low-level automatic, or high-level controlled) is required for learning to take place (Ortega, 2009).

That attention can be intentional means that it can be driven by cognitive control; furthermore, attention can determine what becomes accessible to awareness (Ortega, 2009, p. 94). Further key characteristics of attention are that its capacity is limited and that it, therefore, is also selective (Ortega, 2009, p. 93). The limited and selective attention capacity explains why people may experience difficulties when they need to handle several attention-demanding tasks at the same time. This is, for instance, the reason why making hands-free phone calls while driving a car is found to be as dangerous as is driving under the influence of alcohol (e.g., Burns, Parkes, Burton, Smith, & Burch, 2002; Strayer, Drews, & Crouch, 2006). The selectivity of attention can furthermore be illustrated by the metaphor of a flashlight (Ortega, 2009): while it sheds light on certain objects, other objects are located in the penumbra surrounding the spotlight, or even left completely in the dark. Thus, while selectively paying attention to specific aspects of the environment, other aspects outside of our attentional focus are more or less ignored.

Whether L2 learning is possible without intentionally-driven attention or without awareness of the structure that is being learned are questions that have been a matter of debate in the field of SLA (Ortega, 2009). In the case of incidental learning, SLA research has reached a unanimous consensus that L2 learning in the absence of the intention to learn is actually possible (for reviews, see Horst, 2005; Hulstijn, 2003; Pigada & Schmitt, 2006). However, there is less agreement when it comes to the question of implicit L2 learning, that is, whether learning can take place in the absence of awareness of what is being learned and of the learning process taking place (e.g., Godfroid et al., 2013; Leow, 1997, 2000; Leow & Hama, 2013; Leung & Williams, 2011, 2012, 2014, Schmidt, 1990, 1995, 2001, Williams, 2005, 2009). This question is has much been discussed in the context of the *noticing hypothesis* (a), and becomes more difficult to answer because of the methodological difficulty to measure awareness (b). Yet, evidence for implicit learning has been found for a series of linguistic aspects (c).

### ***a) The noticing hypothesis***

Researchers still disagree on whether mere *detection* (low-level automatic and unconscious registration of aspects in the input; Tomlin & Villa, 1994) is sufficient for L2 learning to take place or whether focused attention to and awareness of specific aspects in the input is necessary for input to become *intake* (input that becomes available for acquisition; Truscott, 1998). The latter point of view has been promoted by the *noticing hypothesis*, formulated by Schmidt (1990, 1993, 1995). According to the strong version of this theory, learning any aspect of an L2 can only happen if learners consciously *notice* it in the input (N. C. Ellis, 2008b; Ortega, 2009). It involves detection in combination with controlled, conscious, and selective attention (Schmidt, 1995), enabling the noticed aspect to be further processed. Whether the presence of noticing is a necessary condition for learning to take place remains an open question; yet, evidence for its facilitative role comes from a series of studies conducted by Ron Leow and colleagues (e.g., Leow, 1997, 2000, 2001; Rosa & Leow, 2004a; Rosa & Neill, 1999). These studies found higher learning rates for participants showing awareness of the linguistic structure, as measured with think-aloud protocols (Ortega, 2009).

A concept that is related to but different from *noticing* is *noticing the gap* (Schmidt & Frota, 1986), which refers to moments in which learners become aware of mismatches between their interlanguage and the correct target structure as produced by an interlocutor or provided in the experimental input (N. C. Ellis, 2008a; Truscott, 1998).

### ***b) Measuring awareness***

A fact that is complicating the investigation of implicit learning is the methodological difficulty to accurately measure awareness (Godfroid et al., 2013; Leow, Johnson, & Zárte-Sández, 2010; Truscott & Sharwood Smith, 2011). Awareness measures need to take into account both the awareness that learning is taking place at the time of learning (e.g., Godfroid & Schmidtke, 2013; Leow, 1997) as well as the awareness of the linguistic aspect that is being learned (e.g., R. Ellis, 2005; Hamrick & Rebuschat, 2012; Rebuschat & Williams, 2012). Recent contributions thoroughly discussing different measures of awareness come from Leow and Hama (Hama & Leow, 2010; Leow & Hama, 2013). The authors note that frequently-used awareness measures, such as retrospective interviews and think-aloud protocols, are problematic because they may be biased by partial loss of memory, the unconscious fabrication of new, inaccurate memories as a result of the debriefing, or the inability to put the awareness experience into words (Godfroid, 2016).

### ***c) What can be learned implicitly?***

Successful implicit learning in terms of statistical learning (unconsciously becoming sensitive to statistical regularities and patterns in the linguistic input; e.g. Williams, 2009) has been found in the areas of lexical segmentation (i.e., breaking streams of syllables into words; e.g., Mirman, Magnuson, Estes, & Dixon, 2008; Saffran, Newport, & Aslin, 1996), phonological and orthographic structure (i.e., becoming sensitive to phonotactic constraints; e.g., Dell, Reed, Adams, & Meyer, 2000), and phrase structure (e.g., Rebuschat, 2009; Williams & Kuribara, 2008). Furthermore, there is a growing body of studies that claim to have found evidence for the implicit learning of grammatical form-meaning connections, which will be discussed in detail in section 2.4.2.

As shown above, a better understanding about the role and measurement of attention and awareness still needs to be gained in order to determine the role that implicit learning plays in SLA. However, as stated by Williams (2009, p. 344), “given that we are clearly endowed with a powerful associative learning mechanism for unintentionally picking up aspects of the statistical structure of the environment, it would surely be absurd to argue that it makes no contribution to language learning”.

In the present study, we operationalize *implicit learning* as the learning process that takes place without awareness of the target structure to be learned (which we call *awareness of the target*) and without awareness of the true intention of the learning task (which we refer to as *awareness of the task*). If learners have awareness of the learning task, they are likely to engage in intentional learning. *Explicit learning* – synonym of *intentional learning* – is operationalized as the learning process that takes place in the presence of both awareness components. *Incidental learning* refers to the learning process that takes place in the absence of awareness of the task, but in the presence of a certain degree of “fleeting awareness” (Ortega, 2009, p. 95) of the target. We used a retrospective interview immediately after the learning task to assess learners’ awareness of target and task. We also asked learners if they remembered instances of noticing the gap between their and the experimenter’s productions.

## **2.2 Implicit and explicit instruction**

### **2.2.1 Definitions**

Language *instruction* or *training* refers to external interventions in the interlanguage development of an L2 learner and can be implicit or explicit. Importantly, both types of instruction “can only be defined from a perspective external to the learner” (R. Ellis, 2009, p. 18). In other words, we can only externally describe the intervention but not make any claims about how it will affect the learners’ internal learning processes. Implicit instruction involves the absence of rules or rule-search instructions (Hulstijn, 2005; Norris & Ortega, 2001). Usually, language learners carry out a meaning-focused language task during which they are auditorily or visually exposed to a specific linguistic target structure (Godfroid, 2016). The aim is that while focusing on meaning, learners will unconsciously infer linguistic patterns or rules from the input. Under explicit instruction conditions, learners are either provided with concrete linguistic rules (the task is *deductive* and *metalinguistic*) or with rule-search instructions, in which case the task is *inductive*, as participants are asked to extract rules from the input (Norris & Ortega, 2001).

### **2.2.2 Comparative research**

#### ***a) An advantage for explicit instruction?***

A large body of behavioral research has been devoted to the comparison of implicit and explicit instruction conditions and the corresponding L2 learning outcomes. Overall, reviews (e.g., Long, 1983; Norris & Ortega, 2000; Spada, 1997; Spada & Tomita, 2010) have found explicit instruction to be more effective than implicit instruction (N. C. Ellis, 2005). However, there are a series of limitations of this body of research, making it difficult to draw clear and valid conclusions in respect to implicit and explicit instruction:

Experimental studies comparing implicit and explicit instruction have used very different

operationalizations of both terms (for examples, see R. Ellis, 2009, p. 19); this may have contributed to the considerable variance that Norris & Ortega's (2000) meta-analysis found between the different studies.

Moreover, the amount of training provided during learning experiments is usually rather small and often lasts less than one hour (Morgan-Short et al., 2012). As a consequence, despite the training, the participants' proficiency levels remain rather low (Rosa & Leow, 2004b; Sanz & Morgan-Short, 2004; VanPatten & Oikkenon, 1996). Any clear advantages of implicit or explicit instruction for reaching higher proficiency levels are, to date, still unknown (Morgan-Short et al., 2012).

Furthermore, a series of factors bias the study outcomes towards an advantage for explicit instruction conditions. The small training durations may contribute to this bias (Morgan-Short et al., 2012; Norris & Ortega, 2000), as learning under implicit instruction conditions is assumed to take longer than does learning under explicit conditions (N. C. Ellis, 2005). Moreover, comparative studies that measure long-term retention are rare (e.g., Tode, 2007); however, a series of studies in the field of cognitive psychology suggest that implicit learning and the resulting implicit knowledge may be of a more durable kind, more robust to forgetting than explicit knowledge (Allen & Reber, 1980; Dienes & Berry, 1997; Reber, 1989). As stated by Kihlstrom et al. (2007, p. 537), "implicit learning, precisely because it is automatic and unconscious, is a very powerful (as well as more primitive) form of learning – more powerful than conscious forms of learning that emerged more recently in evolutionary history (Reber, 1993)". Another factor contributing to the explicit bias is that participants in explicit training conditions often receive more input than those in implicit conditions: explicit conditions do not only provide the same stimuli as the implicit condition, but also extra explicit information – for instance under the form of a brief rule-explanation activity (Rosa & Leow, 2004b; VanPatten & Oikkenon, 1996). This can lead to differences in the amount of exposure and time a certain task requires (Andringa et al., 2011; Morgan-Short et al., 2012). A final factor is that early comparative work has biased the results in favor of explicit instruction by relying primarily on explicit knowledge measures, which are an insensitive and inaccurate measure for implicit knowledge (R. Ellis, 2009; Morgan-Short et al., 2012; Norris & Ortega, 2000, 2001). This aspect is also criticized by Andringa and colleagues' (2011, p. 872) evaluation of the meta-analyses: "All in all, there is convincing evidence that [explicit instruction] is generally superior to [implicit instruction] when measures of controlled production are used. However, for measures of free production, the evidence is circumstantial at best."

When taking all these factors together, it becomes obvious that the advantages for explicit instruction reported in these studies remain questionable (Morgan-Short et al., 2012).

### ***b) Recent developments***

A series of more recent studies has been devoted to the development and the validation of measures of implicit knowledge (e.g., Andringa & Ćurčić, 2015; R. Ellis, 2005; Erlam, 2006; Godfroid, 2016; Godfroid et al., 2015; Granena, 2013; Jiang, 2007), stimulating peer researchers to design methodologically more balanced studies comparing implicit and explicit types of instruction. In some of these studies, the advantage of explicit above implicit instruction becomes less obvious, as similar levels of L2 learning under implicit and explicit training conditions were found (Andringa et al., 2011; Sanz & Morgan-Short, 2004). In their classroom study on grammar instruction on L2 Dutch, Andringa et al. (2011) compared the development of

implicit knowledge – as measured by a free written response task – under explicit and implicit instruction conditions. Although the explicit group outperformed the implicit group on an untimed grammatical judgment task – measuring conscious, explicit knowledge – the authors found equal amounts of learning under both instruction conditions on the free written response task, suggesting that explicit instruction did not represent an advantage over implicit instruction.

In their computer-delivered learning treatment about Spanish word order, Sanz and Morgan-Short (2004) did not find any advantages for explicit rule explanation prior to the learning treatment or explicit negative feedback during the task. Participants not receiving any explicit information showed similar, significant learning effects. Learning was assessed by means of pre- and posttests, consisting of interpretation tasks and production tasks (a sentence completion task, and a written video-retelling task). The authors concluded that explicit instruction “may not necessarily facilitate second language acquisition” (Sanz & Morgan-Short, 2004, p. 36).

There have also been recent contributions to the body of comparative studies that go beyond behavioral measures of knowledge development by using neural measures. Morgan-Short and colleagues (Morgan-Short, Sanz, Steinhauer, & Ullman, 2010; Morgan-Short et al., 2012) examined the neural correlates that are present in implicit compared to explicit training conditions of an artificial L2. Their main finding was that only implicit training evoked native-like electrophysiological signatures. The authors interpreted their findings as evidence that adult L2 learners may, at some point during the learning process, start to engage in nativelike language processing; however, whether nativelike processing will actually take place may depend on the conditions under which the language is learned.

As pointed out earlier, the present study compares learning outcomes of German verb stem allomorphy under implicit and explicit instruction conditions. We use the term *implicit instruction* to refer to an experimental condition that uses a meaning-based task and a cover story to guide attention toward meaning and in which the participants are uninformed that the task is about learning (e.g., Hulstijn, 2003, 2013; Rogers et al., 2016). It is important to keep in mind that implicit instruction refers to an external intervention in the learner’s interlanguage development, which does not guarantee that it will actually lead to implicit learning processes taking place. As pointed out by Rogers et al. (2016, p. 782) “participants may or may not become aware of the linguistic focus of the experiment”. Thus, implicit instruction is above all meant to create a learning condition that might favor implicit or incidental learning processes.

In our *explicit instruction* condition, participants receive exactly the same meaning-based task and instructions as the implicit group, but in addition to this, we inform them about the crucial role of the target structure and that the task is about learning. The task is deductive and metalinguistic in the sense that participants get information about which linguistic aspect represents the focus of attention, but the task is inductive in that learners do not know which items require the changed allomorph and have to ‘search’ for correct conjugation in the input. This explicit instruction is meant to create a learning condition that favors the use of explicit learning processes; however, this does by no means guarantee that participants are going to rely fully on their explicit knowledge. Rather, the learning process may still be implicit to some extent.

### 2.3 Knowledge, learning and instruction: related but distinct concepts

Implicit learning has not been operationalized in a consistent manner. Besides the central problem of how to measure awareness (section 2.1.2. b) and the terminological confusion between implicit and incidental learning (section 2.1.1), this inconsistency is also due to the fact that the limits that differentiate between the constructs of implicit and explicit learning, knowledge and instruction are sometimes being treated in a unclear, fuzzy way (Godfroid, 2016; for discussion, see R. Ellis, 2009; Williams, 2009). Learning has been operationalized both in terms of the learning process, as well as in terms of the product of learning, i.e. the resulting knowledge (Leow & Hama, 2013). However, learning, knowledge and instruction are “related but distinct” concepts (Schmidt, 1994, p. 9). As formulated by Williams (2009, pp. 320–321), “the issue of the existence of implicit or explicit knowledge in the mind of the learner is distinct from the issue of how it got there”.

Implicit knowledge is unconscious knowledge; learners use it without being aware of how it was acquired and that they are using it (Cleeremans, Destrebecqz, & Boyer, 1998, p. 406). This type of knowledge is commonly described as automatic and procedural, intuitive and not verbalizable; it becomes visible in a person’s behavior, without the person being aware of the knowledge or that it is guiding his/her behavior (R. Ellis, 2009; Rogers et al., 2016). We use implicit knowledge on a constant basis in daily life to carry out actions and deal with our perceptual environment. A typical example is riding a bike: while many people are biking every day, they would be unable to explain to others how to turn around a corner (Williams, 2009). Explicit knowledge, on the other hand, is knowledge that we are aware of knowing and using (Dienes & Perner, 1999; Williams, 2009). Its main characteristics are that it is conscious, declarative, and often – yet not always – verbalizable; unlike implicit knowledge, it involves controlled processing (R. Ellis, 2009; Williams, 2009). An example would be a person who is learning to drive a car and who has in mind the driving instructor’s stepwise instructions when changing gears (Williams, 2009). Through extensive practice, this person may start to acquire implicit knowledge of how to change gear and perform this action in an automatic way. However, whether this shows that explicit knowledge *becomes* implicit knowledge, or if both types of knowledge are separate, parallel systems with no interface, is a question that we will not discuss further in the present thesis (for further reading on the interface question, see for instance N. C. Ellis, 2005; R. Ellis, 2005).

Implicit learning is usually associated with the development of implicit knowledge and explicit learning with the development of explicit knowledge (Rebuschat & Williams, 2012). However, implicit learning neither necessarily implies that only implicit knowledge is being acquired, nor does explicit learning automatically imply that the learning outcome is explicit knowledge only. Rather, particular learning tasks implementing implicit or explicit learning conditions can lead, at least to some degree, to both implicit and explicit learning processes and to the involvement and development of both implicit and explicit knowledge (R. Ellis, 2009; Morgan-Short, Faretta-Stutenberg, Brill-Schuetz, Carpenter, & Wong, 2014; Rogers et al., 2016). Some recent studies (e.g., Hamrick & Rebuschat, 2013; Rebuschat, 2009; Tagarelli, Borges-Mota, & Rebuschat, 2011) found that learners developed both implicit and explicit knowledge, independently from whether they received exposure under explicit or implicit learning conditions.

In the present study, we strictly define implicit and explicit learning as learning processes, not in terms of the knowledge resulting from these processes. We will compare learning outcomes (gains in accuracy scores) under different instruction conditions, and our aim is to

characterize the learning processes under these conditions by means of retrospective interviews. *Implicit (automatic, unconscious) knowledge* and *explicit (controlled, conscious) knowledge* are treated as the extremes of a continuum. We cannot make statements about which type of knowledge the participants rely on, but we can assume the participants of the implicit condition to rely more on implicit knowledge and participants of the explicit condition to rely more on their explicit knowledge.

## **2.4 Implicit learning of morphosyntax**

### **2.4.1 The use of (semi-)artificial languages in language learning research**

One way to introduce experimental control in study designs is to control the language to be learned, which can be achieved by using a (semi-)artificial language (Hulstijn, 1997). As early research in cognitive psychology has been criticized for using artificial languages that completely lacked any semantics, there has been a trend over the past decades in SLA research to use artificial languages that include a meaning component (Godfroid, 2016). Sentences in the artificial language *Brocanto2*, for instance, can be used in the context of a chess-like computer game to refer to the different pieces and possible moves (Morgan-Short et al., 2012).

Using artificial languages has the advantage that the researcher can be certain that none of the participants have prior knowledge of the target structures to be learned, which means that the researcher can be confident that performance in the testing phase reflects learning based on the input during the experiment and is not confounded by other factors (Hulstijn, 1997). Researchers can easily gain control over factors such as the amount, timing, and type of exposure, as well as the similarity of the artificial language to the participants' L1 (Morgan-Short et al., 2012). Moreover, Morgan-Short et al. (2012) claimed that for being a meaningful and productive artificial language, whose predecessor *Brocanto* was even found to trigger native-like neural activity (Friederici, Steinhauer, & Pfeifer, 2002; Opitz & Friederici, 2003), *Brocanto2* may function as a model of natural language, meaning that the findings could be generalized to natural language learning.

Recent (semi-)artificial language research in the field of SLA has been quite productive and informative (Godfroid, 2016). In general, such studies have examined the acquisition of grammar (e.g., De Graaff, 1997; DeKeyser, 1995, 1997; Robinson, 1997). Several studies that have focused on the acquisition of morphology (e.g., Faretta-Stutenberg & Morgan-Short, 2011; Hama & Leow, 2010; Leung & Williams, 2011, 2012, 2014; Rebuschat, Hamrick, Riestenberg, Sachs, & Ziegler, 2015; Williams, 2005), syntax (e.g., Rebuschat & Williams, 2012; Tagarelli, Borges-Mota, & Rebuschat, 2015) or syntax and morphology (Grey, Williams, & Rebuschat, 2014; Williams & Kuribara, 2008) have found learning effects under incidental, meaning-based learning conditions. Furthermore, some of these studies reported having found evidence for implicit L2 grammar learning (Leung & Williams, 2011, 2012, 2014; Rebuschat & Williams, 2012; Williams, 2005; see section 2.4.2 a).

Gains in experimental control simultaneously limit the possibilities for generalizing the findings to natural language learning in real-life conditions and therefore also for drawing conclusions for language teaching (Hulstijn, 1997). Despite the advantages pointed out above, artificial languages differ significantly from natural languages, raising serious concerns about the ecological validity of the studies using them (for a detailed discussion, see Robinson, 2010). For instance, by their synthetic nature, they provoke an increased saliency of the target language



forms (Morgan-Short et al., 2014) and may modify the cognitive mechanisms assumed to operate in natural implicit language learning by enhancing attention and learning (Godfroid, 2016; Godfroid et al., 2013). They consist of extremely simplified versions of natural language systems and therefore often lack important parts of natural languages, as for instance pragmatics (Rogers et al., 2016). Thus, there is a large need to test the generalizability of the study findings to natural language learning.

## **2.4.2 Empirical evidence for the implicit acquisition of inflectional morphology**

### ***a) Artificial language learning studies***

DeKeyser (1995) investigated morphosyntactic L2 learning by using a miniature artificial language, containing inflectional morphemes applied to verb or noun stems to mark gender, number, and object role. Learning was tested by means of a production task after training. Despite training, this task did not show any implicit learning effects of the semantics of the different inflectional morphemes. The participants only performed well on stem-morpheme pairs they had encountered during training; for novel combinations of stems and morphemes, performance was at chance.

A series of artificial language studies by Williams and Leung (Leung, 2007<sup>3</sup>; Leung & Williams, 2006, 2011, 2012, 2014; Williams, 2005) found more positive evidence for the implicit learning of form-function mappings. The studies built further on DeKeyser (1995), but decided to use a narrower focus and less novel forms and meaning distinctions. The authors investigated the acquisition of four artificial determiners (*gi*, *ro*, *ul*, *ne*) that were embedded in English carrier phrases. While the participants were told that these morphemes encoded a certain meanings dimension (e.g., distance of the object), the studies actually investigated whether they would implicitly learn another, hidden, meaning dimension (e.g., animacy) without instruction (Williams, 2009).

Rebuschat & Williams (2012) trained participants on a semi-artificial language, consisting of English words but German word order rules, under incidental learning conditions. They tested the resulting syntactic knowledge using grammaticality judgment tasks and subjective measures of awareness. They found that incidental exposure lead to the development of implicit knowledge, suggesting that the learning process was implicit at least to some degree.

### ***b) A natural language learning study: Godfroid (2016)***

The study of Godfroid (2016) investigated the threefold relation between instruction, learning, and knowledge, and further extended the evidence of implicit L2 learning to a natural language, German. The participants, L1 speakers of English and advanced learners of L2 German, were exposed to a series of spoken exemplars of German stemvowel-changing strong verbs, a difficult morphological structure which is also in the center of attention of the present study (section 2.4.3). The meaning-based task the participants were supposed to carry out during exposure was to select the correct picture representing the sentences they were hearing. Towards the end of the input flood, the obligatory vowel change was omitted, resulting in ungrammatical verb forms. Learning was operationalized as a significant increase of sensitivity during listening, which should be reflected by a slowdown in response times on ungrammatical trials during the sentence-picture matching task. The development of learners' knowledge of the vowel change

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<sup>3</sup> As cited in Williams (2009, p. 333).

was assessed by two pre- and posttests: implicit knowledge development was measured by means of a word monitoring task, whereas a controlled oral production task was used to measure explicit knowledge. In addition, retrospective interviews were used to examine the learners' awareness of the ungrammatical verbs. They revealed that while 33 out of 38 learners remained unaware of the ungrammatical verbs, the response times of these unaware learners slowed significantly down for ungrammatical trials, reflecting sensitivity to these ungrammaticalities and thus implicit learning. The pre- and posttests revealed that implicit instruction led to the development of implicit but not explicit knowledge of strong verb conjugation.

### **2.4.3 Vowel change in German strong verbs: a morphosyntactic L2 learning difficulty**

#### **2.4.3.1 The German conjugation system**

The German conjugation system distinguishes between three main verb categories: 'weak', 'strong' and 'irregular' verbs (Gallman et al., 2011). For weak verbs, morphosyntactic information (person, number, tense, and mood) is encoded through affixation only. The weak conjugation paradigm is the youngest paradigm, which is still productive today, and is considered the unmarked, default conjugation. Relative to weak verbs, strong verbs are considered marked because morphosyntactic information is not only encoded through affixation, but also by means of allomorphy – that is, by alternations of the stem vowel, a phenomenon called 'Ablaut' in German. A single verb can have two to five different stem vowels. In present tense and in the imperative, the strong verbs have the same endings as the weak verbs. The strong paradigm is older than the weak paradigm and represents a closed group of verbs, as the paradigm is no longer productive. Irregular verbs represent a mixed type of conjugation, containing inflectional features of both weak and strong verb conjugation. Today, there are about 170 strong German base verbs ("Grundverben", for a list, see Gallman et al., 2011, pp. 484–496), representing about 4% of the totality of German verbs. Despite the low type frequency, the verb class represents a very important part of the German vowel inventory, as the majority of strong verbs have a relatively high token frequency in everyday language use (Gallman et al., 2011; Köpcke, 1998).

In the present study, we are mainly interested in strong verbs in present tense of the indicative (PRES). Strong verbs in present tense have the same endings as weak verbs, but in addition, the stem vowel in the second and third person of the singular (2 and 3SG) generally undergo an Umlaut<sup>4</sup> when the stem vowel is *a*: it changes into *ä*, as in *graben* – *er gräbt* ('to dig – he digs'). Most verbs with an *e* in the stem undergo an *e/i*-change in 2 and 3 SG PRES, as in *essen* – *er isst* ('to eat – he eats'). The length of the vowel usually remains the same (Gallman et al., 2011).

#### **2.4.3.2 Strong verbs as an L2 learning problem**

##### **a) The acquisition difficulty of morphosyntax and allomorphy**

There are various reasons why the German strong conjugation paradigm can be considered a morphosyntactic L2 learning difficulty. First of all, morphosyntax in general has been identified as a source of persistent difficulty for adult L2 learners, both at the level of comprehension and

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<sup>4</sup> The verbs *laufen*, *saufen* and *stoßen* also undergo an Umlaut in 2 and 3 SG PRES (Gallman et al., 2011, p. 455).

production (for reviews, see DeKeyser, 2005; Nick C. Ellis, 2006; see also Hopp, 2013; Larsen-Freeman, 2010). It involves inflectional processes such as *affixation* (a morpheme is added to the lexeme of a word), *suppletion* (the inflection of a single lemma involves a series of different lexemes, as it is the case for the conjugation of the verb *to be*: *I am* versus *I was*), and *allomorphy* (a single morpheme takes different forms or *allomorphs*, depending on the phonologic or morphologic context, without its function or meaning being altered) to encode syntactic information (Krause, Bosch, & Clahsen, 2015). Empirical research has found the processing of inflectional morphology to be different in L2 learners and native speakers (e.g., Clahsen, Felser, Neubauer, & Silva, 2010; Jiang, 2004, 2007; Krause et al., 2015).

The majority of studies in this respect have addressed affixation and suppletion, noting that morphosyntax expressed through suppletion appears to be easier for L2 learners than affixation (Krause et al., 2015). By investigating the processing and representation of German strong verbs, the study by Krause and colleagues (2015) demonstrates that L2 learners' difficulties in the domain of inflection also affect allomorphy. They looked at stem vowel alternations in present tense and conducted a priming experiment in which an auditory prime was followed by a visually presented target word. The participants had to discriminate between words or non-words. The results of native speakers were compared to those of advanced learners of German. The study revealed clear native-nonnative differences at the level of processing: while the verb forms with marked stems (e.g., *wirft* – he throws') facilitated the recognition of the target form with the corresponding unmarked stem (*werfen* – 'to throw') for the native speaker group, they led to worse performance compared to unmarked stems in the nonnative group, probably due to additional processing costs at the moment of recognition, and reflecting "an apparently persisting disadvantage for L2 learners" (Krause et al., 2015, p. 21).

#### *b) The difficulty of the stem-vowel change in present tense*

In the case of German strong verb conjugation, there are several aspects that contribute to the learning problem:

1. **Low perceptual salience.** The correct conjugation may be difficult to acquire because of the low perceptual salience of the different stem allomorphs, that is, the changes in the verb stem have a scope of only one or two letters/phonemes (Godfroid & Uggén, 2013).
2. **Information redundancy.** The vowel change in present tense in strong verbs represents a certain degree of information redundancy: the same morphosyntactic information is encoded through affixation, the changing stem vowel and the subject (DeKeyser, 2005; N. C. Ellis, 2006; Godfroid, 2016).
3. **Unpredictability.** Verb allomorphy can be phonologically conditioned, but sometimes it can also be less predictable and even seemingly idiosyncratic, as it is the case for stem allomorphy in Germanic languages (Krause et al., 2015). In older variants of German, the vowel alternation in strong verb allomorphy was determined by the immediate phonological context; in contemporary German, however, the vowel change is no longer phonologically conditioned and therefore difficult to predict (Bybee & Newman, 1995; Nübling, Dammel, Duke, & Szczepaniak, 2006)<sup>5</sup>. Thus, nowadays, the infinitive alone does not provide any cues about which conjugation (weak, strong, irregular) has to be applied. Therefore, verbs are usually reported with three different stem forms: the

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<sup>5</sup> As cited in Godfroid (2016, p. 184).

infinitive, the first and third person of the indicative preterit, and the participle II (Gallman et al., 2011).

Despite the apparent unpredictability, the class of strong verbs cannot be considered entirely unpredictable and irregular. While strong verb allomorphy is sometimes referred to as a lexical problem, treating marked verb forms as mere exceptions, different theories suggest that the German strong verbs represent grammatical sub-regularities and “form fuzzy grammatical systems” (Godfroid, 2016, p. 185), which are to some extent organized based on the semantic and phonetic similarity between items (DeKeyser, 1995; Godfroid, 2016; Godfroid & Uggen, 2013; Köpcke, 1998; Krause et al., 2015). One theory is to refer to verb allomorphs as items that are stored in the mental lexicon, where they differ from purely lexical items by being organized in associative networks, based on their morphophonological information (Bybee, 1995; N. C. Ellis, 2002; Ullman, 2001). Köpcke (1998) points out that the existence of double forms (i.e., verbs that can be either conjugated in a weak or strong way, as for instance *backen* – ‘to bake’, which can take either the strong preterit *er buk* or the weak preterit *er backte* – ‘he baked’) illustrate that the weak and strong conjugation paradigms are not neatly separable classes, but rather represent the two extremes of a continuum. Furthermore, Köpcke (1998) questions the reasons why the strong verb paradigm persists despite the weak paradigm being the new productive, default paradigm. He argues that while some verbs maintain their strong conjugation mainly because of their high token frequency, other verbs form clusters corresponding to certain phonemic and semantic regularities. The higher the number of members in one cluster, the lower the token frequency needed for persistence because the members in the cluster ensure their mutual existence (Köpcke, 1998).

*c) Godfroid & Uggen (2013): noticing of the vowel change by beginning learners*

By means of eye-tracking, Godfroid and Uggen (2013) examined whether beginning learners of German without any prior knowledge of German strong verb conjugation would notice (Schmidt, 1990) the varying stem allomorphs. Eye-movement recordings showed that participants paid more attention to pairs of strong verbs with alternating stems than to weak verb pairs that were presented in stacked sentences on a screen. Longer fixation times on the changed stem vowels, as well as visual comparisons between marked and unmarked stems by looking back and forth, predicted the participants’ improvement on a written production posttest. More visual comparisons correlated with a better acquisition of *a-ä* but not *e-i* changing verbs; in the absence of such comparisons, *e-i* verbs were produced more accurately than *a-ä* verbs.

*d) Godfroid (2016): more evidence for the learning problem*

The results of Godfroid (2016) bring further evidence that German strong verb conjugation represents a learning problem. As pointed out in more detail in section 2.4.2 b, this study examined the threefold relation between instruction, learning, and knowledge by looking at whether advanced learners of L2 German would unconsciously become more sensitive to the vowel change in German strong verbs after a session of auditory input flooding, containing a high number of strong verbs embedded in sentences. The study found significant implicit learning, operationalized as an increase in sensitivity during exposure, and the two pretests and posttests revealed that implicit learning led to the development of implicit but not explicit knowledge of the strong verb conjugation paradigm.

The author broke down the learning problem of strong verb conjugation into three levels: the perceptual level, the level of form-based learning, and the level of form-function learning (i.e., successfully mapping of a novel form on a meaning or function). The learning of the form-meaning component was believed to be particularly difficult in this study because the relevant morphosyntactic information (number and person) was already encoded in the subject in a more reliable way than in the verb. The study found comparable amounts of implicit knowledge development for both trained and untrained items, suggesting that there was both implicit item and system learning. However, the author interpreted the knowledge development as being limited to form-based learning; no convincing evidence was found for the presence of form-function learning (Godfroid, 2016).

## **2.5 Research on incidental learning in simulated natural language learning contexts**

In the following section, we will present work in progress from De Vos, Schriefers, & Lemhöfer (in prep.), De Vos, Schriefers, & Lemhöfer (submitted), and Brandt, Schriefers, & Lemhöfer (in prep.). These studies approach second language learning in the frame of the broader project ‘L2 learning in the wild’, investigating processes and factors involved in L2 acquisition in natural learning settings. A common aim of these studies is to face the methodological challenge of introducing more naturalness in experimental studies on incidental L2 learning, while retaining experimental control. All studies investigate learning from natural language input under incidental learning conditions; while De Vos and colleagues focus on vocabulary acquisition, Brandt and colleagues investigate learning of grammatical gender. In general, the findings suggest that experiments involving simulated conversation designs represent a fruitful approach to incidental learning. As the present study intends to build upon and extend the De Vos et al. and Brandt et al. studies by using a simulated dialogue situation to investigate implicit, incidental and explicit morphosyntactic learning, we will present these studies more in detail in the following sections.

### **2.5.1 De Vos and colleagues: incidental word learning in conversation**

#### ***a) Study 1: How to study incidental word learning?***

The objective of the first study (De Vos et al., in prep.) was to find an appropriate method to study incidental L2 vocabulary learning in Dutch as a second language in a conversational situation while maintaining experimental control. Furthermore, the study investigated a series of factors that might influence incidental word learning (cognate status, exposure frequency, and retention interval). Sixty-one native speakers of German<sup>6</sup> participated in this study, and all of them were immersed in a Dutch environment as they were living and studying in Nijmegen (the Netherlands). The study used a conversational main task, presented as a ‘Price judgment study’. Participants did not know the study was about language, nor did they know that they were selected for the study because of their L1, German. Participants were trained on 24 Dutch items which were guaranteed to be productively unknown, as well as 80 known Dutch filler words. During the task, the participant and the experimenter took turns in comparing objects by price. Pre- and posttest moments were integrated in the design of the main task, which was followed by an unannounced posttest after 30 minutes, as well as a delayed posttest after six months ( $n = 18$ ).

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<sup>6</sup> Fifteen participants were excluded from the analyses for having too much prior knowledge.

The study found high learning scores and a large effect of cognate status, cognates being learned better than non-cognates. Items on which participants received four exposures were learned better than items with only two exposures. After 30 minutes, participants were approximately back at the knowledge level they had after only two exposures. Knowledge continued to decline over time, but some knowledge was still retained up to six months later. De Vos and colleagues (in prep.) concluded that simulated conversation situations can lead to significant gains in, and retention of, productive L2 vocabulary knowledge. The task design they implemented proved to successfully study incidental L2 word learning in conversational situations while maintaining control.

### ***b) Study 2: Noticing the gap***

In a second study, De Vos and colleagues (submitted) examined whether noticing the gap (section 2.1.2 a; Schmidt & Frota, 1986) facilitates L2 word learning. The authors referred to noticing the gap as ‘output noticing’, which they operationalized as instances in which an L2 learner wants to say something in the L2, but realizes he/she doesn’t know the right word(s). Output noticing was manipulated by introducing two conditions in the experimental design: a ‘noticing condition’ (participants were instructed to sort cards depicting objects according to their prices and to present the ranking out loud, inducing the noticing of gaps), and a ‘silent condition’ (participants had to sort the cards but look through the ranking in silence). Unlike the first study, the treatment did not require the participants to produce output; they were asked to listen to price statements and express their (dis)agreement by pushing buttons. There was a first production posttest immediately after the treatment, and a second after 15 minutes. In a retrospective interview, participants were asked whether they had noticed gaps. Although it was assumed on forehand that participants in the silent condition would not notice the gaps, the interviews revealed that some of the ‘silent’ participants did show output noticing. Overall, the experiment revealed that learning effects were higher for participants who noticed the gaps, suggesting a facilitative effect for vocabulary acquisition. However, the authors noted that much higher learning scores were obtained in study 1 where the treatment included learner productions, pointing towards an important role for learner output.

### **2.5.2 Brandt and colleagues: incidental learning of grammatical gender**

Brandt and colleagues (in prep.) focused on fossilization, which refers to reaching a point in the acquisition process after which L2 learners become unable further improve their linguistic skills based on natural language input alone. The authors examined whether natural corrective L2 input could have a beneficial effect on fossilized structures in the learners’ interlanguage, and under which conditions L2 learners could benefit from such input. Thirty-five L1 speakers of German who were proficient learners of Dutch participated in this study<sup>7</sup>. Due to negative transfer from grammatical gender in their L1 to the L2, German learners of Dutch have a tendency make persistent errors in their L2 (Lemhöfer, Schriefers, & Hanique, 2010). The study induced natural, yet controlled experimental conditions by implementing a simulated dialogue game in which the participant and audio recordings of a native speaker had to take turns in describing picture cards. There were four learner production moments in total, and input was provided after the second learner production.

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<sup>7</sup> Three participants were excluded from the analyses.

Gender accuracy improved significantly after receiving input. However, despite the meaning-based nature of the task, participants were aware that the task was about learning of word gender, suggesting that the learning process may have been intentional rather than incidental. The authors compared the results to a more implicit task (an apparently L2-unrelated memory task), revealing a learning effect of the same size. In line with the studies of De Vos and colleagues, the authors concluded that maintaining experimental control in combination with a certain degree of naturalness seems to be a well-suited method to study processes involved in natural language learning.

## 2.6 The present study

The present study contributes to the existing body of research investigating implicit, incidental and explicit learning processes and the instruction conditions under which these take place by examining the L2 acquisition of a morphosyntactic learning difficulty. While the majority of past studies have used (semi-)artificial language paradigms (e.g., Leung & Williams, 2011, 2012, 2014), we investigated the acquisition of a morphosyntactic aspect of a natural language, German, during a simulated dialogue situation.

Our study further builds upon the De Vos et al. (in prep.), De Vos et al. (submitted) and Brandt et al. (in prep.) studies (section 2.5) by extending the methodological paradigm they implemented to the acquisition of morphosyntactic verb inflection, and by comparing implicit to explicit instruction conditions. In line with De Vos et al. (in prep.), we introduced a certain degree of naturalness in the controlled experimental design by using a learning task which simulated a conversation situation. Our treatment required the learners to engage both in the processing of input and the production of output. We may categorize the task as what Izumi (2002) calls an *output-input treatment*: participants first had to produce the linguistic item to be learned, and subsequently received input on it. As participants also had to produce the items again after exposure, the task could also be categorized as what McDonough and Mackey (2006)<sup>8</sup> refer to as *primed production* task: participants produced an utterance containing a morphological structure that was provided in the interlocutor's input, only a few turns later.

The present study shares with the Godfroid (2016) and Godfroid & Uggen (2013) studies (sections 2.4.3.2 c & d) that the focus is on verb-stem allomorphy in present tense of German strong verbs. As pointed out in section 2.4.3, this morphosyntactic sub-regularity lends itself as an appropriate candidate to investigate the processes involved in natural L2 morphosyntactic learning. While both studies tested German strong verb acquisition in native speakers of English, we extended this line of research to native speakers of Dutch. Furthermore, while the above studies used treatments involving exposure only, we believe our study to make important contributions by using production data. Unlike Godfroid & Uggen (2013), but comparable to Godfroid (2016) and Brandt et al. (in prep.), we did not investigate the entirely novel acquisition of a conjugation paradigm, but rather the further development of a morphological difficulty. Although we did not analyze the differences between items with *a-ä* as compared to *e-i* changes, we matched our sets of critical items for type of vowel change, enabling us to investigate its role and compare the outcomes to the Godfroid (2016) and Godfroid & Uggen (2013) findings once

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<sup>8</sup> The authors use this term rather to refer to priming of syntactic structures.

we increase our sample size.

The following research questions (RQs) guided this study:

1. Do intermediate-to-advanced L2 German learners show learning of the stem-vowel change in German strong verbs during conversation?
2. Does the instruction (explicit/implicit) influence the amount of learning that takes place during the conversation task?
3. To what extent do learners retain what they learned during the conversation task?
4. Does the instruction influence the amount of retention?

We hypothesize to find small but significant learning effects for both instructional groups (RQ1). Although learners' difficulties with L2 morphology are well-attested (DeKeyser, 1995; N. C. Ellis, 2006; Larsen-Freeman, 2010), having to produce the test items orally and receiving subsequent correct auditive input should, at least to some extent, make learning possible. Learning effects were found in studies using comparable conversational learning paradigms, looking at vocabulary (De Vos et al., in prep.; De Vos et al., submitted) or morphology (Brandt, Schriefers & Lemhöfer, in prep.).

As the participants of the explicit condition receive instructions informing them about the target and the true intention of the task, they will have the possibility to guide their attention consciously to the correct forms used by the experimenter. Therefore, we expect the explicit group to have higher learning rates than the learners from the implicit group, who do not receive this additional information (RQ2).

We expect the learners to forget parts of what they previously learned over a short period of time (RQ3). In general, the retention of information of any kind is affected by time. Additionally, the learners will receive only a limited amount of correct input, which may also be a factor reducing the amount of retention over time.

We do not expect any differences between the two groups at the level of retention (RQ4). On the one hand, the explicit group may benefit from prior attention consciously directed to the verb forms; on the other hand, if the implicit group shows significant gains in accuracy, this gain in knowledge may be more sustainable. As pointed out earlier (section 2.2.2 a), some studies in the field of cognitive psychology suggest that knowledge resulting of implicit learning processes may be more durable and robust to forgetting than explicit knowledge (Allen & Reber, 1980; Dienes & Berry, 1997; Reber, 1989).



## Chapter 3. Methods

### 3.1 Pilot study

#### 3.1.1 Introduction

We administered a pilot study in order to assess whether the changing stem vowels of German strong verbs do indeed represent a learning problem for native speakers of Dutch, and to select suitable items for the main experiment. At this stage, we had already defined a rough sketch of the design of the main experiment. By means of the pilot study, we intended to answer the following crucial questions:

- a) *Do native speakers of Dutch who speak German as a second language commit errors at the level of the obligatory stem-vowel change in certain German strong verbs?*
- b) *To what extent does this morphosyntactic aspect represent a difficulty for native speakers of Dutch, as reflected by the amount of committed errors?*

If Dutch native speakers indeed committed a considerable amount of errors, we could use the results of the pilot study to fulfill two aims. First, we could use the error percentages to determine the difficulty of the individual vowel-changing items; based on these difficulty scores, we could then select appropriate items for the main experiment. Second, we could use the outcomes to determine the criteria of the target population of the main experiment.

The pilot study was presented through a *Google Forms* online questionnaire and contained questions about the participants' demographic and linguistic background, as well as a series of German sentences with gaps that had to be filled in. Each sentence was provided with a Dutch translation of the omitted word(s). Thus, the participants had to translate the Dutch words into German and fit them in the sentence. The missing words could be either verbs, nouns, adjectives, prepositions or articles.

Though the main experiment involved an oral production task, the pilot study was a written production task. Thus, one may think that due to this difference, the findings of the pilot study may not be informative for the main experiment. For instance, we may expect considerably more errors in spontaneous, spoken utterances than in the written production of single words. However, our rationale was the following: if the participants were making any errors in the written production task, we could expect them to commit even more errors in the spoken modality.

#### 3.1.2 Participants

There were 71 participants in total who filled in the survey. They were mainly recruited by means of social media, as well as via *Sona*, the system for participant recruitment of Radboud University Nijmegen. In the latter case, students received 0.5 *participant points* (course credit) for their participation.

After inspecting the test outcomes and corresponding profiles of the participants, we decided on a set of selection criteria that we thought would best describe the optimal target population of the future main experiment. Ideally, this target population should be proficient enough to already possess knowledge about strong verb conjugation, but not too proficient; in other words, we still wanted them to commit errors in order to give them the possibility to learn from exposure. We used the same selection criteria to narrow the sample of our pilot study down to 42 participants: the participants' L1 was Dutch; the participants were not dyslexic; their self-

rated proficiency was at least three on a five-point scale; they had had at least three years of German language instruction at school or reported learning German by additional means (for instance, short or long-term immersion, intensive courses, *Duolingo*, etc.). The demographic profiles and L2 German language background for the 42 participants are summarized in Table 1.

**Table 1**

*Demographic profiles and language background in L2 German for native speakers of Dutch (N = 42).*

<i>Demographic profiles</i>		<i>Language background L2 German</i>	
<b>Mean age in years</b>	21.7 (3.3)	<b>Age of L2 onset</b>	13.2 (2.5)
<b>Gender</b>	31 females, 11 males	<b>Mean years of instruction</b>	4.0 (1.4)
<b>Profession</b>	27 students, 15 non students	<b>Mean frequency of usage</b>	3.3 (0.5)
<b>Native language</b>	26 Dutch (NL), 16 Flemish <sup>9</sup> (B)	<b>Mean proficiency</b>	2.3 (1.3)
		<b>Number of additional L2s</b>	2.3 (0.7)

*Note.* Standard deviations of means are given in parentheses. Years of instruction includes both secondary school and evening classes. Self-ratings of frequency of usage and proficiency levels are measured on a scale from 1 (very low) to 5 (very high). All participants reported having knowledge of additional L2s, and they could give information about a maximum of three additional L2s. Of the 27 students, 19 were studying at Radboud University Nijmegen, and 14 reported studying or having studied language-related studies. One participant reported having French and one participant Limburgish (a regional dialect spoken in the South-East of the Netherlands) as their second native languages.

### 3.1.3 Stimulus materials

We tested the participants' knowledge of 41 vowel-changing strong verbs. In addition, we tested a series of distractor items: 20 non-vowel-changing filler verbs, 29 nouns, 10 adjectives, 10 prepositions, and 20 articles. All test items can be found in Appendix A. All verbs had to be inflected in 3SG PRES, as this required the application of the vowel change for critical items.

The test consisted of 97 German sentences containing gaps that the participants had to fill in, and they were presented one by one. To elicit the correct German target verbs, we gave the participants the first letter of these verbs in addition to the Dutch translations. Figure 1 illustrates how the test sentences were presented to the participants.

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<sup>9</sup> Flemish is the version of Dutch that is spoken in Belgium.

**Pilot-study: Duits als vreemde taal (A)**

\*Vereist

**Experiment**

Anna (I) \_\_\_\_\_ ihre \_\_\_\_\_ Schuhe. (houdt van / vindt leuk) (rode) \*

liebt, roten

**Instructiebox**

- Vul de zinnen aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het echt niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

« Vorige Doorgaan »

4% voltooid

Figure 1. Example of a test sentence as presented in the Google Forms survey. The English translation of the target sentence is “Anna loves her red shoes”. The Dutch translations of the target words are provided in parentheses at the end of the sentence. The first letter is given here for the first item only (*liebt* – ‘loves’). A series of key instructions underneath all test sentences (“Instructiebox”) reminds the participants of the most important instructions throughout the test.

We selected the 41 critical verbs by inspecting the list of German strong and irregular verbs in the *Duden* (Gallman et al., 2011, pp. 484–496). Starting with this list, we excluded all archaic verbs, as well as all double forms (i.e., verbs that could be inflected according to the strong as well as the weak conjugation). In order to make them compatible with the learning task of the main experiment (section 3.2.2.2), we only selected verbs that required the vowel change in 3SG PRES and that allowed a sentence structure consisting of a single main clause containing three noun phrases (e.g., transitive sentences as “The man [NP1] hunts [V] the horse [NP2] with [prep] the lasso [NP3]”, or intransitive sentences as “The man [NP1] lives [V] in [prep] the house [NP2] with [prep] the dog [NP3]”)<sup>10</sup>. Furthermore, we created the test sentences in a way that all sentences containing critical or filler verbs were subject-first sentences with only one gap, that is, the verb gap in second position of the sentence. The remaining sentences varied more at the level of sentence structure and number of gaps, and sentence length was not held constant. All sentences were assumed to have a high level of semantic integrity, which means that all missing words were supposed to have a strong semantic relation with the overall sentence meaning. The test sentences as well as the correct solutions can be found in Appendix B.

### 3.1.4 The survey

The first part of the online survey consisted of a series of questions concerning the participants’ personal information and language background. This was followed by a series of instructions concerning the test, after which the 97 test sentences were presented one by one. The entire survey can be found in Appendix C. The sentences were presented in a pseudo-randomized

<sup>10</sup> Abbreviations: NP1 = first noun phrase, NP2 = second noun phrase, NP3 = third noun phrase, V = verb, prep = preposition.

order. There were never more than two sentences containing critical items in a row, nor were there more than two filler verbs in a row. We counterbalanced item order by using two versions of the questionnaire, which were identical, except that the order of test sentences was reversed.

At the beginning of the online test sessions, participants were informed that they were about to participate in a pilot study with a maximum duration of 30 minutes, and with the purpose of testing stimulus materials for a future experiment about learning German as a second language. A set of approximately 100 German sentences would be presented to them, and their task was to fill in the gaps with the correct German words. To facilitate the task, they would receive the Dutch translations and, in some cases, the first letter of the missing words. They were asked to search for a quiet environment before starting the test. Crucially, they were instructed not to use any help tools, and to fill in their answers in a spontaneous and rather speedy way. We informed them that we wished their answers to reflect their authentic knowledge of German. If they were not sure about the correct answer, they were supposed to give it a try anyway and to fill in the idea that first came up in their minds.

Despite the fact that the task format (i.e., a written sentence completion task) was likely more to trigger explicit knowledge, we hoped that asking the participants to fill in their answers in a spontaneous way and reducing the salience of the strong verbs by adding the distractors would contribute to the implicitness of the task and to help us getting a glimpse of the participants' implicit knowledge of strong verb conjugation. However, it goes without saying that we cannot make any judgements about the actual implicitness of the knowledge the participants relied on while taking the test.

### **3.1.5 Scoring and results**

After data collection, we assigned error codes for the entire sample to all the critical verbs and distractor items. The error codes can be found in Appendix D. The next step consisted of inspecting the test outcomes for different sample subsets in order to narrow the final sample down to a group of participants that would best match the target population of the future main experiment. As described above, the final sample consisted of 42 participants. Based on this sample, we calculated the percentages of the different error types per item, which can be found in Appendix E. We used the resulting error percentages to determine the degree of difficulty of the individual vowel-changing strong verbs, and to make a selection of critical items for the main experiment (see section 3.2.2.2 e).

## **3.2 Main experiment**

### **3.2.1 Participants**

Twenty-three native speakers of Dutch with an intermediate-to-advanced level of German participated in the experiment. Most participants were students or scientific employees of Vrije Universiteit Brussel, Belgium. They were divided into two groups: an 'explicit' group ( $n = 11$ ) that received explicit instructions about actual goal of the study (learning of the vowel change during conversation), and an 'implicit' group ( $n = 12$ ) who did not receive this information. One participant from the implicit group had to be excluded for having taken psychoactive medication shortly before the experiment. Moreover, the retrospective report (section 3.2.2.3) revealed that one participant from the explicit group had misunderstood the instructions, and that one

participant from the implicit group was aware of the study's true purpose during the learning task. We decided to exclude both participants. The final sample consisted of ten participants per group.

The remaining 20 participants were between 18 and 34 years old, and 14 were female (also see Table 2). They all reported to be non-dyslexic. Three participants were left-handed, and all participants stated that Dutch was their native language. Sixteen participants reported that they were doing (or that they had been doing in the past) language-related studies, and eight out of them reported having studied German at university-level. Fifteen participants were native speakers of Belgian Dutch (Flemish), while the remaining five participants were native speakers of the Dutch variant spoken in the Netherlands. In addition, four participants reported French and one participant English to be their second native language. Table 2 summarizes how many years of German instruction the participants had received, as well as their self-ratings of their levels of proficiency and frequency of use of German. The participants also spoke foreign languages other than German, in particular English (19 participants), French (16 participants) and Spanish (8 participants). The participants also completed a German language test assessing vocabulary size (section 3.2.2.1). Mann-Whitney *U* tests revealed no significant differences in any measures on experience with German (all  $p > .20$ ; all  $r < .32$ ), except for self-rated proficiency in writing, which was marginally significant ( $U = 76$ ,  $z = 2.07$ ,  $p = .052$ ,  $r = .46$ ). However, as none of the experimental tasks required written production and as the participants were supposed to learn from spoken input, we did not consider this finding to be problematic for our analyses.

**Table 2**

*Demographic profiles and language background in L2 German for the explicit ( $n = 10$ ) and implicit ( $n = 10$ ) condition separately, and for all participants ( $N = 20$ ), as reported in the language background questionnaire.*

	<i>Explicit</i>	<i>Implicit group</i>	<i>Overall</i>
Gender	8 females, 2 males	6 females, 4 males	14 females, 6 males
Mean age in years	23.7 (5.0)	23.3 (3.6)	23.5 (4.2)
Mean years of instruction at school	3.7 (1.8)	4.0 (2.4)	3.9 (2.1)
Mean years of instruction at university	1.1 (1.2)	1.4 (1.1)	1.3 (1.1)
<i>Self-ratings:</i>			
Mean frequency of usage (general)	2.1 (1.0)	2.6 (1.2)	2.4 (1.1)
Mean proficiency (general)	2.9 (1.0)	3.3 (0.7)	3.1 (0.9)
<i>Production:</i>			
Mean proficiency in speaking	2.8 (1.1)	3.3 (0.8)	3.1 (1.0)
Mean proficiency in writing	2.4 (1.0)	3.2 (0.6)	2.8 (0.9)
<i>Comprehension:</i>			
Mean proficiency in listening	3.6 (0.9)	4.2 (0.8)	3.9 (0.9)
Mean proficiency in reading	4.0 (0.7)	4.3 (0.5)	4.2 (0.6)

*Note.* Standard deviations are given in parentheses. Years of instruction at school includes both secondary school and evening classes. Years of instruction at university includes German as a main field of study or as an elective course at university. Self-ratings of frequency of usage and proficiency levels are measured on a scale from 1 (very low) to 5 (very high).

### 3.2.2 Procedure

Each participant was tested individually in a quiet room, containing two desks (one for the participant, one for the experimenter) that were situated opposite to each other, as well as two sets consisting of a computer, keyboard and mouse. The order of events during the experimental session is depicted in Figure 2. After filling out the consent form and the screening form for behavioral research of the *Donders Center for Cognition*, participants completed an online background questionnaire (Appendix F), followed by a computer administered German vocabulary test (*LexTALE*; 3.2.2.1). Then, the learners performed the sentence-formation task (3.2.2.2), consisting of a pre-measure (10 trials) and the subsequent conversational learning task (270 trials). Immediately after finishing the learning task, participants answered the questions of the debriefing interview (3.2.2.3). After that, they took the short phonemic discrimination task (3.2.2.4), which was followed by a brief explicit posttest (3.2.2.5). Finally, they completed the verb knowledge assessment form (3.2.2.6), after which they were rewarded with 10€ in cash for their participation. The total duration of the experimental session was about one hour and a half, but varied depending on how much time the participants spent on the sentence-formation task.

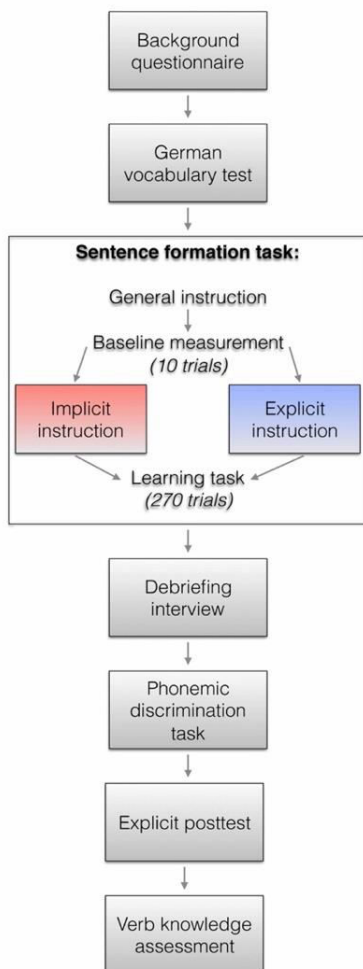


Figure 2. Schematic overview of the tasks in chronological order.

### 3.2.2.1 German Vocabulary Test

After filling in the background questionnaire, participants were asked to perform a German vocabulary test on the computer in the form of a non-speeded lexical decision task. This test was the German version of the *LexTALE* (*Lexical Test for Advanced Learners of English*), a test that was created by Meara (1996)<sup>11</sup> to measure English vocabulary, and validated by Lemhöfer and Broersma (2012). The German version ( [www.lextale.com](http://www.lextale.com) ) consists of 40 existing words and 20 nonwords<sup>12</sup>. The order of test items was the same across participants, and maximally five words or nonwords were presented in a row. The script was written in the programming language *Python* by Tomonori Nagano, adapted by Sean Roberts and Johanna de Vos, and presented in *Canopy*. The completion of the task took about four minutes. Participants were instructed to push a ‘yes’ button when they were confident that the presented item was a correct, existing German word; otherwise, they should press ‘no’. They could take as much time as they wanted for their responses. The scores were obtained by calculating the mean percentage of the average of correctly identified words and the average of correctly identified nonwords (Lemhöfer & Broersma, 2012, p. 329). The results are listed in Table 3. A Wilcoxon rank-sum test did not reveal a statistically significant difference between the mean *LexTALE* scores of the implicit and the explicit groups,  $W = 38$ ,  $z = -0.88$ ,  $p = .38$ ,  $r = -.20$ .

**Table 3**

*Descriptive statistics of accuracy scores (%) on the German Vocabulary Test.*

	<i>Explicit condition</i>	<i>Implicit condition</i>
Sample size	10	10
Mean	67.25	69.75
95% CI for mean (lower bound)	62.82	67.88
95% CI for mean (upper bound)	72.75	71.12
Standard Deviation	8.05	2.88
Median	68.75	70.00
Minimum score	56.25	65.00
Maximum score	82.50	73.75

### 3.2.2.2 Conversational learning task

#### *a) Global task: Meaning-based sentence-formation*

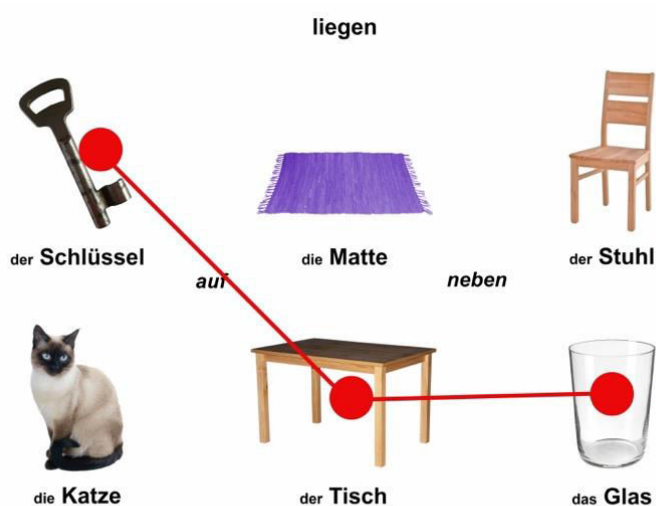
The main task of the experiment had the format of a meaning-based sentence-formation task and was presented with *PsychoPy*. The script was written by Johanna de Vos in the programming language *Python*. The participant and the experimenter were sitting opposite to each other, each of them having an individual computer screen. Just as in the example trial in Figure 3, a set of six pictures in a 2 x 3 grid format and the corresponding German nouns and articles were displayed

<sup>11</sup> As cited in Lemhöfer, Spalek & Schriefers (2008).

<sup>12</sup> The full experiment (including materials and instructions) can be downloaded from the website: [www.lextale.com](http://www.lextale.com).

on the screen. A verb in the infinitive form was displayed at the top of the screen, and – if applicable – prepositions were given. The participants were instructed to formulate sentences based on the information on the screen. They had to select three pictures: one from the first column of pictures, one from the second, and one from the third. The order of the elements in the sentence was supposed to correspond to the horizontal order of the pictures on the screen. Participants were asked to formulate a semantically plausible and ‘typical’ sentence and to select the pictures accordingly. The ‘typicality’ of the sentence meaning was supposed to be defined in a subjective way and the participants had to decide for themselves how to interpret and apply it. We suggested that they could create a sentence based on the first scenario that would come to their minds when perceiving the pictures. Thus, the instruction was meaning-based above all. As we can see in Figure 3, there are eight different possibilities to combine the pictures, and one of the possibilities is represented by the red dots and lines. The English translation of the resulting sentence would be “The key lies on the table next to the glass”.

The entire task consisted of 280 trials in total, including 10 trials of a pre-measure and 270 of the conversational learning task. The task was audio recorded and the total duration was about 45 minutes on average.



Possible sentence: *“Der Schlüssel liegt auf dem Tisch neben dem Glas.”*

Figure 3. Illustration of an experimental trial.

#### *b) The conversational learning task*

The major part of the sentence-formation task consisted of the conversational learning task, a short-term learning treatment, with a duration of more or less 40 minutes. The participant and the experimenter (the author of this thesis and a balanced German-Flemish bilingual) had to take turns in producing typical sentences based on the pictures and words on the screen. This way, the L2 speaker had the possibility to learn from native speaker input during a conversation-like situation. When one of them had spoken the sentence out loud, the interlocutor was instructed to make – in silence – a judgement by pressing a ‘yes’ button on the keyboard when agreeing with the typicality, or a ‘no’ button when they were disagreeing. What the participant did not know



was that the experimenter did not make any typicality judgments; instead, she would type the error code (Appendix G) for the conjugated verb produced by the participant.

The learning task was considered to mimic natural conversations by involving turn-taking, oral production, as well as aural comprehension of the interlocutor's output. Furthermore, the produced sentences and judgments involved thinking about the utterances and ideas expressed by the interlocutor. The communication took place at the auditory and oral level only, as the two interlocutors were looking at the screens in front of them, disabling them to see each other's faces or body movements.

#### *c) Explicit and implicit instruction conditions*

The participants were divided over two different conditions: an explicit instruction condition, and an implicit instruction condition. Our aim was to measure whether the instruction would affect the learning outcomes of the two groups in a different way.

*General instructions.* Prior to the learning task, all participants received identical instructions about the meaning-based task they were to carry out (i.e., creation of typical sentences, turn-taking structure and typicality judgments). They were all told that the intention of the study was to look at how the language one speaks is related to one's way of thinking. The latter was a cover story that we used in order to conceal the study's actual focus, namely learning of strong verb conjugation during conversation. In the same line, participants were told that the same study would be carried out in other foreign languages, such as Spanish, Swedish or Chinese. In order to strengthen the cover story further, we had included a series of distractor questions in the background questionnaire that the participants had to fill out at the beginning of the experimental session. For instance, we added some forced-choice questions about the participants' personal preferences about travelling, food and the environment, which were topics that would return in the learning task.

*Implicit group.* The participants in the implicit instruction condition received only the instructions described above. We hoped that this group would remain unaware of the actual study's purpose and about the central role of the vowel change. This would allow us to tap into the participants' implicit knowledge of the strong verb paradigm, as well as processes of implicit or incidental learning.

*Explicit group.* The participants in the explicit instruction condition received the instructions stated above as well as one extra page with explicit instructions, informing them about the facts that the vowel-changing verbs were playing a central role in the task, that they should try to conjugate these verbs correctly, and that they would have the possibility to pick up some of the target forms from the experimenter's utterances. In this case, we were presuming the participants to rely more on their explicit knowledge, and we were hoping to tap into more explicit learning processes, making use of conscious attention towards the target structure.

#### *d) The pre-measure*

In order to assess any a-priori differences between the implicit and the explicit group that were unrelated to the instruction they received, we included a brief pre-measurement (T0) of the

knowledge of the vowel change prior to the conversational learning task. The pre-measure consisted of only ten trials and was presented to the participants as a practice block, in which the experimenter did not yet intervene. The only information that the participants had received by then was the instruction to formulate typical sentences based on the materials on the screen, as well as the cover story. The instruction concerning the turn-taking and the typicality judgments, as well as the explicit instruction for the explicit group, was presented after the pre-measurement.

#### *e) Stimulus materials*

The learning task contained 32 critical, 32 control, and 26 filler items, which will be presented in the following subsections and which can be retrieved in Appendix H. All trials were constructed in a way that required the production of a sentence containing the target verb inflected in 3SG PRES.

*Critical items.* We included 32 critical items in our study, consisting of German strong verbs requiring a stem-vowel change in 3SG PRES and therefore representing the main focus of our study. As all verbs in the task needed to be conjugated in 3SG PRES, all critical items were supposed to be produced with application of the vowel change. The selection of critical items was based on the set of strong verbs that we had piloted prior to the main experiment, and on the results of this pilot study (Appendix E). We selected 32 items that fit the main experiment best in terms of their overall percentage of knowledge<sup>13</sup> (i.e., how many of the participants of the pilot study had knowledge of the item in question?) and the percentage of committed vowel errors (i.e., not applying the stem-vowel change when it should have been applied).

The resulting 32 critical items were divided in two matched sets. Integrating two matched sets in the design was related to the input variable that we would be using to assess learning: the learners would receive native speaker input only for one of the two sets, making it possible to compare the effect of input against a baseline measure for items on which the learners did not receive any input. The percentage of knowledge (as assessed by the pilot study) ranged from 71.43 to 100% for set A ( $M = 89.14$ ), and from 61.09 to 100% for set B ( $M = 88.24$ ). The percentage of committed *expected vowel errors* ranged from 14.29 to 59.52% for set A ( $M = 34.98$ ) and from 16.67 to 69.05% for set B ( $M = 36.76$ ).

The two sets were matched for the verbs' degrees of difficulty, as measured in the pilot study. More specifically, this means that the items were matched for the percentage of committed *expected vowel errors* in the first place, and for other error types in the second place. Furthermore, the critical items were matched for the type of vowel change (*a-ä*, *au-äu*, or *e-i*) and stem-vowel length<sup>14</sup>, as well as word length (measured in syllables) and the sentence structure required by the verb (e.g. subject / accusative object / prepositional phrase; subject /

<sup>13</sup> 'Not knowing the target verb' included: not knowing the target verb at all, using a wrong verb, or committing a vowel error different from the one we expected as well as an additional error.

<sup>14</sup> Vowel length is phonemic in German. The German phonological system contains long as well as short vowels, which is usually reflected by a quantitative difference (i.e., a difference in duration), as in *lass* /las/ ('let', imperative, 2<sup>nd</sup> p. sg.) versus *las* /la:s/ ('read', past tense, 3<sup>rd</sup> p. sg.). This quantitative difference is usually accompanied by qualitative differences, short vowels being more open than long vowels: /e:/-/ɛ/; /o:/-/ɔ/; /i:/-/ɪ/, /u:/- /ʊ/, /ø:/- /œ/, /y:/- /ʏ/.

Thus, an *e-i* change in strong verbs is phonetically realized differently for short and long vowels, as in *empfehlen* – *empfiehl*t, involving an /e:/-/i:/ change, versus *brechen* – *bricht* involving an /ɛ/-/ɪ/ change.

dative object / accusative object; etc.).

*Control items.* We used 32 control verbs that had the vowels *a*, *au*, *e*, and *o* in the infinitive forms; however, these verbs did not require stem-vowel changes in present tense. Instead, 3SG PRES was marked only by the addition of the suffix *-(e)t* to the stem. We integrated the control items in our design for two reasons. First, it enabled us to detect whether participants were making use of strategic processing (i.e., applying the vowel change as a default strategy) that may bias the test results. As we hypothesized the weak conjugation to be the default paradigm in the learners' interlanguage (see findings of Godfroid, 2016, p. 204), we expected the participants to have high accuracy rates on control items and to commit substantively more errors on critical items. However, learners who were or became aware of the fact that we were testing their performance on strong verbs might start to overgeneralize the strong conjugation paradigm and to apply changed stem vowels to control verbs. If this were the case, measuring learning would become impossible without this control condition. Second, the addition of 32 non-vowel-changing items helped to reduce the salience of the vowel changing items in the main task. The number of items for which the participants would actually hear input containing the vowel change was limited to 16 items, out of a total of 90 items (critical items, control items, and fillers).

In parallel with the critical items, the 32 control items were divided in two comparable sets, matched for frequency, stem vowel quality and length, and sentence structure. The learners would receive input on only one of the sets. The items were selected from the [CELEX database](#) (Baayen, Piepenbrock, & Gulikers, 1995). In order to maintain a low comprehension difficulty for these verbs for our participants, we prioritized high-frequency items, mostly cognates with Dutch.

*Filler items.* We used 26 non-vowel-changing verbs as filler items. All of them were cognates with Dutch and therefore presumed to be easily comprehensible. They were also divided in two equally-sized subsets. In order to match the overall item frequency in the experiment, half of the fillers were produced two times, while the other half were produced four times during the learning task. In contrast to the other test items, and to conceal the high frequency of *a* and *e* in verb stems, the fillers covered a more diverse range of stem vowels, including for instance *äu* /ɔʏ/, *ei* /ai/, *i* /ɪ/, *ie* /i:/, *ö* /ø/, *u* /u/ or *ü* /y/. The filler items were used to fill the remaining free slots in the trial list (for details, see below in section h), and they were not used for the analysis.

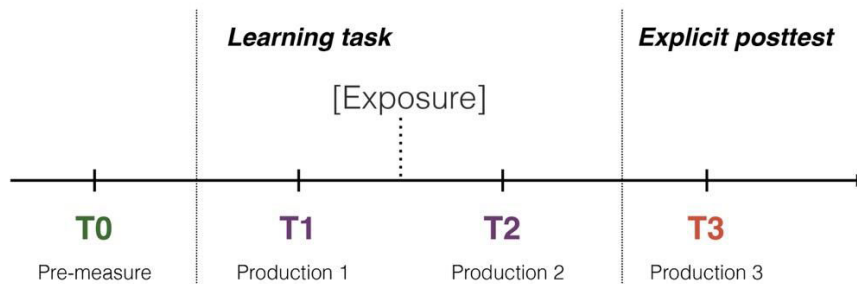
#### *f) The scoring system*

Immediately after hearing each learner production, the experimenter entered a specific error code (Appendix G). After data collection, missing data or doubts were corrected by means of the audio recordings; furthermore, the error codes were recoded in a binary way with vowel errors receiving a 0 and no vowel errors receiving a 1. In concrete, we recoded the former error codes 0 (*no error*) and 1 (*correct vowel, but other error*) as 1, and the remaining error types as 0. Based on these binary scores, we calculated an accuracy percentage per item type per participant. These accuracy scores represented the dependent variable for the statistical analyses.

*g) Pretest-posttest task design to measure learning from native speaker input*

In order to measure learning effects due to native speaker input, a pretest-posttest design was integrated into the conversational learning task. Between the two production moments of the participant, consisting of a specific test item embedded in a sentence, there were two input moments in which the experimenter produced sentences containing the correct target form of the same item. Thus, participants heard the target verb form twice and had the possibility to learn from the native speaker's input. The first learner production (T1) could be seen as a pretest moment, while the second learner production (T2) could be seen as posttest moment. A schematic overview can be found in Figure 4.

However, the learners were exposed to correct input only for half of the test items, i.e. for only one set of the critical items and one set of the control items. This way, we could compare the change in accuracy scores from T1 to T2 for items with input to a baseline condition with no input. In other words, participants were functioning as their own controls. This enabled us to assess whether any improvement in accuracy was due to the experimenter's input, or due to spontaneous fluctuations (in particular, improvements) in verb production accuracy between T1 and T2. The learning effect due to native speaker input could be assessed by measuring the improvement for input items from T1 to T2, and by subtracting from it the improvement on no-input items caused by factors other than input.



*Figure 4.* Schematic overview of the different learner production moments. T0 refers to the brief pre-measure prior to the learning task; T1 refers to the first learner production of a specific test item during the conversational learning task, and T2 refers to the second learner production of the same item during the learning task and is preceded – or not – by 2 input moments. T3 refers to the third learner production which takes place at the unannounced explicit posttest.

*h) Pseudorandomization and counterbalancing*

There were 270 trials in total. Participants were free to take short breaks after approximately every 70 trials<sup>15</sup>. The number of intermediate trials between T1 (participant), first input (experimenter), second input (experimenter), and T2 (participant) was fixed: There was a lag of two trials between T1 and first input, five trials between first and second input, and four trials between second input and T2. For no-input items, this structure was not altered, but the free input slots could be filled by other production, input or filler trials. In order to conceal the systematic trial pattern, an encapsulated, pseudo-random order was used. For instance, the T1 trial for one item could immediately be followed by an input trial for another, or free input slots for no-input items could be filled by T1 or T2 trials of other items. We made sure that there were

<sup>15</sup> Trials 73, 135, and 203.

never more than two critical items in a row. The concealment of the trial structure turned out to be successful, as none of the participants reported having noticed a systematic pattern in the order of trials.

We established a fixed structure of the trial list (Appendix I), determining the learner production moments, input moments, and whether these were to be filled with critical or control items of the input or no-input subsets, or with fillers. At testing, these pre-determined item slots were filled randomly with concrete items. Counterbalancing was achieved by exposing half of the participants to input only for sets A of the critical and control items while giving no input on the B sets, and by exposing the other half to input on sets B of critical and control items, while not giving any input for the A sets.

To match the proportions of the test items used in the learning task, the pre-measurement consisted of four critical, four control, and two filler items. To maintain a consistent token frequency for the items of the learning task, we used separate items for the pre-measure. Again, we fixed the order of item types beforehand, and they were filled in at random by concrete tokens during the experiment.

### ***3.2.2.3 The retrospective interview to measure awareness***

Immediately after the learning task, we carried out an audio-recorded retrospective interview to assess the participants' awareness about the task (learning of inflection from native speaker input) and the target (central role of vowel change). The interview would enable us to assess whether the instruction manipulation had been successful, and to assess the type of learning process the learners had engaged in. Moreover, the interview allowed us to detect unexpected task completion patterns for both groups, and to gather important background information. Crucially, by the end of the interview, all participants would have become aware of the target and of the true aim of the study.

The interview was established following the guidelines of Rebuschat (2013) and held in Dutch. A translation of the questions into English, as well as an English transcription of an exemplary interview, can be found in Appendix J and Appendix K, respectively. The experimenter started by asking general questions, inviting the participants to report what they thought the study was about, and whether they noticed something special. The following questions were increasingly specific, asking about the role of grammar, the role of verbs, and leading ultimately towards questions about strong verb inflection. Participants that were still unaware about the study's target structure at the beginning of the interview would become aware of it at some point during the interview. Still, being or becoming aware of the central role of strong verb conjugation did not necessarily imply that participants were aware of the fact that the study was about learning from input. After the target-related questions, awareness of the task was assessed by asking the participants to report what they believed to be the true purpose of the study. Participants who were not aware of the task yet would be informed about it at this point. Then, participants were explicitly asked whether they could remember having noticed strong verbs, and whether they remembered having actively tried to take over the correct forms from the input. The last question served to gather background information about the learners' prior explicit instruction about strong-verb conjugation during language courses.

We classified participants who had awareness of the target and of the task as *explicit/intentional learners*. Participants without awareness of the task but some awareness of the target were classified as *incidental learners*. Participants who had neither awareness of the

task nor awareness of the target would be classified as *implicit learners*.

#### 3.2.2.4 Phonemic discrimination task

An additional learner variable that we measured was phonemic discrimination ability. The purpose was to investigate whether this variable influenced the participants' ability of perceiving the presence of a vowel change in spoken native speaker input, and therefore affected the learning outcomes. However, as the calculation of the results and their integration would have taken considerable time and effort, and as the phonetic level did not constitute a central element of the present study, we decided to leave the analysis and interpretation of the outcomes aside for now. Therefore, this section is restricted to a brief presentation of the task.

Participants had to discriminate between five different vowels: /a/, /ɛ/, /e/, /i/ or /ɪ/. All of them were relevant for the vowel-changing test items of the learning task. The test had a duration of about five minutes, was administered using *Praat* towards the end of the experimental session, and consisted of 100 brief trials. At each trial, the participants had to listen to an artificially synthesized vowel corresponding to one of the five phoneme categories mentioned above. They had to decide which sound they were hearing by clicking with the mouse on one out of five buttons displayed on the computer screen (see Figure 5). For each phoneme category, five different versions of the vowel were synthesized by slightly altering the formant frequencies. An instruction sheet can be found in Appendix L.

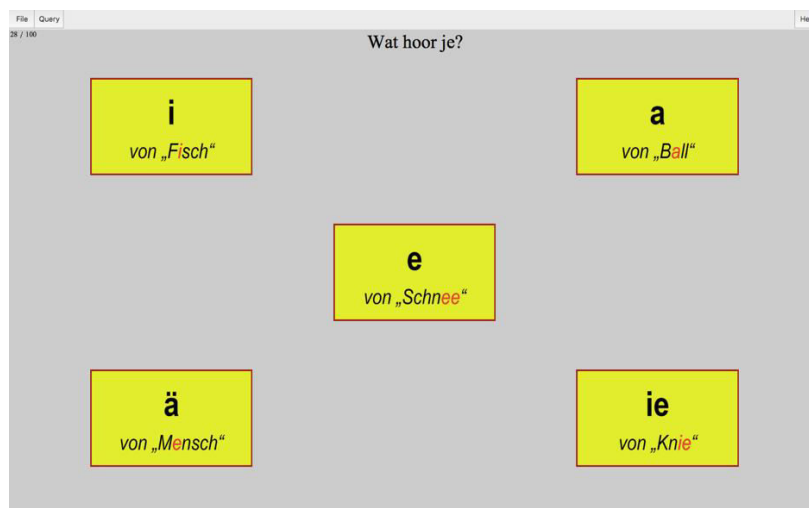


Figure 5. Illustration of the phonemic discrimination task. Participants were hearing a sound and had to click on the corresponding button on the screen.

#### 3.2.2.5 Unannounced explicit posttest

In order to investigate the learning outcomes of the conversational task over time (i.e., the amount of retention), we introduced an unannounced explicit posttest (T3) at the end of the experimental session. The test took place about 15 minutes after the end of the learning task and had a short duration of approximately three minutes. The task was programmed in *PsychoPy* by Johanna de Vos and presented in *Canopy*. All critical and control items from the learning task were presented in their infinitive forms (e.g., *geben* – ‘to give’) one by one in a random order on the screen. Participants were instructed to orally produce the verbs in 3SG PRES (e.g., *gibt* –

‘gives’). The scoring system was the same as during the learning task, for the specific error codes as well as for the binary recoding. The posttest was called ‘explicit’ because of its explicit task format, likely to trigger the use of explicit knowledge about strong verb inflection.

### 3.2.2.6 Verb knowledge assessment

Although most test items were cognates of Dutch, improving the probability of word comprehension, it was important to assess the learners’ knowledge status for individual test items. We conducted a brief knowledge assessment at the end of the experimental session. All critical and control items were listed in random order on a A4-size sheet and handed out to the participants together with an instruction sheet (Appendix M). We asked the participants to indicate the verbs they did not know at all (*no knowledge*), the verbs that they had never actively used before but of which they understood the meaning (*passive knowledge*), and the verbs they had been actively using in the past (*active knowledge*). This assessment was crucial for being able to differentiate between conjugation learning and novel vocabulary learning. As we were only interested in the former, we excluded all *no-knowledge* items from subsequent scoring and analyses. This resulted in a loss of 1.56% for critical items and 1.56% for control items in the learning task, and a loss of 7.50% for critical items and 8.75% for control items in the pre-measure.

### 3.2.3 Analysis

The accuracy data from the learning task and the explicit posttest (for details about the scoring system, see section 3.2.2.2 f) of our final sample ( $N = 20$ ; section 3.2.1) were entered into the *Statistical Package for Social Sciences (SPSS)*, version 23. Before conducting the main analyses, we used a Mann-Whitney test in order to detect whether there were any important differences in accuracy scores between the explicit and the implicit groups at the pre-measurement (T0), prior to the learning task.

The subsequent main analyses consisted of two separate four-way mixed-design analyses of variance. The first mixed-design ANOVA was run with the within-subject factors Test Moment (test moment 1 [T1, before potential input] of the main task vs. test moment 2 [T2, after potential input] of the main task), Input (input vs. no input), Verb Type (critical items vs. control items), and the between-participants factor Instruction (explicit vs. implicit instruction). The dependent variable consisted of the participants’ accuracy scores. The descriptive statistics of the accuracy scores over all factor levels and combinations can be found in Table 4. As we were measuring learning (RQ1) as a significant increase in accuracy from T1 to T2 of the main task for input items – while subtracting from it any increase for no-input items – we were mainly interested the interaction effect between Test Moment and Input. In addition, we had the intention to assess any differences between the two instruction groups, so we investigated whether a main effect for this variable could be found and whether the Test Moment x Input interaction would be modulated by Instruction (RQ2).

The second mixed-design ANOVA was identical to the first, except that different levels of Test Moment were used. T2 of the main task was compared to T3, the explicit posttest. This time, we investigated to what extent the participants would retain what they just had learned (RQ3). We defined full retention as no change in accuracy scores on input items from T2 to T3, while a decline in accuracy scores was supposed to reflect a reduced amount of retention (i.e., forgetting). Thus, again, we were mainly interested in the interaction effect of Test Moment and

Input. We were also interested in any differences between the explicit and the implicit instruction groups. We investigated the main effect of Instruction, and whether this variable modulated the Input x Test Moment interaction (RQ4).

In addition, we planned to assess whether there was any overgeneralization of the vowel change to control items. As mentioned earlier (section 3.2.2.2 e), we expected the unmarked weak conjugation to represent the default paradigm in the learners' interlanguage, and therefore, we expected our participants to have high accuracy rates on control items – learning not being necessary – and to commit considerably more errors on critical items. Overgeneralization of the strong verb paradigm to control items would represent strategic processing and would bias the test results. The absence of overgeneralization should be reflected by high accuracy rates on control items. Thus, for both mixed-design ANOVAs, we planned to verify whether the Test Moment x Input interaction was affected by Verb Type, and if there was a main effect for Verb Type.

All effects are reported as significant at  $p < .05$  unless otherwise stated. Statistical assumptions were tested and appropriate measures were taken in case they were not met. The assumption of sphericity is not an issue for our data, as we never measured more than two points of data per participant. However, as we were dealing with relatively small sample sizes, it was more difficult to account for the assumption of normality. For all comparisons between two instruction conditions, we decided to use non-parametric alternatives as soon as the assumption of normality was violated for at least one of the variables in question. We used the Mann-Whitney test for comparing two independent conditions, and the Wilcoxon signed-rank test for comparing two related conditions. We also investigated the confidence intervals of the differences between group means in order to improve the reliability of the analysis. Equal variances are not assumed; however, this becomes an issue only when dealing with unequal sample sizes and the largest group having the largest variance (Field, 2012, p. 423). As this is not the case for our sample, using alternative  $F$ -ratio's, such as Brown and Forsythe's (1974) or Welch's (1951)  $F$ -ratios was not necessary. Effect sizes are reported with partial eta squared (*Partial  $\eta^2$* ) for the ANOVAs, and the correlation coefficient  $r$  for the follow-up tests.



**Table 4***Descriptive statistics of accuracy scores (%) in all subject conditions.*

	<i>Test moment 1 (Main task)</i>				<i>Test moment 2 (Main task)</i>				<i>Test moment 3 (Explicit posttest)</i>			
	<b>Critical items</b>		<b>Control items</b>		<b>Critical items</b>		<b>Control items</b>		<b>Critical items</b>		<b>Control items</b>	
	<b>Input</b>	<b>No input</b>	<b>Input</b>	<b>No input</b>	<b>Input</b>	<b>No input</b>	<b>Input</b>	<b>No input</b>	<b>Input</b>	<b>No input</b>	<b>Input</b>	<b>No input</b>
<b>Explicit condition (<i>n</i> = 10)</b>												
Mean	64.38	63.33	84.79	87.67	85.63	63.21	94.92	89.67	75.00	65.84	92.38	90.17
95% CI for mean (lower bound)	46.00	48.30	80.43	81.54	75.96	45.83	90.79	83.40	61.34	49.30	87.14	84.12
95% CI for mean (upper bound)	82.76	78.37	89.16	93.79	95.30	80.59	99.04	95.94	88.66	82.37	97.61	96.22
Standard Deviation	25.69	21.02	6.10	8.56	13.52	24.29	5.77	8.76	19.09	23.12	7.32	8.47
Median	71.88	61.25	83.96	90.42	93.75	61.25	96.67	93.54	78.13	64.38	90.63	93.33
Minimum score	12.50	26.67	75.00	73.33	62.50	33.33	87.50	73.33	50.00	26.67	80.00	73.33
Maximum score	100.00	93.75	93.75	100.00	100.00	93.75	100.00	100.00	100.00	100.00	100.00	100.00
<b>Implicit condition (<i>n</i> = 10)</b>												
Mean	44.50	53.10	90.63	88.90	59.50	52.30	91.25	94.19	69.08	68.58	86.25	86.98
95% CI for mean (lower bound)	23.07	33.88	85.80	83.28	36.44	31.53	85.60	90.85	51.14	53.92	79.65	82.82
95% CI for mean (upper bound)	65.93	72.33	95.45	94.52	82.56	73.08	96.91	97.52	87.03	83.24	92.85	91.15
Standard Deviation	29.96	26.88	6.75	7.86	32.23	29.04	7.91	4.66	25.08	20.50	9.22	5.82
Median	43.75	56.25	90.63	90.42	71.88	59.38	93.75	93.75	78.13	68.75	84.38	87.50
Minimum score	6.67	13.33	81.25	75.00	6.67	14.29	75.00	87.50	20.00	40.00	68.75	76.92
Maximum score	87.50	81.25	100.00	100.00	93.75	93.75	100.00	100.00	93.75	100.00	100.00	93.75
<b>Overall (<i>N</i> = 20)</b>												
Mean	54.44	58.22	87.71	88.28	72.56	57.76	93.08	91.93	72.04	67.21	89.31	88.58
95% CI for mean (lower bound)	40.86	46.96	84.46	84.53	59.68	45.28	89.81	88.55	61.79	57.23	85.24	85.18
95% CI for mean (upper bound)	68.02	69.48	90.96	92.04	85.45	70.23	96.36	95.31	82.29	77.18	93.38	91.97
Standard Deviation	29.01	24.06	6.94	8.02	27.54	26.65	6.99	7.21	21.91	21.31	8.69	7.26
Median	65.63	61.25	87.50	90.42	84.38	61.25	93.75	93.75	78.13	68.75	87.50	87.50
Minimum score	6.67	13.33	75.00	73.33	6.67	14.29	75.00	73.33	20.00	26.67	68.75	73.33
Maximum score	100.00	93.75	100.00	100.00	100.00	93.75	100.00	100.00	100.00	100.00	100.00	100.00

## Chapter 4. Results

### 4.1 Results of the retrospective interview: Incidental and explicit learners

The retrospective interview confirmed that all the participants already possessed explicit, declarative knowledge of strong verb inflection; however, most of the participants reported that they were still struggling with the correct application of the vowel change.

As expected, the interview revealed that during the learning task, all but one of the participants in the explicit condition were aware that the study was about learning of strong verb conjugation. Thus, we classify them as *explicit learners*. The only participant that proved to be unaware about the task probably had not properly read the crucial page containing the explicit instructions, and was excluded from the analysis. Furthermore, the participants from the explicit group reported having difficulties in remaining concentrated on the verbs' stem vowels due to their divided attention. They were not only paying attention the strong verbs but also to other aspects, such as semantics and case marking.

All participants from the implicit group manifested some degree of awareness of the target during the learning task. They reported having noticed the presence of strong verbs and having in some cases been consciously thinking about the correct conjugation. Furthermore, most of them reported a few instances of noticing the gap between their own and the experimenter's productions. However, their main focus was on meaning and case marking, and verb conjugation was of inferior importance to them. All but one of the participants from the implicit group remained unaware of the actual task during the learning task. Even after the experimenter revealed to them during the interview that strong verb conjugation was the target, most participants were still unable to think of what the study was actually investigating. As there was no awareness of the task but some awareness of the target during the learning task, we can conclude with confidence that learning, if present, was incidental. Thus, we classify the participants from the implicit group as *incidental learners*. However, a pure form of implicit learning proved to be entirely absent, as none of the participants was both unaware of the task and the target. Thus, there were no *implicit learners* in our study.

In sum, the interview revealed that our instruction manipulation had been successful at the level of the participants' awareness. While the participants of the explicit instruction group were clearly aware both of the task and the target, the implicit instruction group remained unaware about the task, but showed some fleeting awareness (Ortega, 2009) of the target.

### 4.2 No group differences at the pre-measurement

Differences in accuracy between the two groups prior to the treatment seemed to be unlikely. The Mann-Whitney test revealed no significant differences between the explicit ( $M = 58.75$ ,  $SD = 13.39$ ) and the implicit instruction condition ( $M = 60.42$ ,  $SD = 11.66$ ) in accuracy scores at T0, ( $U = 57$ ,  $z = 0.57$ ,  $p = .631$ ,  $r = .13$ ); for full descriptive statistics, see Appendix N. The absence of a statistical difference is confirmed by the fact that the observed mean difference,  $-1.67$ ,  $SD = 5.61$ , BCa 95% CI  $[-12.44, 8.33]$  has a confidence interval that crosses zero.

### 4.3 Mixed Design ANOVA 1: Learning during the conversational task (RQs 1 & 2)

The first mixed-design analysis of variance was run with the within-subject factors Test Moment (test moment 1 vs. test moment 2), Input (input vs. no input), Verb Type (critical vs. control

items), and the between-subjects factor Instruction (explicit vs. implicit). The results are listed in Table 5.

**Table 5**

*Results of the Mixed ANOVA of accuracy scores on the learning task (test moments 1 and 2).*

Effect	df	F	p	Partial $\eta^2$
Input	1, 18	2.40	.138	.12
Test Moment***	1, 18	53.61	<.001	.75
Verb Type***	1, 18	25.78	<.001	.59
Instruction	1, 18	1.98	.177	.10
Input x Test Moment**	1, 18	16.72	.001	.48
Input x Test Moment x Instruction	1, 18	3.42	.081	.16
Input x Test Moment x Verb Type*	1, 18	11.46	.033	.39
Input x Test Moment x Verb Type x Instruction	1, 18	0.52	.479	.03
<i>Critical items only</i>				
Input	1, 19	2.94	.103	.13
Test Moment***	1, 19	36.16	<.001	.66
Input x Test Moment***	1, 19	18.34	<.001	.49
<i>Control items only</i>				
Input	1, 19	0.03	.874	.00
Test Moment**	1, 19	14.65	.001	.44
Input x Test Moment	1, 19	0.42	.526	.02

Note. \* =  $p < .05$ , \*\* =  $p < .01$ , \*\*\* =  $p < .001$ .

#### *Main effects: Test Moment and Verb Type*

Although there was a trend for the mean accuracy to be higher for the explicit group ( $M = 79.20$ ,  $SD = 10.20$ , 95% CI [71.90, 86.50]) than for the implicit group ( $M = 71.80$ ,  $SD = 13.16$ , 95% CI [62.39, 81.21]), there was no significant main effect of Instruction. Participants from the explicit and the implicit groups performed equally well. There was a significant main effect of Test Moment, suggesting a difference in accuracy scores between T1 and T2. Overall, participants performed better on T2 ( $M = 78.83$ ,  $SD = 12.79$ , BCa 95% CI [73.04, 84.05]) than on T1 ( $M = 72.16$ ,  $SD = 11.71$ , BCa 95% CI [67.12, 77.24]). There also was a significant main effect of Verb Type, revealing that accuracy scores on critical items ( $M = 60.74$ ,  $SD = 25.23$ , BCa 95% CI [49.12, 71.09]) were lower than scores on control items ( $M = 90.25$ ,  $SD = 4.61$ , BCa 95% CI [88.25, 92.22]).

#### *Three-way interaction: Input x Test Moment x Verb Type*

There was a significant interaction effect between Input and Test Moment, reflecting that the change in accuracy scores between T1 and T2 was different for input and no-input items. While there was an increase for input items from T1 ( $M = 71.07$ ,  $SD = 13.26$ , BCa 95% CI [64.87,

77.28]) to T2 ( $M = 82.82$ ,  $SD = 14.17$ , BCa 95% CI [76.19, 89.46]), there seemed to be no change in accuracy for no-input items from T1 ( $M = 73.25$ ,  $SD = 12.06$ , BCa 95% CI [67.61, 78.90]) to T2 ( $M = 74.85$ ,  $SD = 13.91$ , BCa 95% CI [68.33, 81.35]).

The Input x Test Moment interaction was not significantly influenced by Instruction. However, the interaction was further modulated by Verb Type, resulting in a significant interaction effect between Input, Test Moment and Verb Type. This suggests that the interaction between Input and Test Moment is different for critical and control items, respectively. The latter three-way interaction was further investigated by means of separate analyses for critical and control items. The results are visually represented in Figure 6.

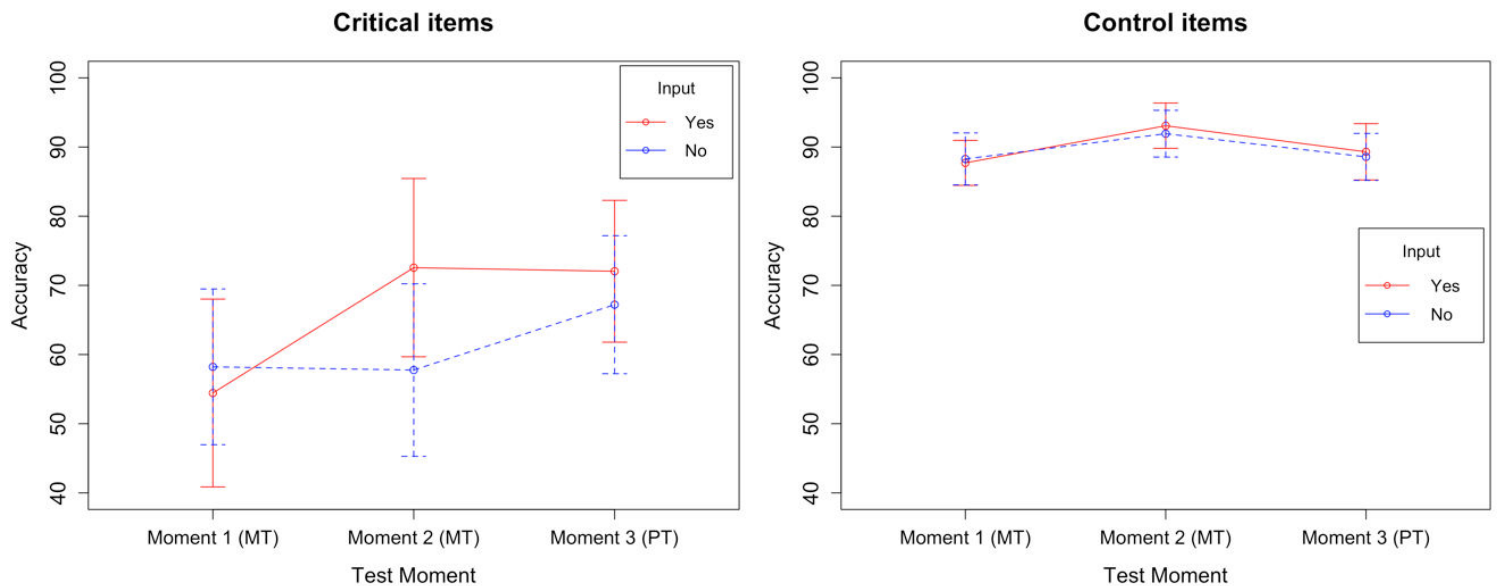


Figure 6. Mean accuracy scores (y-axis) and their 95% confidence intervals are plotted against the three moments of testing: Moment 1 (T1 of the main task), Moment 2 (T2 of the main task), and Moment 3 (T3, the delayed explicit posttest). The scores are split by input, with input items represented by the red, solid line and no-input items represented by the blue, dashed line. The plot on the left represents the scores on critical items, and the plot on the right visualizes the scores for control items. As there was no significant main effect of Instruction, we represent the scores averaged over both instruction conditions.

#### *Critical items:*

For critical items, there was a significant main effect of Test Moment, reflecting an increase in accuracy from T1 ( $M = 56.33$ ,  $SD = 25.59$ , BCa 95% CI [44.35, 68.31]) to T2 ( $M = 65.16$ ,  $SD = 25.29$ , BCa 95% CI [53.33, 76.99]). There was a significant interaction between Input and Test Moment. Wilcoxon signed-rank tests revealed that accuracy scores on critical items significantly increased from T1 ( $M = 54.44$ ,  $SD = 29.01$ , 95% CI [40.86, 68.02]) to T2 ( $M = 72.56$ ,  $SD = 27.54$ , 95% CI [59.68, 85.45]) when participants received input,  $T = 186.5$ ,  $p < .001$ ,  $r = .83$ . Without input, there was no significant difference between T1 ( $M = 58.22$ ,  $SD = 24.06$ , 95% CI [46.96, 69.48]) and T2 ( $M = 57.76$ ,  $SD = 26.65$ , 95% CI [45.28, 70.23]),  $T = 39$ ,  $p = .65$ ,  $r = -.10$ . While the difference between input and no-input items on T1 is not significant,  $T = 116.5$ ,  $p = .39$ ,  $r = .19$ , on T2, participants performed significantly better on items for which they received

input,  $T = 13$ ,  $p = .008$ ,  $r = -.60$ .

Thus, participants exhibited learning for critical items during the main task. They performed equally well on all items at the first test moment, before having received any input. At the second test moment, there was a clear improvement in accuracy, except for items for which participants received input. Without correct input, accuracy scores remained at the same level.

#### *Control items:*

For control items, the interaction between Input and Test Moment was not significant. The main effect of Test Moment was significant, reflecting a slight increase in accuracy from T1 ( $M = 88.00$ ,  $SD = 5.33$ , BCa 95% CI [85.50, 90.49]) to T2 ( $M = 92.51$ ,  $SD = 5.29$ , BCa 95% CI [90.03, 94.98]). Wilcoxon signed-rank tests revealed that for both input and no-input items, there was an improvement from T1 to T2. Input items significantly improved from T1 ( $M = 87.71$ ,  $SD = 6.94$ , 95% CI [84.46, 90.96]) to T2 ( $M = 93.08$ ,  $SD = 6.99$ , 95% CI [89.81, 96.36]),  $T = 91$ ,  $p = .014$ ,  $r = .55$ . In a parallel manner, no-input items significantly improved from T1 ( $M = 88.28$ ,  $SD = 8.02$ , 95% CI [84.53, 92.04]) to T2 ( $M = 91.93$ ,  $SD = 7.21$ , 95% CI [88.55, 95.31]),  $T = 55$ ,  $p = .048$ ,  $r = .44$ . There was no significant difference for input compared to no-input items at T1,  $T = 55.5$ ,  $p = .849$ ,  $r = .04$ , nor was there a significant difference at T2,  $T = 70$ ,  $p = .497$ ,  $r = -.15$ .

Thus, participants improved in accuracy on control items from the first to the second test moment, regardless whether they received input on the items or not. This finding may point towards a slight overgeneralization of the strong conjugation system to non-vowel-changing verbs, which decreases over time. We will discuss this finding in more detail later in section 5.3.

#### *Summary of analysis 1:*

In sum, the analysis revealed that all participants, regardless of their instructional condition (RQ2), showed an overall improvement in accuracy from T1 to T2. In general, they had higher scores on control items than on critical items, suggesting that participants frequently failed to apply the stem-vowel change, rather than applying it too often by overgeneralizing it to control verbs. In the case of the critical items, the improvement in accuracy from test moment 1 to 2 was restricted to items for which the participants received input after the first test moment, reflecting learning from input (RQ1). Without input, accuracy remained at the same level. However, for control items, input did not appear to play a role, as there was an improvement in accuracy for both input and no-input items.

### **4.4 Mixed Design ANOVA 2: Assessment of short-term retention rate (RQs 3 & 4)**

A second mixed-design analysis of variance was run with the same factors as the first one, with the only change being that we used test moment 2 of the main task and test moment 3 (explicit posttest) as levels of the factor Test Moment. Descriptive statistics can be found above in Table 4; the results of the analysis are listed in Table 6.

**Table 6***Results of the Mixed ANOVA of accuracy scores on Test Moments 2 (Main Task) and 3 (Explicit Posttest).*

Effect	<i>df</i>	<i>F</i>	<i>p</i>	<i>Partial η<sup>2</sup></i>
Test Moment	1, 18	0.12	.734	.01
Input*	1, 18	6.60	.019	.27
Verb Type***	1, 18	25.54	<.001	.59
Instruction	1, 18	1.42	.249	.07
Test Moment x Input*	1, 18	7.84	.012	.30
Test Moment x Input x Verb Type*	1, 18	5.04	.038	.22
Test Moment x Input x Instruction	1, 18	2.53	.129	.12
<i>Critical items only</i>				
Input*	1, 18	8.40	.010	.32
Test Moment x Input*	1, 18	8.18	.010	.31
<i>Control items only</i>				
Input	1, 18	0.27	.607	.02
Test Moment x Input	1, 18	0.05	.833	.00

*Note.* \* =  $p < .05$ , \*\* =  $p < .01$ , \*\*\* =  $p < .001$ .

### *Main effects: Input and Verb Type*

There was no significant main effect of Test Moment, suggesting that overall, accuracy scores were similar on T2 ( $M = 78.83$ ,  $SD = 12.79$ , BCa 95% CI [73.05, 84.10]) and T3 ( $M = 79.28$ ,  $SD = 11.13$ , BCa 95% CI [74.37, 84.32]). There was no significant main effect of Instruction either. Thus, despite the fact that there was a trend for participants in the explicit group to score higher on average ( $M = 82.10$ ,  $SD = 10.34$ , BCa 95% CI [75.94, 88.61]), their performance did not differ significantly from the implicit group ( $M = 76.02$ ,  $SD = 12.41$ , BCa 95% CI [68.53, 83.30]).

Significant main effects were found for Input and for Verb Type. Overall, participants had higher accuracy scores on input items ( $M = 81.75$ ,  $SD = 12.52$ , BCa 95% CI [75.89, 87.10]) than on no-input items ( $M = 76.37$ ,  $SD = 12.71$ , BCa 95% CI [70.98, 81.99]). In addition, participants had higher scores overall on control items ( $M = 90.73$ ,  $SD = 4.44$ , BCa 95% CI [88.75, 92.68]) than on critical items ( $M = 67.39$ ,  $SD = 21.38$ , BCa 95% CI [57.65, 76.60]).

### *Three-way interaction: Input x Test Moment x Verb Type*

There was a significant interaction effect between Test Moment and Input, revealing that the change in accuracy from T2 to T3 (reflecting retention over time) was different for input and no-input items. This interaction was not further modulated significantly by Instruction, suggesting that the interaction acted in the same way for the explicit and implicit groups. However, the interaction was influenced by Verb Type, resulting in a three-way interaction between Test Moment, Input and Verb Type. Thus, the Test Moment x Input interaction was different in critical and control items. In order to analyze the observed three-way interaction, we performed separate analyses for critical and control items, similar to the procedure for the first mixed

ANOVA. Results are displayed in Figure 6.

*Critical items:*

For critical items, we observed a significant main effect of Input and a significant interaction between Input and Test Moment. Thus, the difference in accuracy between T2 and T3 was not the same across input and no-input items. Wilcoxon signed-rank tests revealed that for critical items that had received input, there was no difference between T2 ( $M = 72.56$ ,  $SD = 27.54$ , 95% CI [59.68, 85.45]) and T3 ( $M = 72.04$ ,  $SD = 21.91$ , 95% CI [61.79, 82.29]),  $T = 49$ ,  $p = .527$ ,  $r = .14$ . For critical items that had not received input, there was a significant improvement from T2 ( $M = 57.76$ ,  $SD = 26.65$ , 95% CI [45.28, 70.23]) to T3 ( $M = 67.21$ ,  $SD = 21.31$ , 95% CI [57.23, 77.18]),  $T = 138.5$ ,  $p = .021$ ,  $r = .52$ .

Thus, while participants had, overall, higher scores on input-items than on no-input items, their scores on input-items seemed to be steady across T2 and T3, suggesting that they fully retained what they had learned during the main task. For no-input items, we observed a significant improvement from T2 to T3. These findings are not in line with our expectations formulated in section 2.6; that is, we expected the learned items to be forgotten to some degree over a short period of time, and we did not expect any considerable improvements to occur for the items on which participants had not received any exposure. We will discuss the possible explanations for these findings later (section 5.4.2).

*Control items:*

Unlike the critical items, the control items did not show a main effect for Input. Thus, overall, participants had equally high scores on input items ( $M = 91.20$ ,  $SD = 6.48$ , BCa 95% CI [88.31, 94.05]) and no-input items ( $M = 90.25$ ,  $SD = 5.70$ , BCa 95% CI [87.69, 92.58]). There was no significant interaction between Test Moment and Input either, suggesting that the change in accuracy across T2 and T3 remained the same for input and no-input items.

*Summary of analysis 2:*

In sum, the second mixed design ANOVA revealed that, overall, the learners had similar accuracy scores across the second and third test moment (RQ3), and the two groups performed equally well (RQ4). Overall, accuracy scores were higher on input items than on no-input items, and higher for control than for critical items. In the case of the critical items, learners had higher scores on input items than on no-input items. The scores on input items remained the same across T2 and T3, while there was an improvement for the scores on no-input items. This pattern was not found in control items: there were no differences between input and no-input items, and both item types remained similar from T2 to T3.

## **Chapter 5. Discussion**

### **5.1 Summary of results**

Our research questions were whether native speakers of Dutch would be able to learn a morphosyntactic feature of German as a second language during a simulated conversation situation. We also asked to what extent the learning effects, if present, would be retained over a period of 15 minutes, and if learning or retention would be dependent on whether the participants received an explicit instruction prior to the learning task or not. The retrospective interview (section 4.1) had revealed that this manipulation had been successful: while participants in the explicit group were aware that they were supposed to learn the strong verb conjugation from exposure, participants in the implicit group were unaware of this fact and generally believed the task to focus on meaning and/or case marking.

The results of the first analysis indicated that both incidental and intentional learning took place during the learning task. This was reflected by an improvement in accuracy scores on critical items for which learners heard the correct form twice before T2, while no improvement was observed in the absence of input. The second analysis revealed that the accuracy scores on input items remained unchanged between learning task and explicit posttest. In contrast, there was an improvement for items without prior input. For both analyses, there were no significant differences between the instruction groups.

### **5.2 Some limitations of the present study**

#### **5.2.1 Limited sample size**

Before we start to discuss these results in detail, we need to point out that the analyses are based on a relatively small sample of only ten participants per condition. As a consequence, the variability in our data is relatively high, as reflected by large standard deviations and wide confidence intervals. Therefore, we consider our findings to be preliminary, and in order to gain more confidence in our interpretations, we would need to increase the sample size.

#### **5.2.2 Incidental but not implicit learning**

As pointed out earlier, we designed the implicit condition of the learning task in a way to maximize the probability of tapping into implicit learning processes. However, as the awareness interviews revealed, the participants of the implicit group engaged in incidental but not implicit learning: they were unaware of the fact that the task was about learning, but they reported having noticed the strong verbs.

Implicit learning may have been inhibited by two reasons. The first reason is the presence of the written infinitives (see Figure 3), which may automatically evoke the use of explicit knowledge and increase the salience of the verbs in the experiment, leading to a higher probability of the participants' noticing of the central role of the verbs. Unfortunately, we did not find any satisfying alternative techniques that may successfully elicit the target verbs. Using video scenes or pictures depicting action scenes may bypass the risks of increased verb salience and of triggering explicit knowledge, but there would be a high risk for data loss due to the participants using alternative verbs, synonyms or expressions. We tried to reduce the salience of the verbs by presenting the other elements needed for the sentence construction (i.e.,



prepositions, nouns and articles) in their written forms too. The second reason that might have inhibited implicit learning is the fact that the participants had to orally produce the verbs in their inflected forms. This may have led to moments of noticing the gap (or what De Vos et al., submitted, refer to as ‘output noticing’): the participant becomes aware that he/she does not know how to inflect a specific item.

### **5.2.3 Limitations of the explicit posttest**

Another aspect that is important to note is that we administered the explicit posttest (T3) at a moment where all participants had become aware of the actual purpose of the study, due to the information they received during the retrospective interview. Thus, we could not administer the explicit posttest under the same implicit conditions as the main task, which may have affected the test results, especially in the case of the implicit group.

Unfortunately, it was methodologically impossible to question the participants about their beliefs and thoughts about the learning task without raising their awareness of the study’s purpose. Conducting the interview after the explicit posttest was not an option either for two reasons. First, participants might start to forget about how they experienced the learning task and become unable to recall their experiences and thoughts. Second, as the posttest explicitly and exclusively focused on strong verb conjugation, the interview would have undoubtedly raised the participants’ awareness of the target structure, thereby biasing the outcomes of the retrospective report.

Furthermore, the mere fact that the explicit posttest involved a different kind of task than the learning task may have caused differences in performance, both for the implicit and explicit groups. This issue is related to the fact that different types of tasks may elicit the use of different types of knowledge, and therefore lead to differences in performance on task (e.g., Andringa et al., 2011; also see section 2.2.2 a). For both groups, the explicit posttest was likely to trigger a very explicit kind of knowledge. In other words, performance on T3 may rely on a different kind of knowledge than the types of knowledge used during the learning task, making it hard to draw conclusions about the effect of time on the retention rate of the freshly learned items. Even in the case of the explicit group, the knowledge elicited by the task may have been more explicit in the explicit posttest than in the learning task. As the awareness interview revealed, the majority of explicit learners reported having been able to concentrate on the strong verbs only to a limited extent, suggesting that they were partly relying on implicit, automatic knowledge instead of controlled retrieval of explicit knowledge.

In sum, the validity of the explicit posttest as a measure of retention over time is questionable from a point of view that takes into account the fact that implicit and explicit knowledge represent separate knowledge systems, explaining why different types of tasks may lead to different outcomes (Andringa et al., 2011, p. 871). As it was very explicit in nature, and as it took place at a moment in time in which the incidental learners had become aware of the study purpose, the explicit posttest was probably an insensitive measure for tracking the development of implicit knowledge that was gained over time during the learning task.

## **5.3 Control condition**

A set of control items (section 3.2.2.2. e) were integrated in our research design to detect whether

the participants were strategically applying the vowel change as the default conjugation, which might bias the test results. The question that we were trying to answer by means of the statistical analyses was whether learners did, at any time during the experiment, overgeneralize the stem-vowel change to verbs that did not require the vowel change.

As expected, the analyses revealed across all test moments, participants had much higher scores on control than on critical items. However, there seemed to be cases where they erroneously applied the vowel change to control items, pointing towards a slight overgeneralization of the strong conjugation system. Therefore, we investigated the individual control items to assess which of them could be considered problematic (all results for individual test items can be found in Appendix O). We found that for the majority of items, learners attained accuracy scores from 90% up to 100% at the different test moments. For instance, no vowel errors were made on *gehen* ('to go'), *parken* ('to park'), *senden* ('to send'), *bekommen* ('to get'), *machen* ('to make'), *stehen* ('to stand') and *warten* ('to wait'). In contrast, up to four items per set turned out to be more problematic, with average accuracy ranging from 56% to 76% overall. The question arises whether these are cases of pure overgeneralization of the strong verb conjugation paradigm, or if other factors may be interfering as well.

We argue that the second option holds true. For all problematic control items, we were able to find related words – by meaning or by form – containing the 'changed' counterpart of the item's stem vowel. For instance, *kaufen* ('to buy', accuracy score of 60%) happened to be erroneously conjugated as *\*er kauft*, but the verb is related to the nouns *die Verkäuferin* ('the saleslady'), *der Käufer* ('the buyer' / 'the customer') or *die Einkäufe* ('the groceries'). The item *jagen* ('to hunt', score of 62%), often conjugated as *\*er jägt* ('he hunts') by our participants, is related to the noun *der Jäger* ('the hunter'). The verb *legen* ('to lay down', score of 56%) was frequently conjugated as *\*er liegt* ('he lays down'), which is not very surprising as the word is semantically and structurally closely related to *liegen* ('to lie').

Thus, we can conclude that there seemed to be some overgeneralization, but it was limited to cases having closely related words that contain the 'changed' counterpart of the target stem vowel. These findings make clear that it may be wise for future research to incorporate a by-item analysis. In order to observe pure forms of overgeneralization (i.e., without the presence of additional interfering factors), we could also attempt to only use verbs that do not have related words containing the 'changed' vowel; however, these verbs might be hard to find, especially if we try to use high-frequency verbs. In addition, our scoring system made it impossible to differentiate between expected vowel errors (i.e., application of a changing vowel as if the control item were a strong, vowel-changing verb in present tense) and other vowel errors - for instance, when the participant uses a stem vowel of a past tense form, as in *kennen* - *\*er kannt* ('to know' – 'he knows').

## 5.4 Research questions revisited: results and interpretations

### 5.4.1 Incidental and intentional learning

#### a) RQ1: Significant learning effect

As expected, we found significant learning effects of the stem-vowel change in strong German verbs for all participants. As there was no improvement from T1 to T2 when no input was given, we were confident that the improvement for input items reflected that the participants were learning from the experimenter's utterances.

At this point, it is important to be reminded of the fact that all participants had prior knowledge about German strong verb conjugation. They all reported having heard of the phenomenon before, and the vast majority reported having received explicit instruction about it in German language courses. Thus, what we define as learning in this study equals a reactivation and expansion of existing knowledge of a conjugation paradigm. Learning is not defined as the acquisition of an entirely novel conjugation paradigm without any existing prior knowledge. Furthermore, the learning effect that we found by no means guarantees sustained learning effects. Rather, what we are looking at can be seen as micro-steps of second language acquisition that may or may not lead towards the development of sustainable knowledge available for active language use that can occur during conversation by picking up features of the interlocutor's speech.

The fact that our study results proved that German strong verb inflection can be learned during an experimental session is in line with Godfroid (2016). Although her study found evidence for implicit learning, our findings were restricted to incidental and explicit learning processes. Still, the mere fact that we found learning confirms that German strong verb inflection is a useful and appropriate linguistic structure for future studies that investigate the acquisition of L2 morphosyntax. Furthermore, just like the Godfroid (2016) study, our study represents a successful extension of research on incidental/implicit L2 grammar learning to natural languages, thereby being complementary to studies using artificial languages.

That we found a clear learning effect also implies that the conversational learning paradigm (De Vos et al., in prep.; De Vos et al., submitted; Brandt et al., in prep.; section 2.5) we applied proved to be well-suited to study incidental L2 morphosyntactic learning, and may be exploited further by applying it to the acquisition of other morphosyntactic features. It goes without saying that our conversational learning task can be called 'conversational' and 'natural' only to a quite limited extent. We were only simulating a conversation situation by introducing some elements of natural conversation in our experiment (section 3.2.2.2 b). Maintaining experimental control automatically implies a reduction the naturalness of the conversational situation.

In short, the answer to our first research question is that the Dutch native speakers learned to correctly apply the vowel change in strong German verbs due to the experimenter's correct input that they heard in a simulated conversation situation.

#### ***b) RQ2: No group differences at the level of learning***

Whether the participants were aware or not of the fact that the task was about the acquisition of the vowel change, did not seem to play a role. Both groups learned equally well. In other words, the advantage that we expected the explicit group to have turned out to be absent, or at least it did not become visible in the accuracy scores.

The fact that no advantage of explicit over implicit instruction was found, deviates from the findings of numerous previous studies that brought evidence for the beneficial role of explicit instruction for grammar acquisition (e.g., De Graaff, 1997; DeKeyser, 1995; Robinson, 1996). However, our finding is in line with the studies of Sanz & Morgan-Short (2004) and Andringa et al. (2011). These studies were mainly interested in whether explicit instruction had an advantage over implicit instruction on a rather implicit task format (free written response task), assumed to measure the development of implicit knowledge. In the same line, our conversational learning

task had a rather implicit format: it was a meaning-based conversational task in which participants had to combine pictures, form opinions about utterances, master several grammatical aspects (inflection and case marking) at the same time, and use the spoken modality for both comprehension and production. This implies that even for the participants in the explicit group, task performance was likely to rely on, at least to a certain degree, implicit knowledge. Thus, we can conclude that our findings suggest that in the case of a rather meaning-based and conversational kind of learning task, explicit instruction may not necessarily play a beneficial role.

Two reasons may account for the absence of an explicit advantage in our study. First, the learners of both groups had to divide their attention and to focus on several linguistic aspects at the same time in order to produce correct and plausible sentences. This divided attention may explain that the participants of the explicit group could concentrate less on the stem vowels than expected. Indeed, the retrospective interview revealed that most participants, even in the explicit instruction condition, dedicated much cognitive effort to case marking. The implication that we can infer from this is that if the learning task reaches a certain degree of difficulty because of the presence of several features that claim the attention needed for the acquisition of the critical target structure, the explicit instruction may not make a difference anymore and not lead to more learning than implicit types of instruction. Second, the incidental learners also reported some noticing of and paying attention to the vowel change. It may have played a role that the verbs were presented in written form, leading to conscious scrutinizing about the correct conjugation to apply. Thus, the ‘implicitness’ of the implicit instruction condition was reduced. Both reasons taken together may have obscured the differences between two groups and account for the similar learning effects.

In brief, the answer to the second research question is that the instruction that the learners had received prior to the learning task turned out not to influence the learning effect. Thus, learners learned equally well under explicit/intentional compared to implicit/incidental learning conditions.

### **5.4.2 Retention**

#### ***a) RQ3: Retention over a short time lapse***

We expected the learners to forget to some degree what they had just learned from native speaker input. This forgetting should be reflected by a decline in accuracy scores from T2 of the learning task to the explicit posttest (T3), which took place about 15 minutes later. Furthermore, we expected that no prior input would lead to no change in accuracy.

The pattern we observed for the critical items did not meet our expectations. While there was no change in accuracy rates for input items, suggesting full retention, there was a significant improvement for no-input items. The question arises of how these findings can be interpreted: how can we explain the improvement on test items in the absence of prior input, and what does this reveal about the unchanging results for input items? An improvement in the absence of input suggests that other variables may have been intervening. We suggest two possible factors that are unrelated to input and learning and that may explain the findings.

First, the improvement on no-input items may be due to an effect of exposure and time. At T3, the participants had to produce the no-input items already for the third time during the experimental session. Before that, they had been actively working with the strong verb

conjugation, so their knowledge of it may have become increasingly activated over time, leading to more knowledge retrieval at T3 and more accurate responses. Second, there may be an effect of the task format. As already discussed in section 5.2.3, the learning task and the explicit posttest consisted of very different task formats. While the latter was a short and explicit verb conjugation test, the former had a much longer duration, was conversational, and more cognitively demanding. As a consequence, the explicit posttest may have enabled the participants to benefit from the fact that they could now fully access their explicit knowledge, and that they no longer had to divide their attention. It is difficult to say which one of the two factors interfered, or whether they interfered jointly, due to the impossibility to isolate them based on our current data alone.

As these factors can explain the improvement for no-input items, we can also assume them to affect the scores of the input items to some extent. Why then do we not see a comparable improvement for the latter? To find out whether our speculations hold true, we had a closer look at the behavior of the accuracy scores of the input items over time (Appendix P). The image that roughly emerges is the following: about one third of the items retains unchanging scores between T2 and T3 (full retention), while we can observe a decrease in accuracy for another third of the items (forgetting), and an increase for still another third (improvements due to task or exposure effects). It is not surprising, then, that these three thirds taken together result in an overall apparent steadiness in test scores. Thus, it seems as if the effect of task or exposure also has a beneficial effect on input items, but only on part of them.

In sum, we can formulate the (speculative) answer to the third research question as follows: The participants did not seem to fully retain over time what they had learned over time due to native speaker input during the learning task. However, they seemed to benefit from an effect of time and exposure, and/or an effect of the task format, which led to a clearly visible improvement on no-input items and also affected about one third of the input items. The remaining two thirds of input items were affected by forgetting (decrease in scores) and full retention (unchanging scores), respectively. Together, the improvements, unchanging scores and decrease in scores lead to no visible change in scores between the learning task and the explicit posttest for input items.

#### ***b) RQ4: No group differences at the level of retention***

As expected, we did not find any group differences at the level of retention. In addition, both groups seemed to benefit equally from effect of exposure, and/or the task effect, leading to an improvement in scores from T2 to T3 for no-input items and for part of the input items.

Again, the absence of group differences is in line with the study of Andringa et al. (2011). The authors conducted a delayed posttest four weeks after the learning treatment and found rather similar test scores compared to the immediate posttest that was administered right after the learning treatment, suggesting that there was only limited progress in accuracy, once the instruction stopped. Although our study differed considerably from the Andringa et al. (2011) study by using a different time lapse and test format, both studies converged in that no difference between implicit and explicit instruction conditions was found. The findings are also in line with Uludag & VanPatten (2012), who examined the acquisition of the passive voice in English by native speakers of Turkish. A common processing difficulty of the passive voice occurs when learners rely on FNP (*First Noun Principle*, i.e., strategically interpreting the first noun of a

sentence as the subject), inhibiting a correct interpretation of passive sentences. The authors compared the outcomes of an extensive learning treatment under different instruction conditions: while one group received the explicit instruction to avoid FNP, the other group merely received general instructions about the passive voice. No group differences were found between pre- and posttests on a sentence completion and a reconstruction task, nor were there any differences between posttest (immediately after treatment) and delayed posttests (8 days after treatment).

Again, the absence of a group difference in our study may be due to an absence of processing differences during the learning task. The ‘implicit’ condition may have been more explicit than we expected it to be, and the ‘explicit’ condition may be more implicit than we expected it to be. Alternatively, the absence of a group difference at the level of retention may be explained by the fact that both groups might have had advantages over the other, cancelling each other out and leading to similar scores. While the intentional learners could have benefited from the prior attention they had paid to the verb morphology, the incidental learners may have developed a more sustainable type of knowledge.

In short, the answer to the fourth research question is that the instruction that the learners had received prior to the learning task turned out not to influence the amount of retention subsequent to learning. Thus, incidental and intentional learners retained equally well what they had learned from the input. In addition, both groups benefitted equally from an effect of time and exposure, and/or an effect of the task, leading to an improvement in accuracy scores for no-input and part of the input items from T2 of the learning task to T3, the explicit posttest.

## Conclusions

This study investigated Dutch native speakers' acquisition of stem allomorphy in German strong verbs in a conversational, yet controlled experimental context and compared learning outcomes under implicit and explicit instruction conditions. It was our aim to better understand the subprocesses of real-life L2 learning that take place in conversations between learners and native speakers and to assess whether consciously paying attention to specific target structures may be beneficial for the acquisition process.

A retrospective interview after the learning task revealed that our instruction manipulation had been successful. During the learning task, participants in the explicit instruction group were aware that we investigated learning of German strong verb inflection, and were thus explicit learners. Participants in the implicit group were unaware of the true purpose of the study and believed semantics to be the main study focus; however, they noticed the presence of the strong verbs in the study, implying that learning was incidental but not implicit.

The statistical analyses revealed a significant learning effect for vowel-changing strong verbs, proving that L2 speakers are able to learn from native speaker input during a simulated conversation situation. By inspecting the participants' performance on a set of non-stem-vowel-changing control verbs, strategic learner processing by means of an over-application of the vowel change could be ruled out. Furthermore, the fact that participants frequently committed the error of omitting an obligatory stem-vowel change, corroborates the findings of Godfroid (2016), suggesting the weak conjugation paradigm to be the default paradigm in the L2 learners' interlanguage. We also investigated whether the L2 learners retained what they had learned over a period of about 15 minutes; however, the results were less straightforward to interpret. The main reason was that the posttest by which we meant to measure retention had a different task format and took place at a moment in which all participants – including the incidental learners – had been informed about the actual purpose of the study. Thus, it was impossible to measure knowledge development as a pure function of time. The picture that emerged despite these limitations was that forgetting, full retention, as well as spontaneous improvements due to other sources than time (e.g. effect of exposure or effect of the task format) seemed to determine the test scores in a combined way.

In line with Andringa et al. (2011) and Sanz & Morgan-Short (2004), no significant group differences were attested, neither at the level of learning, nor at the level of retention. Participants in the explicit instruction group seemed to be unable to take advantage of the fact that they were aware of the study's purpose. The finding suggests that in meaning-based and conversational learning tasks, explicit instruction may not necessarily lead towards more learning than implicit instruction.

The mere fact that we found a significant learning effect is noteworthy because – as mentioned in the literature review and as confirmed by our results – verb-stem allomorphy in German strong verbs appears to be a very challenging aspect for L2 learners to acquire. This proves that even difficult morphosyntactic features can be learned incidentally in dialogue. Thus, this finding confirms not only that incidental morphosyntactic learning can be studied by using natural languages, but also that both the learning paradigm we used, as well as the morphosyntactic target structure to be learned, could be of great potential use to future studies investigating incidental or implicit language learning under natural learning conditions.

The learning effect that we found is not to be confounded with the entirely novel

acquisition of a conjugation paradigm. All of our participants already had prior knowledge about German strong verb conjugation, implying that the learning represented a reactivation and expansion of existing knowledge. Moreover, this learning effect is no guarantee for steady, sustained learning effects, but should be thought of as micro-steps of L2 learning that may or may not lead towards the development of sustainable knowledge, and that can take place during communication by picking relevant aspects out of the interlocutor's speech.

Because of the relatively small sample size of our study, we consider our findings to be preliminary. Conducting a future study with an increased sample size would make it possible to have more precise results. Future research may also try to find an alternative way to accurately measure retention (i.e., the development of knowledge over time). A further challenge might be to develop a comparable study design as the one we used, but by optimizing it for implicit learning to take place. Last but not least, we encourage future researchers to explore the versatile possibilities of experimental L2 learning designs that introduce a certain degree of naturalness. The conversational learning paradigm may be applied to a broad range of linguistic aspects and to different language combinations. Introducing naturalness in experimental studies may already be achieved by the mere fact of investigating the acquisition of natural, not artificial languages. The value of the contributions and findings of artificial language studies to SLA research should by no means be doubted; yet, studies using natural languages may be complementary and increase the validity of these findings and their generalizability to adult L2 learning in real-life conversation situations or immersion contexts.



## References

- Allen, R., & Reber, A. S. (1980). Very long term memory for tacit knowledge. *Cognition*, 8, 175–185.
- Andringa, S., & Ćurčić, M. (2015). How explicit knowledge affects online L2 processing: Evidence from differential object marking acquisition. *Studies in Second Language Acquisition*, 37, 237–268.
- Andringa, S., de Glopper, K., & Hacquebord, H. (2011). Effect of explicit and implicit instruction on free written response task performance. *Language Learning*, 61, 868–903.
- Andringa, S., & Rebuschat, P. (2015). New directions in implicit and explicit language learning [special issue]. *Studies in Second Language Acquisition*, 37.
- Baayen, R. H., Piepenbrock, R., & Gulikers, L. (1995). *The CELEX lexical database (Release 2)* [CD-ROM]. Philadelphia, PA: Linguistic Data Consortium, University of Pennsylvania (distributor).
- Berry, D. C., & Dienes, Z. (1993). *Implicit learning: Theoretical and empirical issues*. Hove: Erlbaum.
- Brandt, A., Schriefers, H., & Lemhöfer, K. (in preparation). [The acquisition of grammatical gender in a foreign language from natural input]
- Brown, M. B., & Forsythe, A. B. (1974). The small sample behavior of some statistics which test the equality of several means. *Technometrics*, 16, 129–132.
- Burns, P. C., Parkes, A., Burton, S., Smith, R. K., & Burch, D. (2002). *How dangerous is driving with a mobile phone? Benchmarking the impairment to alcohol*. Berkshire, UK: TRL (Report No. TRL547).
- Bybee, J. (1995). Regular morphology and the lexicon. *Language and Cognitive Processes*, 10, 425–455.
- Bybee, J., & Newman, J. (1995). Are stem changes as natural as affixes? *Linguistics*, 33, 633–654.
- Clahsen, H., Felser, C., Neubauer, K., & Silva, R. (2010). Morphological structure in native and nonnative language processing. *Language Learning*, 60, 21–43.
- Cleeremans, A., Destrebecqz, A., & Boyer, M. (1998). Implicit learning: News from the front. *Trends in Cognitive Sciences*, 2(10), 406–416.
- De Graaff, R. (1997). The eXperanto experiment: Effects of explicit instruction on second language acquisition. *Studies in Second Language Acquisition*, 19(2), 249–276.
- DeKeyser, R. M. (1995). Learning second language grammar rules: An experiment with a miniature linguistic system. *Studies in Second Language Acquisition*, 17, 379–410.
- DeKeyser, R. M. (1997). Beyond explicit rule learning. *Studies in Second Language Acquisition*, 19(2), 195–221.
- DeKeyser, R. M. (2003). Implicit and explicit learning. In C. J. Doughty & M. H. Long (Eds.), *The handbook of second language acquisition* (pp. 313–348). Oxford: Blackwell.
- DeKeyser, R. M. (2005). What makes learning second-language grammar difficult? A review of issues. *Language Learning*, 55, 1–25.
- Dell, G. S., Reed, K. D., Adams, D. R., & Meyer, A. S. (2000). Speech errors, phonotactic constraints, and implicit learning: A study of the role of experience in language

- production. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 26(6), 1355–1367.
- De Vos, J., Schriefers, H., & Lemhöfer, K. (in preparation). Naturalistic incidental spoken L2 word learning and retention: An experimental study.
- De Vos, J., Schriefers, H., & Lemhöfer, K. (submitted). Noticing vocabulary gaps aids naturalistic second language word learning: An experimental study.
- Dienes, Z., & Berry, D. (1997). Implicit learning: Below the subjective threshold. *Psychonomic Bulletin & Review*, 4(1), 3–23.
- Dienes, Z., & Perner, J. (1999). A theory of implicit and explicit knowledge. *Behavioral and Brain Sciences*, 22(5), 735–808.
- Ellis, N. C. (2002). Frequency effects in language processing: A review with implications for theories of implicit and explicit language acquisition. *Studies in Second Language Acquisition*, 24, 143–188.
- Ellis, N. C. (2005). At the interface: Dynamic interactions of explicit and implicit knowledge. *Studies in Second Language Acquisition*, 27, 305–352.
- Ellis, N. C. (2006). Selective attention and transfer phenomena in L2 acquisition: Contingency, cue competition, salience, interference, overshadowing, blocking, and perceptual learning. *Applied Linguistics*, 27(2), 164–194.
- Ellis, N. C. (2008a). Implicit and explicit knowledge about language. In J. Cenoz & N. H. Hornberger (Eds.), *Encyclopedia of language and education* (2nd ed., Vol. 6, pp. 1–13). Springer US.
- Ellis, N. C. (2008b). Usage-based and form-focused language acquisition. In P. Robinson & N. C. Ellis (Eds.), *Handbook of cognitive linguistics and second language acquisition* (pp. 372–405). New York: Routledge.
- Ellis, R. (2005). Measuring implicit and explicit knowledge of a second language: A psychometric study. *Studies in Second Language Acquisition*, 27, 141–172.
- Ellis, R. (2009). Implicit and explicit learning, knowledge and instruction. In R. Ellis, S. Loewen, C. Elder, R. Erlam, J. Philip, & H. Reinders (Eds.), *Implicit and explicit knowledge in second language learning, testing and teaching* (pp. 3–25). Bristol: Multilingual Matters.
- Erlam, R. (2006). Elicited imitation as a measure of L2 implicit knowledge: An empirical validation study. *Applied Linguistics*, 27, 464–491.
- Faretta-Stutenberg, M., & Morgan-Short, K. (2011). Learning without awareness reconsidered: A replication of Williams (2005). In G. Granena, J. Koeth, S. Lee-Ellis, A. Lukyanenko, G. Prieto Botana, & E. Rhoades (Eds.), *Selected Proceedings of the 2010 Second Language Research Forum* (pp. 18–28). Somerville, MA: Cascadia Proceedings Project.
- Field, A. (2012). *Discovering statistics using IBM SPSS Statistics* (Third edit). London, UK: SAGE Publications Ltd.
- Frensch, P. A., & Rüniger, D. (2003). Implicit learning, 12(1), 13–18.
- Friederici, A. D., Steinhauer, K., & Pfeifer, E. (2002). Brain signatures of artificial language processing: Evidence challenging the critical period hypothesis. *Proceedings of the National Academy of Sciences of the United States of America*, 99, 529–534.
- Gallman, P., Fiehler, R., Fritz, T., Fabricius-Hansen, C., Eisenberg, P., Nübling, D., ... Peters, J. (2011). *Duden (04) Die Grammatik: Unentbehrlich für richtiges Deutsch*. Mannheim:

Bibliographisches Institut.

- Gibson, J. J., & Gibson, E. J. (1955). Perceptual learning: Differentiation or enrichment? *Psychological Review*, 62(1), 32–41.
- Godfroid, A. (2016). The effects of implicit instruction on implicit and explicit knowledge development. *Studies in Second Language Acquisition*, 38, 177–215.
- Godfroid, A., Boers, F., & Housen, A. (2013). An eye for words: Gauging the role of attention in incidental L2 vocabulary acquisition by means of eye-tracking. *Studies in Second Language Acquisition*, 35(3), 483–517.
- Godfroid, A., Loewen, S., Jung, S., Park, J., Gass, S. M., & Ellis, R. (2015). Timed and untimed grammaticality judgments measure distinct types of knowledge. *Studies in Second Language Acquisition*, 37, 269–297.
- Godfroid, A., & Schmidtke, J. (2013). What do eye movements tell us about awareness? A triangulation of eye-movement data, verbal reports, and vocabulary learning scores. *Noticing and Second Language Acquisition: Studies in Honor of Richard Schmidt*, 183–205.
- Godfroid, A., & Uggen, M. S. (2013). Attention to irregular verbs by beginning learners of German. *Studies in Second Language Acquisition*, 35, 291–322.
- Granena, G. (2013). Individual differences in sequence learning ability and second language acquisition in early childhood and adulthood. *Language Learning*, 63, 1–39.
- Grey, S., Williams, J. N., & Rebuschat, P. (2014). Incidental exposure and L3 learning of morphosyntax. *Studies in Second Language Acquisition*, 36, 611–645.
- Hama, M., & Leow, R. P. (2010). Learning without awareness revisited: Extending Williams (2005). *Studies in Second Language Acquisition*, 32, 465–491.
- Hamrick, P., & Rebuschat, P. (2012). How implicit is statistical learning? In *Statistical learning and language acquisition* (pp. 365–382). Berlin, Germany: Mouton de Gruyter.
- Hamrick, P., & Rebuschat, P. (2013). Frequency effects, learning conditions, and the development of implicit and explicit lexical knowledge. In J. Connor-Linton & L. Amoroso (Eds.), *Measured language: Quantitative approaches to acquisition, assessment, processing, and variation*. Washington, DC: Georgetown University Press.
- Hopp, H. (2013). The development of L2 morphology. *Second Language Research*, 29(1), 3–6.
- Horst, M. (2005). Learning L2 vocabulary through extensive reading: A measurement study. *Canadian Modern Language Review*, 61, 355–382.
- Hulstijn, J. H. (1997). Second-language acquisition research in the laboratory: Possibilities and limitations. *Studies in Second Language Acquisition*, 19, 131–143.
- Hulstijn, J. H. (2003). Incidental and intentional learning. In C. J. Doughty & M. H. Long (Eds.), *The handbook of second language acquisition* (pp. 349–381). Oxford: Blackwell.
- Hulstijn, J. H. (2005). Theoretical and empirical issues in the study of implicit and explicit second-language learning: Introduction. *Studies in Second Language Acquisition*, 27, 129–140.
- Hulstijn, J. H. (2007). Psycholinguistic perspectives on second language acquisition. In J. Cummins & C. Davison (Eds.), *The international handbook on English language teaching: Vol. 2 Current trends and issues* (pp. 701–713). Norwell, MA: Springer.
- Hulstijn, J. H. (2013). Incidental learning in second language acquisition. In C. A. Chapelle (Ed.), *The encyclopedia of applied linguistics* (pp. 2632–2637). Oxford: Wiley-Blackwell.

- Izumi, S. (2002). Output, input enhancement, and the noticing hypothesis. *Studies in Second Language Acquisition*, 24, 541–577.
- Jiang, N. (2004). Morphological insensitivity in second language processing. *Applied Psycholinguistics*, 25, 603–634.
- Jiang, N. (2007). Selective integration of linguistic knowledge in adult second language learning. *Language Learning*, 57, 1–33.
- Kihlstrom, J. F., Dorfman, J., & Park, L. (2007). Implicit and explicit memory and learning. In M. Velmans & S. Schneider (Eds.), *The Blackwell companion to consciousness* (pp. 525–539). Oxford, UK: Blackwell Publishing Ltd.
- Köpcke, K. M. (1998). Prototypisch starke und schwache Verben der deutschen Gegenwartssprache [Prototypical strong and weak verbs of contemporary German]. *Germanistische Linguistik*, 141, 45–60.
- Krause, H., Bosch, S., & Clahsen, H. (2015). Morphosyntax in the bilingual mental lexicon. *Studies in Second Language Acquisition*, 37, 597–621.
- Larsen-Freeman, D. (2010). Not so fast: A discussion of L2 morpheme processing and acquisition. *Language Learning*, 60(1), 221–230.
- Lemhöfer, K., & Broersma, M. (2012). Introducing LexTALE: A quick and valid Lexical Test for Advanced Learners of English. *Behavior Research Methods*, 44, 325–343.
- Lemhöfer, K., Schriefers, H., & Hanique, I. (2010). Native language effects in learning second-language grammatical gender: A training study. *Acta Psychologica*, 135, 150–158.
- Lemhöfer, K., Spalek, K., & Schriefers, H. (2008). Cross-language effects of grammatical gender in bilingual word recognition and production. *Journal of Memory and Language*, 59(3), 312–330.
- Leow, R. P. (1997). Attention, awareness, and foreign language behavior. *Language Learning*, 47(3), 467–505.
- Leow, R. P. (2000). A study of the role of awareness in foreign language behavior: Aware versus unaware learners. *Studies in Second Language Acquisition*, 22, 557–584.
- Leow, R. P. (2001). Attention, awareness, and foreign language behavior. *Language Learning*, 51, 113–155.
- Leow, R. P., & Hama, M. (2013). Implicit learning in SLA and the issue of internal validity. *Studies in Second Language Acquisition*, 35, 545–557.
- Leow, R. P., Johnson, E., & Zárate-Sández, G. (2010). Getting a grip on the slippery construct of awareness: Toward a finer-grained methodological perspective. In C. Sanz & R. P. Leow (Eds.), *Implicit and explicit conditions, processes and knowledge in SLA and bilingualism* (pp. 61–72). Washington, DC: Georgetown University Press.
- Leung, J. H. C. (2007). *Implicit learning of form-meaning connections*. University of Cambridge.
- Leung, J. H. C., & Williams, J. N. (2006). Implicit learning of form-meaning connections. In R. Sun & N. Miyake (Eds.), *Proceedings of the annual meeting of the cognitive science society* (pp. 465–470). Mahwah, NJ: Lawrence Erlbaum Associates.
- Leung, J. H. C., & Williams, J. N. (2011). The implicit learning of mappings between forms and contextually derived meanings. *Studies in Second Language Acquisition*, 33, 33–55.
- Leung, J. H. C., & Williams, J. N. (2012). Constraints on implicit learning of grammatical form-meaning connections. *Language Learning*, 62, 634–662.
- Leung, J. H. C., & Williams, J. N. (2014). Crosslinguistic differences in implicit language learning. *Studies in Second Language Acquisition*, 36, 733–755.

- Long, M. H. (1983). Does second language instruction make a difference? A review of the research. *TESOL Quarterly*, 17, 359–382.
- McDonough, K., & Mackey, A. (2006). Responses to recasts: Repetitions, primed production, and linguistic development. *Language Learning*, 56(4), 693–720.
- Meara, P. (1996). *English vocabulary tests: 10k*. Unpublished manuscript. Swansea: Center for Applied Language Studies.
- Mirman, D., Magnuson, J. S., Estes, K. G., & Dixon, J. A. (2008). The link between statistical segmentation and word learning in adults. *Cognition*, 108, 271–280.
- Morgan-Short, K., Faretta-Stutenberg, M., Brill-Schuetz, K. a., Carpenter, H., & Wong, P. C. M. (2014). Declarative and procedural memory as individual differences in second language acquisition. *Bilingualism: Language and Cognition*, 17, 56–72.
- Morgan-Short, K., Sanz, C., Steinhauer, K., & Ullman, M. T. (2010). Second language acquisition of gender agreement in explicit and implicit training conditions: An event-related potential study. *Language Learning*, 60(1), 154–193.
- Morgan-Short, K., Steinhauer, K., Sanz, C., & Ullman, M. T. (2012). Explicit and implicit second language training differentially affect the achievement of native-like brain activation patterns. *Journal of Cognitive Neuroscience*, 24(4), 933–947.
- Norris, J. M., & Ortega, L. (2000). Effectiveness of L2 instruction: A research synthesis and quantitative meta-analysis. *Language Learning*, 50(3), 417–528.
- Norris, J. M., & Ortega, L. (2001). Does type of instruction make a difference? Substantive findings from a meta-analytic review. *Language Learning*, 51, 157–213.
- Nübling, D., Dammel, A., Duke, J., & Szczepaniak, R. (2006). *Historische Sprachwissenschaft des Deutschen: Eine Einführung in die Prinzipien des Sprachwandels*. Tübingen, Germany: Gunter Narr Verlag.
- Opitz, B., & Friederici, A. D. (2003). Interactions of the hippocampal system and the prefrontal cortex in learning language-like rules. *Neuroimage*, 19, 1730–1737.
- Ortega, L. (2009). *Understanding second language acquisition*. Routledge.
- Pigada, M., & Schmitt, N. (2006). Vocabulary acquisition from extensive reading: A case study. *Reading in a Foreign Language*, 18(1), 1–28.
- Reber, A. S. (1967). Implicit learning of artificial grammars. *Journal of Verbal Learning and Verbal Behavior*, 6(6), 855–863.
- Reber, A. S. (1989). Implicit learning and tacit knowledge. *Journal of Experimental Psychology: General*, 118(3), 219–235.
- Reber, A. S. (1993). *Implicit learning and tacit knowledge: An essay on the cognitive unconscious*. Oxford, UK: Oxford University Press.
- Rebuschat, P. (2009). *Implicit learning of natural language syntax*. University of Cambridge.
- Rebuschat, P. (2013). Measuring implicit and explicit knowledge in second language research. *Language Learning*, 63(3), 595–626.
- Rebuschat, P., Hamrick, P., Riestenberg, K., Sachs, R., & Ziegler, N. (2015). Triangulating measures of awareness: A contribution to the debate on learning without awareness. *Studies in Second Language Acquisition*, 37, 299–334.
- Rebuschat, P., & Williams, J. N. (2012). Implicit and explicit knowledge in second language acquisition. *Applied Psycholinguistics*, 33(4), 829–856.
- Robinson, P. (1996). Learning simple and complex second language rules under implicit, incidental, rule-search and instructed conditions. *Studies in Second Language*

- Acquisition*, 18, 233–247.
- Robinson, P. (1997). Generalizability and automaticity of second language learning under implicit, incidental, enhanced, and instructed conditions. *Studies in Second Language Acquisition*, 19, 223–247.
- Robinson, P. (2010). Implicit artificial grammar and incidental natural second language learning: How comparable are they? *Language Learning*, 60, 245–263.
- Rogers, J., Révész, A., & Rebuschat, P. (2016). Implicit and explicit knowledge of inflectional morphology. *Applied Psycholinguistics*, 37, 781–812.
- Rosa, E. M., & Leow, R. P. (2004a). Awareness, different learning conditions, and second language development. *Applied Psycholinguistics*, 25, 269–292.
- Rosa, E. M., & Leow, R. P. (2004b). Computerized task-based exposure, explicitness, type of feedback, and Spanish L2 development. *Modern Language Journal*, 88, 192–216.
- Rosa, E. M., & Neill, M. D. (1999). Explicitness, intake, and the issue of awareness: Another piece to the puzzle. *Studies in Second Language Acquisition*, 21, 511–556.
- Saffran, J. R., Newport, E. L., & Aslin, R. N. (1996). Word segmentation: The role of distributional cues. *Journal of Memory and Language*, 35, 606–621.
- Sanz, C., & Morgan-Short, K. (2004). Positive evidence versus explicit rule presentation and explicit negative feedback: A computer-assisted study. *Language Learning*, 54, 35–78.
- Schacter, D. L. (1987). Implicit memory: History and current status. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 13, 501–518.
- Schacter, D. L., & Tulving, E. (Eds.). (1994). *Memory systems 1994*. Cambridge, MA: MIT Press.
- Schmidt, R. (1990). The role of consciousness in second language learning. *Applied Linguistics*, 11, 129–158.
- Schmidt, R. (1993). Awareness and second language acquisition. *Annual Review of Applied Linguistics*, 13, 206–226.
- Schmidt, R. (1994). Deconstructing consciousness in search of useful definitions for applied linguistics. *AILA Review*, 11, 11–26.
- Schmidt, R. (1995). Consciousness and foreign language learning: A tutorial on the role of attention and awareness in learning. In R. Schmidt (Ed.), *Attention and awareness in foreign language learning* (pp. 1–63). Honolulu, HI: National Foreign Language Resource Center.
- Schmidt, R. (2001). Attention. In P. Robinson (Ed.), *Cognition and second language instruction*. Cambridge University Press.
- Schmidt, R., & Frota, S. (1986). Developing basic conversational ability in a second language: A case study of an adult learner of Portuguese. In R. R. Day (Ed.), *Talking to learn: Conversation in second language acquisition* (pp. 237–326). Rowley, MA: Newbury House.
- Seger, C. A. (1994). Implicit learning. *Psychological Bulletin*, 115(2), 163–196.
- Spada, N. (1997). Form-focussed instruction and second language acquisition: A review of classroom and laboratory research. *Language Teaching*, 29, 1–15.
- Spada, N., & Tomita, Y. (2010). Interactions between type of instruction and type of language feature: A meta-analysis. *Language Learning*, 60(2), 263–308.
- Squire, L. R. (2009). The legacy of patient H.M. for neuroscience. *Neuron*, 61, 6–9.
- Stadler, M. A., & Frensch, P. A. (Eds.). (1998). *Handbook of implicit learning*. Thousand Oaks,

- CA: Sage.
- Strayer, D. L., Drews, F. A., & Crouch, D. J. (2006). A comparison of the cell phone driver and the drunk driver. *Human Factors*, 48(2), 381–391.
- Tagarelli, K. M., Borges-Mota, M., & Rebuschat, P. (2011). *The role of working memory in the implicit and explicit language learning*. (L. Carlson, C. Hölscher, & T. Shipley, Eds.) *Proceedings of the 33rd Annual Conference of the Cognitive Science Society*. Austin, TX: Cognitive Science Society.
- Tagarelli, K. M., Borges-Mota, M., & Rebuschat, P. (2015). Working memory, learning context, and the acquisition of L2 syntax. In W. Zhisheng, M. Borges Mota, & A. McNeill (Eds.), *Working memory in second language acquisition and processing: Theory, research and commentary*. Bristol, UK: Multilingual Matters.
- Tode, T. (2007). Durability problems with explicit instruction in an EFL context: the learning of the English copula be before and after the introduction of the auxiliary be. *Language Teaching Research*, 11(1), 11–30.
- Tomlin, R., & Villa, V. (1994). Attention in cognitive science and SLA. *Studies in Second Language Acquisition*, 16, 183–204.
- Truscott, J. (1998). Noticing in second language acquisition: A critical review. *Second Language Research*, 14(2), 103–135.
- Truscott, J., & Sharwood Smith, M. (2011). Input, intake, and consciousness: The quest for a theoretical foundation. *Studies in Second Language Acquisition*, 33(497–528).
- Ullman, M. T. (2001). The declarative/procedural model of lexicon and grammar. *Journal of Psycholinguistic Research*, 30, 37–69.
- Uludag, O., & VanPatten, B. (2012). The comparative effects of processing instruction and dictogloss on the acquisition of the English passive by speakers of Turkish. *International Review of Applied Linguistics*, 50, 189–212.
- VanPatten, B., & Oikkenon, S. (1996). Explanation versus structured input in processing instruction. *Studies in Second Language Acquisition*, 18, 495–510.
- Verhoef, K. M. W., Roelofs, A., & Chwilla, D. J. (2009). Role of inhibition in language switching: evidence from event-related brain potentials in overt picture naming. *Journal of Cognitive Neuroscience*, 22(8), 1832–1843.
- Welch, B. L. (1951). On the comparison of several means: An alternative approach. *Biometrika*, 38, 330–336.
- Williams, J. N. (2005). Learning without awareness. *Studies in Second Language Acquisition*, (27), 269–304.
- Williams, J. N. (2009). Implicit learning in second language acquisition. In W. C. Ritchie & T. K. Bhatia (Eds.), *The new handbook of second language acquisition* (pp. 319–353). Bingley, UK: Emerald Press.
- Williams, J. N., & Kuribara, C. (2008). Comparing a nativist and emergentist approach to the initial stage of SLA: An investigation of Japanese scrambling. *Lingua*, 118(4), 522–553. <http://doi.org/10.1016/j.lingua.2007.03.003>

## Appendices



## Appendix A. Pilot study: List of all test items

The list on the following page includes all German test items (critical verbs, filler verbs, nouns, adjectives, prepositions and articles) of the pilot study, as well their translations into Dutch. Furthermore, information is given about whether participants received the first letter (“FL”) of the solution or not. The verb *fressen* was tested twice, as this verb is prototypically used in German to refer to eating in animals, but also to eating in humans in a greedy, impolite way. The corresponding Dutch cognate *vreten*, however, corresponds to the latter meaning and cannot be used with animals. We piloted the verb with both meanings in order to see which of them would be more appropriate for the main experiment.

Critical verbs (41)	Translation	FL
blasen	blaast	yes
braten	braadt	yes
brechen	breekt	yes
empfangen	ontvangt	yes
empfehlen	beveelt... aan	yes
essen	eet	no
fahren	rijdt	yes
fallen	valt	yes
fangen	vangt	yes
fressen (1)	eet	yes
fressen (2)	vreet	yes
geben	geeft	yes
graben	graaft	yes
halten	houdt	yes
helfen	helpt	yes
laden	laadt	yes
lassen	laat	yes
laufen	loopt	yes
lesen	leest	yes
messen	meet	yes
nehmen	neemt	yes
saufen	zuipt	yes
schlafen	slaapt	yes
schlagen	slaat	yes
schmelzen	smelt	yes
sehen	ziet	yes
sprechen	spreekt	yes
stechen	steekt	yes
stehlen	steelt	yes
sterben	sterft	yes
stoßen	stoot	yes
tragen	draagt	yes
treffen	treft / raakt	yes
treten	treedt	yes
verbergen	verbergt	yes
vergessen	vergeet	yes
verlassen	verlaat	yes
verraten	verraadt	yes
wachsen	groeit	yes
waschen	wast	yes
werben	werft	yes
werfen	werpt / gooit	yes

Filler verbs (20)	Translation	FL
bauen	bouwt	no
bekommen	krijgt	yes
bezahlen	betaalt	yes
brauchen	heeft... nodig / heeft behoefte aan...	yes
folgen	volgt	yes
gehen	gaat	yes
heiraten	trouwt met...	yes
holen	haalt	yes
jagen	jaagt	no
kaufen	koopt	yes
kochen	kookt	yes
legen	legt	no
machen	maakt	yes
reden	praat	yes
schreiben	schrijft	yes
setzen	zet	yes
stehen	staat	no
tanzen	danst	yes
warten	wacht	yes
zeigen	toont / laat... zien	yes

Nouns (29)	Translation	FL
Affe	aap	no
Bauer	boer	yes
Eisbär	ijsbeer	yes
Erde	aarde	yes
Fahrrad	fiets	yes
Flagge	vlag	yes
Fuchs	vos	yes
Fuß	voet	no
Haus	huis	no
Himmel	hemel	yes
Höhle	hol	yes
Hund	hond	no
Käse	kaas	no
Katze	kat	yes
Küche	keuken	yes
Loch	gat	yes
Mücke	mug	yes
Nase	neus	yes
Nuss	noot	yes
Oger	oger	yes
Pferd	paard	yes
Puppe	pop	yes
Radfahrer	fietser	no
Riese	reus	yes
Schnabel	snavel	yes
Sonne	zon	yes
Tisch	tafel	no
Topf	pan / kookpot	yes
Torte	taart	yes

Adjectives (10)	Translation	FL
alt	oude	yes
amerikanisch	Amerikaanse	no
blond	blonde	no
gefährlich	gevaarlijke	yes
grün	groene	no
jung	jonge	yes
lang	lange	no
lieb	lieve	yes
nass	natte	yes
sauber	propere	yes

Prepositions (10)	Translation	FL
bis	tot	yes
hinter	achter	yes
nach	naar	no
neben	Naast	yes
ohne	zonder	yes
seit	Sinds	yes
unter	onder	yes
vor	vóór	no
während	tijdens	yes
zwischen	tussen	yes

Articles (20)	Translation	FL
den Eingang	de	no
ein Elefant	een	no
Das Flugzeug	Het	no
Das frische Wasser	Het	no
Der Bäcker	De	no
eine herrliche Torte	een	no
den Baum	de	no
die Wolken	die	no
Der Schlüssel	De	no
Die Studentin	De	no
ein Sandwich	een	no
Das Semester	Het	no
Der Student	De	no
einen Pullover	een	no
den freundlichen Bauern	de	no
den Tisch	de	no
dem Mond	de	no
den Boden	een	no
Das Kaninchen	Het	no
der Schere	de	no

## Appendix B. Pilot study: Test sentences and solutions

All test sentences and solutions are given in their pseudorandomized order. Counterbalancing was achieved by using two versions of the questionnaire (set A and set B), which were identical, except that the order of test sentences was reversed. The list here presented represents set A. The red sentences are the sentences that contain critical verbs; sentences with filler verbs are marked in blue; the remaining sentences are left white.

SET A	
Order	Solution & Gap-text
1	Die <b>Mücke</b> fliegt zur Lampe. Die (M) _____ fliegt zur Lampe. ( <i>mug</i> )
2	Das Atelier befindet sich <b>hinter</b> dem Haus. Das Atelier befindet sich (h) _____ dem Haus. ( <i>achter</i> )
3	Das Baby <b>braucht</b> viel Liebe und viel Schlaf. Das Baby (b) _____ viel Liebe und viel Schlaf. ( <i>heeft... nodig / heeft behoefte aan...</i> )
4	<b>Neben</b> der Badewanne liegt ein <b>nasses</b> Handtuch. (N) _____ der Badewanne liegt ein (n) _____ Handtuch. ( <i>Naast</i> ) ( <i>natte</i> )
5	Der Literaturstudent <b>liest</b> ein modernes Gedicht. Der Literaturstudent (l) _____ ein modernes Gedicht. ( <i>leest</i> )
6	Die <b>Katze</b> klettert auf <b>den Tisch</b> . Die (K) _____ klettert auf _____. ( <i>kat</i> ) ( <i>de</i> ) ( <i>tafel</i> )
7	Der große Baum <b>fällt</b> auf die Hütte und beschädigt das Dach. Der große Baum (f) _____ auf die Hütte und beschädigt das Dach. ( <i>valt</i> )
8	<b>Seit</b> gestern scheint die <b>Sonne</b> . (S) _____ gestern scheint die (S) _____. ( <i>Sinds</i> ) ( <i>zon</i> )
9	Der Athlet <b>läuft</b> einen Marathon in 3 Stunden und 50 Minuten. Der Athlet (l) _____ einen Marathon in 3 Stunden und 50 Minuten. ( <i>loopt</i> )
10	Der Lehrer <b>legt</b> das Buch in den Karton. Der Lehrer _____ das Buch in den Karton. ( <i>legt</i> )
11	Der Tourist <b>lässt</b> den Rucksack im Hotel. Der Tourist (l) _____ den Rucksack im Hotel. ( <i>laat</i> )
12	<b>Die</b> Studentin plant im Sommer eine <b>lange</b> Reise. _____ Studentin plant im Sommer eine _____ Reise. ( <i>De</i> ) ( <i>lange</i> )
13	Emma <b>redet</b> mit einem Mann, der wie Brad Pitt aussieht. Emma (r) _____ mit einem Mann, der wie Brad Pitt aussieht. ( <i>praat</i> )
14	Der Direktor <b>empfangt</b> die Eltern beim Schulfest. Der Direktor (e) _____ die Eltern beim Schulfest. ( <i>ontvangt</i> )
15	Der <b>alte</b> Mann pflanzt <b>den</b> Baum in die <b>Erde</b> . Der (a) _____ Mann pflanzt _____ Baum in die (E) _____. ( <i>oude</i> ) ( <i>de</i> ) ( <i>aarde</i> )
16	Die Mutter <b>hilft</b> ihrem Sohn bei den Hausaufgaben. Die Mutter (h) _____ ihrem Sohn bei den Hausaufgaben. ( <i>helpt</i> )
17	<b>Das</b> Flugzeug fliegt von Berlin <b>nach</b> Beirut. _____ Flugzeug fliegt von Berlin _____ Beirut. ( <i>Het</i> ) ( <i>naar</i> )
18	Das Mädchen <b>holt</b> eine Dose Pralinen aus der Tasche. Das Mädchen (h) _____ eine Dose Pralinen aus der Tasche. ( <i>haalt</i> )
19	Der Sohn <b>gibt</b> seiner Mutter einen Becher Milch. Der Sohn (g) _____ seiner Mutter einen Becher Milch. ( <i>geeft</i> )
20	Der Naturliebhaber fotografiert den <b>Eisbären</b> . Der Naturliebhaber fotografiert den (E) _____. ( <i>ijsbeer</i> )
21	Die Schokolade <b>schmilzt</b> in der heißen Milch. Die Schokolade (s) _____ in der heißen Milch. ( <i>smelt</i> )
22	Der Junge <b>geht</b> mit seinem Großvater in den Wald.

	Der Junge (g) _____ mit seinem Großvater in den Wald. ( <i>gaat</i> )
23	Der Student <b>fährt</b> immer mit der Metro zur Universität.
	Der Student (f) _____ immer mit der Metro zur Universität. ( <i>rijdt</i> )
24	Der Räuber <b>stiehlt</b> das Gold von den Kaufleuten.
	Der Räuber (s) _____ das Gold von den Kaufleuten. ( <i>steelt</i> )
BREAK 1	
25	Peter liegt im <b>grünen</b> Gras und zählt <b>die</b> Wolken am <b>Himmel</b> .
	Peter liegt im _____ Gras und zählt _____ Wolken am (H) _____. ( <i>groene</i> ) ( <i>de</i> ) ( <i>hemel</i> )
26	Der Tourist <b>isst</b> Spaghetti mit Pesto im italienischen Restaurant.
	Der Tourist _____ Spaghetti mit Pesto im italienischen Restaurant. ( <i>eet</i> )
27	Christoph <b>heiratet</b> die Tochter des Bürgermeisters.
	Christoph (h) _____ die Tochter des Bürgermeisters. ( <i>trouwt met...</i> )
28	Der Chauffeur <b>sieht</b> die Tram im Spiegel.
	Der Chauffeur (s) _____ die Tram im Spiegel. ( <i>ziet</i> )
29	Der Wikinger <b>sauft</b> Bier aus einem Horn.
	Der Wikinger (s) _____ Bier aus einem Horn. ( <i>zuipt</i> )
30	Lisa schneidet mit <b>der</b> Schere ein <b>Loch</b> in den Pullover.
	Lisa schneidet mit _____ Schere ein (L) _____ in den Pullover. ( <i>de</i> ) ( <i>gat</i> )
31	Der Pirat <b>wirft</b> die Flaschenpost in den Ozean.
	Der Pirat (w) _____ die Flaschenpost in den Ozean. ( <i>werpt / gooit</i> )
32	Max schaut sich einen <b>amerikanischen</b> Film an.
	Max schaut sich einen _____ Film an. ( <i>Amerikaanse</i> )
33	Der Bandit <b>verbirgt</b> das gestohlene Auto im Wald.
	Der Bandit (v) _____ das gestohlene Auto im Wald. ( <i>verbergt</i> )
34	Die Kuh <b>steht</b> im Stall und wird gemolken.
	Die Kuh _____ im Stall und wird gemolken. ( <i>staat</i> )
35	<b>Der</b> Bäcker präsentiert <b>eine</b> herrliche <b>Torte</b> .
	_____ Bäcker präsentiert _____ herrliche (T) _____. ( <i>De</i> ) ( <i>een</i> ) ( <i>taart</i> )
36	Der Vater <b>bricht</b> das Stockbrot in zwei Stücke.
	Der Vater (b) _____ das Stockbrot in zwei Stücke. ( <i>breekt</i> )
37	<b>Das</b> frische Wasser ist für das <b>Pferd</b> .
	_____ frische Wasser ist für das (P) _____. ( <i>Het</i> ) ( <i>paard</i> )
38	Robin Hood <b>trifft</b> den Sherriff mit dem Pfeil.
	Robin Hood (t) _____ den Sherriff mit dem Pfeil. ( <i>treft / raakt</i> )
39	Der Mann <b>bezahlt</b> die Rechnung im Restaurant.
	Der Mann (b) _____ die Rechnung im Restaurant. ( <i>betaalt</i> )
40	<b>Der</b> Student kratzt sich an der <b>Nase</b> .
	_____ Student kratzt sich an der (N) _____. ( <i>De</i> ) ( <i>neus</i> )
41	Der Politiker <b>tritt</b> auf die Bühne und hält eine Rede.
	Der Politiker (t) _____ auf die Bühne und hält eine Rede. ( <i>treedt</i> )
42	Der <b>Riese</b> ist so groß wie <b>ein</b> Elefant.
	Der (R) _____ ist so groß wie _____ Elefant. ( <i>reus</i> ) ( <i>een</i> )
43	Linda <b>macht</b> einen großen Schneemann.
	Linda (m) _____ einen großen Schneemann. ( <i>maakt</i> )
44	Die Prinzessin <b>schläft</b> 100 Jahre lang.

	Die Prinzessin (s) _____ 100 Jahre lang. ( <i>slaapt</i> )
45	Die Pflanze <b>stirbt</b> auf dem Acker durch die Pestizide.
	Die Pflanze (s) _____ auf dem Acker durch die Pestizide. ( <i>sterft</i> )
46	Die Wäscheleine mit der <b>sauberen</b> Wäsche hängt <b>zwischen</b> den Bäumen.
	Die Wäscheleine mit der (s) _____ Wäsche hängt (z) _____ den Bäumen. ( <i>propere</i> ) ( <i>tussen</i> )
47	Der Lehrer <b>trägt</b> die Bücher in die Schulbibliothek.
	Der Lehrer (t) _____ die Bücher in die Schulbibliothek. ( <i>draagt</i> )
48	Der <b>junge</b> Vogel öffnet die Frucht mit seinem <b>Schnabel</b> .
	Der (j) _____ Vogel öffnet die Frucht mit seinem (S) _____. ( <i>jonge</i> ) ( <i>snavel</i> )
BREAK 2	
49	Die Giraffe <b>frisst</b> am liebsten Blätter.
	Die Giraffe (f) _____ am liebsten Blätter. ( <i>eet</i> )
50	Der <b>Topf</b> befindet sich in der <b>Küche</b> auf dem Herd.
	Der (T) _____ befindet sich in der (K) _____ auf dem Herd. ( <i>pan / kookpot</i> ) ( <i>keuken</i> )
51	Der Lehrer <b>verrät</b> die Lösung des Rätsels.
	Der Lehrer (v) _____ die Lösung des Rätsels. ( <i>verraadt</i> )
52	Die Großmutter näht <b>einen</b> Pullover für die <b>Puppe</b> .
	Die Großmutter näht _____ Pullover für die (P) _____. ( <i>een</i> ) ( <i>pop</i> )
53	Die Köchin <b>brät</b> das Gemüse mit dem Reis in der Wok-Pfanne.
	Die Köchin (b) _____ das Gemüse mit dem Reis in der Wok-Pfanne. ( <i>braadt</i> )
54	Der Arbeiter holt <b>während</b> der Pause <b>ein</b> Sandwich.
	Der Arbeiter holt (w) _____ der Pause _____ Sandwich. ( <i>tijdens</i> ) ( <i>een</i> )
55	Marijke <b>stößt</b> mit dem Kopf gegen die Lampe.
	Marijke (s) _____ mit dem Kopf gegen die Lampe. ( <i>stoot</i> )
56	Der Mann <b>bekommt</b> eine neue Bohrmaschine.
	Der Mann (b) _____ eine neue Bohrmaschine. ( <i>krijgt</i> )
57	Das kleine Kind <b>gräbt</b> einen Kanal um seine Sandburg.
	Das kleine Kind (g) _____ einen Kanal um seine Sandburg. ( <i>graft</i> )
58	Der <b>Hund</b> liegt <b>vor</b> dem <b>Haus</b> auf der Matte.
	Der _____ liegt _____ dem _____ auf der Matte. ( <i>hond</i> ) ( <i>vóór</i> ) ( <i>huis</i> )
59	Der Löwe <b>jagt</b> das Zebra, aber das Zebra ist zu schnell.
	Der Löwe _____ das Zebra, aber das Zebra ist zu schnell. ( <i>jaagt</i> )
60	Das kleine Mädchen mag <b>den</b> freundlichen <b>Bauern</b> sehr.
	Das kleine Mädchen mag _____ freundlichen (B) _____ sehr. ( <i>de</i> ) ( <i>boer</i> )
61	Der Tennisspieler <b>schlägt</b> den Ball ins Aus und verliert das Turnier.
	Der Tennisspieler (s) _____ den Ball ins Aus und verliert das Turnier. ( <i>slaat</i> )
62	Der Patient <b>nimmt</b> ein Medikament gegen Husten.
	Der Patient (n) _____ ein Medikament gegen Husten. ( <i>neemt</i> )
63	Die Mutter schenkt dem Kind ein neues <b>Fahrrad</b> .
	Die Mutter schenkt dem Kind ein neues (F) _____. ( <i>fiets</i> )
64	Der Wind <b>bläst</b> die Blätter vom Baum.
	Der Wind (b) _____ die Blätter vom Baum. ( <i>blaast</i> )
65	Der Vogel <b>baut</b> ein Nest aus Stroh und Zweigen.
	Der Vogel _____ ein Nest aus Stroh und Zweigen. ( <i>bouwt</i> )
66	Der Professor <b>spricht</b> mit den Studenten über die Krise.



	Der Professor (s) _____ mit den Studenten über die Krise. ( <i>spreekt</i> )
67	Das Mädchen <b>kauft</b> ein Eis beim Kiosk.
	Das Mädchen (k) _____ ein Eis beim Kiosk. ( <i>koopt</i> )
68	Frau Meiers <b>Fuß</b> ist gebrochen.
	Frau Meiers _____ ist gebrochen. ( <i>voet</i> )
69	Der Politiker <b>wirbt</b> für seine Partei.
	Der Politiker (w) _____ für seine Partei. ( <i>werft</i> )
70	Der Farmer <b>lädt</b> die Melonen auf den Wagen.
	Der Farmer (l) _____ die Melonen auf den Wagen. ( <i>laadt</i> )
71	<b>Das</b> Kaninchen lebt in einer <b>Höhle</b> .
	_____ Kaninchen lebt in einer (H) _____. ( <i>Het</i> ) ( <i>hol</i> )
72	Die Mutter <b>setzt</b> ihr Kind auf den Stuhl und bringt das Essen.
	Die Mutter (s) _____ ihr Kind auf den Stuhl und bringt das Essen. ( <i>zet</i> )
BREAK 3	
73	Das böse Monster <b>frisst</b> 43 kg Pudding, 12 kg Milchreis, 15 Bratwürste und 9 Dosen Thunfisch.
	Das böse Monster (f) _____ 43 kg Pudding, 12 kg Milchreis, 15 Bratwürste und 9 Dosen Thunfisch. ( <i>vreet</i> )
74	Der <b>Affe</b> mag am liebsten Bananen, Trauben und <b>Käse</b> .
	Der _____ mag am liebsten Bananen, Trauben und _____. ( <i>aap</i> ) ( <i>kaas</i> )
75	Lena <b>wäscht</b> ihr Haar in der Dusche mit Shampoo.
	Lena (w) _____ ihr Haar in der Dusche mit Shampoo. ( <i>wast</i> )
76	Die Verkäuferin <b>empfiehlt</b> den Film mit Julia Roberts.
	Die Verkäuferin (e) _____ den Film mit Julia Roberts. ( <i>beveelt... aan</i> )
77	Der Astronaut landet auf <b>dem</b> Mond und steckt eine <b>Flagge</b> in <b>den</b> Boden.
	Der Astronaut landet auf _____ Mond und steckt eine (F) _____ in _____ Boden. ( <i>de</i> ) ( <i>vlag</i> ) ( <i>de</i> )
78	Der <b>blonde</b> Junge steckt eine <b>Nuss</b> in seinen Mund.
	Der _____ Junge steckt eine (N) _____ in seinen Mund. ( <i>blonde</i> ) ( <i>noot</i> )
79	Herr Müller <b>schreibt</b> einen Roman.
	Herr Müller (s) _____ einen Roman. ( <i>schrijft</i> )
80	Die kleine Prinzessin <b>vergisst</b> ihre Krone im Badezimmer.
	Die kleine Prinzessin (v) _____ ihre Krone im Badezimmer. ( <i>vergeet</i> )
81	Anna <b>kocht</b> eine leckere Suppe für ihre Oma.
	Anna (k) _____ eine leckere Suppe für ihre Oma. ( <i>kookt</i> )
82	Der Taxifahrer <b>hält</b> den Mantel der Dame in der Hand.
	Der Taxifahrer (h) _____ den Mantel der Dame in der Hand. ( <i>houdt</i> )
83	<b>Das</b> Semester dauert von September <b>bis</b> Januar.
	_____ Semester dauert von September (b) _____ Januar. ( <i>Het</i> ) ( <i>tot</i> )
84	Der schlaue <b>Fuchs</b> sucht <b>den</b> Eingang des Hühnerstalls.
	Der schlaue (F) _____ sucht _____ Eingang des Hühnerstalls. ( <i>vos</i> ) ( <i>de</i> )
85	Die Pflanze <b>wächst</b> sehr schnell, wenn sie genug Licht bekommt.
	Die Pflanze (w) _____ sehr schnell, wenn sie genug Licht bekommt. ( <i>groeit</i> )
86	Der Patient <b>wartet</b> auf den Arzt.
	Der Patient (w) _____ auf den Arzt. ( <i>wacht</i> )
87	Der Architekt <b>misst</b> die Länge des Daches.
	Der Architekt (m) _____ die Länge des Daches. ( <i>meet</i> )
88	Der Matrose <b>verlässt</b> das Schiff und geht an Land.

	Der Matrose (v) _____ das Schiff und geht an Land. ( <i>verlaat</i> )
89	Der Schlüssel liegt <b>unter</b> der Matte. _____ Schlüssel liegt (u) _____ der Matte. ( <i>De</i> ) ( <i>onder</i> )
90	Die Frau <b>tantzt</b> mit ihrem Tango-Lehrer. Die Frau (t) _____ mit ihrem Tango-Lehrer. ( <i>danst</i> )
91	Der mutige Ritter <b>sticht</b> den Drachen mit der Lanze. Der mutige Ritter (s) _____ den Drachen mit der Lanze. ( <i>steekt</i> )
92	„Shrek“ ist ein Film über einen <b>lieben Oger</b> . „Shrek“ ist ein Film über einen (l) _____ (o) _____. ( <i>lieve</i> ) ( <i>oger</i> )
93	Der Jäger <b>fängt</b> den Tiger und bringt ihn in den Zoo. Der Jäger (f) _____ den Tiger und bringt ihn in den Zoo. ( <i>vangt</i> )
94	Jennifer mag am liebsten Fritten <b>ohne</b> Mayonnaise. Jennifer mag am liebsten Fritten (o) _____ Mayonnaise. ( <i>zonder</i> )
95	Der Junge <b>zeigt</b> seinem Freund das neue Skateboard. Der Junge (z) _____ seinem Freund das neue Skateboard. ( <i>toont / laat... zien</i> )
96	Der neue Lehrling <b>folgt</b> dem Chefkoch in den Weinkeller. Der neue Lehrling (f) _____ dem Chefkoch in den Weinkeller. ( <i>volgt</i> )
97	Der <b>Radfahrer</b> vermeidet die <b>gefährliche</b> Straße. Der _____ vermeidet die (g) _____ Straße. ( <i>fietser</i> ) ( <i>gevaarlijke</i> )

## Appendix C. Pilot study: Entire *Google Forms* survey

5/16/2016

Pilot-study: Duits als vreemde taal

### Pilot-study: Duits als vreemde taal

Beste deelnemer,

Bedankt om deel te nemen aan ons experiment! Deze pilotstudie duurt maximaal 30 minuten en dient om stimulusmateriaal voor een toekomstig experiment over Duits als vreemde taal te testen.

Je zult ongeveer 100 Duitse zinnen te zien krijgen waarbij er steeds een paar woorden ontbreken. Je moet dan de ontbrekende woorden invullen.

Probeer om even een rustige omgeving op te zoeken waar je niet gestoord of afgeleid kunt worden. (Een kleine tip: Je kunt bijvoorbeeld ook je hoofdtelefoon opzetten zonder muziek af te spelen - dat werkt ook isolerend.)

Voor deze studie is het belangrijk om GEEN hulpmiddelen te gebruiken.

Voor je aan het experiment begint, zouden we je nog even een paar korte vragen over jezelf en je taalachtergrond willen stellen.

Door te klikken op "Doorgaan" geef je automatisch ook je toestemming voor het gebruik van je gegevens voor wetenschappelijke doeleinden. Dit gebeurt volledig anoniem.

**\*Vereist**

### RU-studenten:

---

Als je student bent aan de Radboud Universiteit Nijmegen krijg je voor je deelname aan deze studie 0,5 proefpersoon-punten. Als je de vragenlijst tussendoor afbreekt kunnen we je helaas geen proefpersoon-punten geven.

### Persoonlijke informatie

We gaan je nu nog even een paar vragen rond je persoon stellen.

1. Wat is je leeftijd? \*

---

2. Wat is je geslacht? \*

---

3. E-mail adres

Je hoeft je e-mail adres enkel aan te geven als je achteraf graag de resultaten te weten zou komen.

---

4. Wat is je SONA-nummer?

Deze vraag is enkel voor RU studenten met een SONA-nummer.

---

## Als je studeert:

---

5. Wat studeer je?

.....

6. In welk jaar zit je?

.....

## Als je niet studeert:

---

7. Wat is je hoogst behaalde diploma?

(professionele bachelor/academische bachelor/postgraduaat/master/...)

.....

8. Wat heb je gestudeerd?

.....

9. Wat is je huidig beroep?

.....

## Informatie over je taalachtergrond

Voor de evaluatie van het experiment waaraan je gaat deelnemen, is het voor ons belangrijk om meer te weten over jouw taalachtergrond: je moedertaal, je ervaringen met vreemde talen in het algemeen en met het Duits in het bijzonder.

10. Wat is jouw moedertaal? \*

Je kunt ook meerdere opties aanvinken. Als je bijvoorbeeld meerdere moedertalen hebt kun je indien nodig gebruik maken van de optie 'Andere...'.  
*Vink alle toepasselijke opties aan.*

☐ Nederlands (NL)

☐ Nederlands (BE)

☐ Duits

☐ Anders: .....

11. Heb je dyslexie of leesproblemen? \*

*Markeer slechts één ovaal.*

☐ Ja, ik ben gediagnosticeerd met dyslexie

☐ Ja, ik heb leesproblemen, maar ik ben niet officieel gediagnosticeerd met dyslexie

☐ Ja, ik heb leesproblemen anders dan dyslexie

☐ Nee, ik heb geen dyslexie of andere leesproblemen

## Als je in Nederland naar school bent gegaan:

---



12. Hoe veel jaar heb je Duitse les op school gehad?

---

13. Heb je Duits als eindexamenvak gehad?

*Markeer slechts één ovaal.*

☐ Ja

☐ Nee

14. Zo ja: Wat was je cijfer?

---

### **Als je in Vlaanderen naar school bent gegaan:**

15. Hoe veel jaar heb je Duitse les op school gehad?

---

16. Hoe veel uren per week waren dat gemiddeld?

---

### **Andere:**

17. Heb je via andere instellingen Duitse les gevolgd? Zo ja, hoeveel jaar? \*

*Markeer slechts één ovaal per rij.*

	0 jaar	1 jaar	2 jaar	3 jaar	4 jaar of meer
Avondschool	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Studie Duits aan universiteit of hogeschool	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Duits als keuzevak tijdens je studies	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

18. Als de opties hierboven niet van toepassing zijn en je in een andere context Duitse les hebt gevolgd, licht dat hier dan even toe:

---



---



---



---



---

### **Informatie over je taalachtergrond**

19. Op welke leeftijd ben je voor het eerst intensief met de Duitse taal in contact gekomen? \*

.....

20. Hoe is dat gebeurd? \*

Markeer slechts één ovaal.

☐ Familie

☐ School

☐ Studie

☐ Anders: .....

21. Hoe goed is jouw Duits in het algemeen? \*

Markeer slechts één ovaal.

1 2 3 4 5

heel slecht ☐ ☐ ☐ ☐ ☐ heel goed

22. Hoe vaak gebruik je Duits in het algemeen? \*

Markeer slechts één ovaal.

1 2 3 4 5

zeer zelden ☐ ☐ ☐ ☐ ☐ zeer vaak

23. Heb je nog opmerkingen in verband met je gebruik en je leerproces van de Duitse taal?

.....

.....

.....

.....

.....

## Andere vreemde talen

Heb je nog andere vreemde talen geleerd? Zo ja, welke?

Hieronder kun je informatie geven over (maximaal) 3 bijkomstige vreemde talen.

## Bijkomstige vreemde taal 1:

24. Over welke taal gaat het?

.....

**25. Hoe vaak gebruik je deze vreemde taal?***Markeer slechts één ovaal.*

	1	2	3	4	5	
zeer zelden	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	zeer vaak

**26. Hoe goed beheers je volgens jou deze vreemde taal?***Markeer slechts één ovaal.*

	1	2	3	4	5	
heel slecht	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	heel goed

**27. Beheers je deze taal beter of slechter dan Duits?***Markeer slechts één ovaal.*

- ☐ beter
- ☐ slechter
- ☐ even goed

**Bijkomstige vreemde taal 2:****28. Over welke taal gaat het?**


---

**29. Hoe vaak gebruik je deze vreemde taal?***Markeer slechts één ovaal.*

	1	2	3	4	5	
zeer zelden	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	zeer vaak

**30. Hoe goed beheers je volgens jou deze vreemde taal?***Markeer slechts één ovaal.*

	1	2	3	4	5	
heel slecht	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	heel goed

**31. Beheers je deze taal beter of slechter dan Duits?***Markeer slechts één ovaal.*

- ☐ beter
- ☐ slechter
- ☐ even goed

### Bijkomstige vreemde taal 3:

32. Over welke taal gaat het?

33. Hoe vaak gebruik je deze vreemde taal?

Markeer slechts één ovaal.

	1	2	3	4	5	
zeer zelden	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	zeer vaak

34. Hoe goed beheers je volgens jou deze vreemde taal?

Markeer slechts één ovaal.

	1	2	3	4	5	
heel slecht	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	heel goed

35. Beheers je deze taal beter of slechter dan Duits?

Markeer slechts één ovaal.

- ☐ beter
- ☐ slechter
- ☐ even goed

## Instructies

Je zult zo dadelijk met het experiment beginnen, maar eerst even een paar instructies.

**Lees de instructies aandachtig!**

Je krijgt zo dadelijk een reeks Duitse zinnen aangeboden.

In ieder Duits zinnetje ontbreekt er minstens één woord. We zouden je willen vragen om steeds de correcte ontbrekende Duitse woorden in te vullen.

Bij ieder ontbrekend woord is de Nederlandse vertaling aangegeven, dus hoef je het gewoon naar het Duits te vertalen. De Nederlandse vertalingen staan steeds tussen haakjes achter de zin.

Soms zijn er voor de duidelijkheid ook twee synonieme Nederlandse vertalingen aangegeven, dat ziet er dan bijvoorbeeld zo uit: (dessert / toetje)

Als er meerdere woorden ontbreken zijn de vertalingen achter de zin in de correcte volgorde aangegeven. Je hoeft dus zeker niet te puzzelen. In je antwoord kun je de woorden dan opsommen en afbakenen door komma's.

Om de opdracht wat gemakkelijker te maken geven we af en toe de beginletter van de oplossing. De beginletter staat dan tussen haakjes vóór het gaatje in de zin.

Let wel op: we vragen je om steeds het hele woord in te geven, dus inclusief de eerste letter!

### Een paar voorbeelden:

Der Papagei sitzt \_\_\_\_\_ dem Dach. (op)

Oplossing: "auf"  
Der Papagei sitzt auf dem Dach.

Anna (l) \_\_\_\_\_ ihre \_\_\_\_\_ Schuhe. (houdt van / vindt leuk) (rode)  
Oplossing: "liebt, roten"  
Anna liebt ihre roten Schuhe.

\_\_\_ Symbol für Freiheit ist eine weiße Taube. (het)  
Oplossing: "Das"  
Das Symbol für Freiheit ist eine weiße Taube.

Die Ente (s) \_\_\_\_\_ auf dem See. (zwemt)  
Oplossing: "schwimmt"  
Die Ente schwimmt auf dem See.

## Heel belangrijk:

---

Het is de bedoeling dat je antwoorden zo goed en trouw mogelijk je authentieke kennis van het Duits weerspiegelen.

Gebruik dus geen hulpmiddelen!  
Dit is heel erg belangrijk. Als je hulpmiddelen gebruikt moeten we je antwoorden helaas bij de analyse uitsluiten.

Vul je antwoorden zo snel en zo spontaan mogelijk in!  
(Snel en spontaan - maar ook niet overhaast, geen paniek.)

Uiteraard is het de bedoeling om zo correct mogelijke antwoorden in te vullen. Als je echter niet zeker bent of je het juist hebt of als je niet zeker bent van je spelling, probeer dan toch het eerste idee dat in je is opgekomen in te vullen.  
Aarzel vooral niet te veel! Blijf niet te lang bij een woordje hangen maar ga vlug over naar de volgende zin.

Opgelet: Als je een woord écht niet weet, schrijf dan gewoon drie vraagtekens: ???



## Moeilijkheden met het intypen van ä, ö, ü, ß...?

---

Laat zeker de Umlauten (ä, ö, ü, äu) niet achterwege!  
Je mag deze ook schrijven als klinker + e.  
Als je moeilijkheden hebt met het ingeven van een Beta (ß), mag je in plaats daarvan ook 'ss' gebruiken.

ä: ae (Lärm – Laerm)  
ö: oe (böse – boese)  
ü: ue (günstig – guenstig)

äu – aue (Bäume – Baueme)

ß: ss (Gruß – Gruss)

Zo worden de zinnen straks dan gepresenteerd:

**Pilot-study: Duits als vreemde taal (A)**  
\*Vereist

**Experiment**

Anna (i) \_\_\_\_\_ ihre \_\_\_\_\_ Schuhe. (houdt van / vindt leuk) (rode) \*

**Instructiebox**

- Vul de zinnen aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

« Vorige Doorgaan » 4% voltooid

... je schrijft je antwoord onderaan de zin, net zoals hier:

**Pilot-study: Duits als vreemde taal (A)**  
\*Vereist

**Experiment**

Anna (i) \_\_\_\_\_ ihre \_\_\_\_\_ Schuhe. (houdt van / vindt leuk) (rode) \*

**Instructiebox**

- Vul de zinnen aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

« Vorige Doorgaan » 4% voltooid

... of als je een woord echt niet weet, schrijf je '???'', net zoals hier

**Pilot-study: Duits als vreemde taal (A)**

\*Vereist

**Experiment**

Anna (I) \_\_\_\_\_ ihre \_\_\_\_\_ Schuhe. (houdt van / vindt leuk) (rode) \*

???, roten

**Instructiebox**

- Vul de zinnen aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

< Vorige Doorgaan >

4% voltooid

## Ben je er klaar voor?

Heb je de instructies aandachtig gelezen?  
Dan kan je zo dadelijk van start gaan.

Je zult de zinnen één voor één te zien krijgen. Je antwoord schrijf je onderaan de zin.  
Je krijgt doorgaans ook een instructiebox te zien (net zoals in het voorbeeld) waarin we de meest relevante instructies herhalen. Een geheugensteuntje dus!

TIP 1: je kunt je snel door de vragenlijst heen bewegen door TAB en ENTER te gebruiken (vul het woord in, druk dan twee keer op TAB, dan op ENTER, dan weer op TAB, en vul het volgende woord in).

TIP 2: klik niet op Back (<) in je browser, want dan verlaat je de vragenlijst.

Tussendoor bieden we ook momenten voor een pauze aan.  
Let er wel op dat je de vragenlijst niet wegklikt, want je antwoorden worden pas naar ons verstuurd als je bij het einde van de vragenlijst bent aangekomen en op "Verzenden" ("submit") klikt.

Als je er klaar voor bent, mag je beginnen!

## Experiment

36. Die (M) \_\_\_\_\_ fliegt zur Lampe.  
(mug) \*

## Instructiebox

- Vul de zinnen aan met het ontbrekende Duitse woord (inclusief eerste letter)



- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

37. Das Atelier befindet sich (h)\_\_\_\_\_ dem Haus. (achter) \*

## Instructiebox

---

- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

38. Das Baby (b)\_\_\_\_\_ viel Liebe und viel Schlaf. (heeft... nodig / heeft behoefte aan...) \*

## Instructiebox

---

- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

39. (N)\_\_\_\_\_ der Badewanne liegt ein (n)\_\_\_\_\_ Handtuch. (Naast) (natte) \*



## Instructiebox

---

- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

40. Der Literaturstudent (I) \_\_\_\_\_ ein  
modernes Gedicht. (leest) \*

## Instructiebox

---

- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

41. Die (K) \_\_\_\_\_ klettert auf \_\_\_\_\_  
\_\_\_\_\_. (kat) (de) (tafel) \*

## Instructiebox

---

- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

42. Der große Baum (f) \_\_\_\_\_ auf die  
Hütte und beschädigt das Dach. (valt) \*

## Instructiebox

---

- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

43. (S) \_\_\_\_\_ gestern scheint die  
(S) \_\_\_\_\_. (Sinds) (zon) \*

## Instructiebox

---

- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

44. Der Athlet (l) \_\_\_\_\_ einen Marathon  
in 3 Stunden und 50 Minuten. (loopt) \*

## Instructiebox

---

- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

45. Der Lehrer \_\_\_\_\_ das Buch in den  
Karton. (legt) \*

## Instructiebox

---

- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

46. Der Tourist (I) \_\_\_\_\_ den Rucksack  
im Hotel. (laat) \*

## Instructiebox

---

- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

47. \_\_\_\_\_ Studentin plant im Sommer eine  
\_\_\_\_\_ Reise. (De) (lange) \*

## Instructiebox

---

- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'

- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

48. Emma (r)\_\_\_\_\_ mit einem Mann, der  
wie Brad Pitt aussieht. (praat) \*

## Instructiebox

---

- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

49. Der Direktor (e)\_\_\_\_\_ die Eltern  
beim Schulfest. (ontvangt) \*

## Instructiebox

---

- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

50. Der (a)\_\_\_\_\_ Mann pflanzt \_\_\_\_\_  
Baum in die (E)\_\_\_\_\_. (oude) (de)  
(aarde) \*

## Instructiebox

---

- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.

- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

51. Die Mutter (h) \_\_\_\_\_ ihrem Sohn bei  
den Hausaufgaben. (helpt) \*

## Instructiebox

---

- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

52. \_\_\_\_\_ Flugzeug fliegt von Berlin  
\_\_\_\_\_ Beirut. (Het) (naar) \*

## Instructiebox

---

- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

53. Das Mädchen (h) \_\_\_\_\_ eine Dose  
Pralinen aus der Tasche. (haalt) \*

## Instructiebox

---

- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)

- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

54. Der Sohn (g)\_\_\_\_\_ seiner Mutter  
einen Becher Milch. (geeft) \*

## Instructiebox

---

- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

55. Der Naturliebhaber fotografiert den  
(E)\_\_\_\_\_. (ijsbeer) \*

## Instructiebox

---

- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

56. Die Schokolade (s)\_\_\_\_\_ in der  
heißen Milch. (smelt) \*

## Instructiebox

---



- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

57. Der Junge (g)\_\_\_\_\_ mit seinem  
Großvater in den Wald. (gaat) \*

## Instructiebox

---

- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

58. Der Student (f)\_\_\_\_\_ immer mit der  
Metro zur Universität. (rijdt) \*

## Instructiebox

---

- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

59. Der Räuber (s)\_\_\_\_\_ das Gold von  
den Kaufleuten. (steelt) \*

## Instructiebox

---

- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Pauze

Als je wilt mag je nu even tijd nemen voor een kleine pauze...



## Experiment

60. Peter liegt im \_\_\_\_\_ Gras und zählt  
\_\_\_\_\_ Wolken am (H) \_\_\_\_\_.  
(groene) (de) (hemel) \*

## Instructiebox

---

- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'



- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

61. Der Tourist \_\_\_\_\_ Spaghetti mit  
Pesto im italienischen Restaurant. (eet) \*

## Instructiebox

---

- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

62. Christoph (h) \_\_\_\_\_ die Tochter des  
Bürgermeisters. (trouwt met...) \*

## Instructiebox

---

- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

63. Der Chauffeur (s) \_\_\_\_\_ die Tram im  
Spiegel. (ziet) \*

## Instructiebox

---

- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???

- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

64. Der Wikinger (s)\_\_\_\_\_ Bier aus  
einem Horn. (zuipt) \*

## Instructiebox

- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

65. Lisa schneidet mit \_\_\_\_\_ Schere ein  
(L)\_\_\_\_\_ in den Pullover. (de) (gat) \*

## Instructiebox

- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

66. Der Pirat (w)\_\_\_\_\_ die  
Flaschenpost in den Ozean. (werpt /  
gooit) \*

## Instructiebox

- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)

- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

67. Max schaut sich einen \_\_\_\_\_ Film  
an. (Amerikaanse) \*

## Instructiebox

---

- Vul de zinnnetjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

68. Der Bandit (v) \_\_\_\_\_ das gestohlene  
Auto im Wald. (verbergt) \*

## Instructiebox

---

- Vul de zinnnetjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

69. Die Kuh \_\_\_\_\_ im Stall und wird  
gemolken. (staat) \*

## Instructiebox

---

- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

70. \_\_\_\_ Bäcker präsentiert \_\_\_\_ herrliche  
(T) \_\_\_\_\_. (De) (een) (taart) \*

## Instructiebox

---

- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

71. Der Vater (b) \_\_\_\_ das Stockbrot in  
zwei Stücke. (breekt) \*

## Instructiebox

---

- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

72. \_\_\_\_ frische Wasser ist für das  
(P) \_\_\_\_\_. (Het) (paard) \*

## Instructiebox

---

- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

73. Robin Hood (t) \_\_\_\_\_ den Sherriff  
mit dem Pfeil. (treft / raakt) \*

## Instructiebox

---

- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

74. Der Mann (b) \_\_\_\_\_ die Rechnung  
im Restaurant. (betaalt) \*

## Instructiebox

---

- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

75. \_\_\_\_\_ Student kratzt sich an der  
(N)\_\_\_\_\_. (De) (neus) \*

## Instructiebox

---

- Vul de zinnnetjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

76. Der Politiker (t)\_\_\_\_\_ auf die Bühne  
und hält eine Rede. (treedt) \*

## Instructiebox

---

- Vul de zinnnetjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

77. Der (R)\_\_\_\_\_ ist so groß wie \_\_\_\_\_  
Elefant. (reus) (een) \*

## Instructiebox

---

- Vul de zinnnetjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß



## Experiment

78. Linda (m) \_\_\_\_\_ einen großen  
Schneemann. (maakt) \*

## Instructiebox

---

- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

79. Die Prinzessin (s) \_\_\_\_\_ 100 Jahre  
lang. (slaapt) \*

## Instructiebox

---

- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

80. Die Pflanze (s) \_\_\_\_\_ auf dem Acker  
durch die Pestizide. (sterft) \*

## Instructiebox

---

- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'

- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

81. Die Wäscheleine mit der (s) \_\_\_\_\_  
 Wäsche hängt (z) \_\_\_\_\_ den  
 Bäumen. (propere) (tussen) \*

## Instructiebox

- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

82. Der Lehrer (t) \_\_\_\_\_ die Bücher in  
 die Schulbibliothek. (draagt) \*

## Instructiebox

- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

83. Der (j) \_\_\_\_\_ Vogel öffnet die Frucht  
 mit seinem (S) \_\_\_\_\_. (jonge)  
 (snavel) \*

## Instructiebox

- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!



- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Pauze

Je kunt nu weer een kleine pauze nemen. Je zit alvast in de helft.



## Experiment

84. Die Giraffe (f) \_\_\_\_\_ am liebsten  
Blätter. (eet) \*

## Instructiebox

- Vul de zinnnetjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.

- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

85. Der (T)\_\_\_\_\_ befindet sich in der  
(K)\_\_\_\_\_ auf dem Herd. (pan /  
kookpot) (keuken) \*

## Instructiebox

---

- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

86. Der Lehrer (v)\_\_\_\_\_ die Lösung des  
Rätsels. (verraadt) \*

## Instructiebox

---

- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

87. Die Großmutter näht \_\_\_\_\_ Pullover für  
die (P)\_\_\_\_\_. (een) (pop) \*

## Instructiebox

---

- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

88. Die Köchin (b) \_\_\_\_\_ das Gemüse  
mit dem Reis in der Wok-Pfanne. (braadt)

\*

## Instructiebox

- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

89. Der Arbeiter holt (w) \_\_\_\_\_ der  
Pause \_\_\_\_\_ Sandwich. (tijdens) (een) \*

## Instructiebox

- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

90. Marijke (s) \_\_\_\_\_ mit dem Kopf  
gegen die Lampe. (stoot) \*

## Instructiebox

---

- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

91. Der Mann (b)\_\_\_\_\_ eine neue  
Bohrmaschine. (krijgt) \*

## Instructiebox

---

- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

92. Das kleine Kind (g)\_\_\_\_\_ einen  
Kanal um seine Sandburg. (graaft) \*

## Instructiebox

---

- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

93. Der \_\_\_\_\_ liegt \_\_\_\_\_ dem  
 \_\_\_\_\_ auf der Matte. (hond) (vóór)  
 (huis) \*

## Instructiebox

- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

94. Der Löwe \_\_\_\_\_ das Zebra, aber  
 das Zebra ist zu schnell. (jaagt) \*

## Instructiebox

- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

95. Das kleine Mädchen mag \_\_\_\_\_  
 freundlichen (B) \_\_\_\_\_ sehr. (de)  
 (boer) \*

## Instructiebox

- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß



## Experiment

96. Der Tennisspieler (s)\_\_\_\_\_ den Ball  
ins Aus und verliert das Turnier. (slaat) \*

## Instructiebox

---

- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

97. Der Patient (n)\_\_\_\_\_ ein  
Medikament gegen Husten. (neemt) \*

## Instructiebox

---

- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

98. Die Mutter schenkt dem Kind ein neues  
(F)\_\_\_\_\_. (fiets) \*

## Instructiebox

---

- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'

- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

99. Der Wind (b)\_\_\_\_\_ die Blätter vom Baum. (blaast) \*

## Instructiebox

---

- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

100. Der Vogel \_\_\_\_\_ ein Nest aus Stroh und Zweigen. (bouwt) \*

## Instructiebox

---

- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

101. Der Professor (s) \_\_\_\_\_ mit den Studenten über die Krise. (spreekt) \*

## Instructiebox

---

- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???

- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

102. Das Mädchen (k)\_\_\_\_\_ ein Eis beim  
Kiosk. (koopt) \*

## Instructiebox

---

- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

103. Frau Meiers \_\_\_\_\_ ist gebrochen.  
(voet) \*

## Instructiebox

---

- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

104. Der Politiker (w)\_\_\_\_\_ für seine  
Partei. (werft) \*

## Instructiebox

---

- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!



- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

105. Der Farmer (I) \_\_\_\_\_ die Melonen  
auf den Wagen. (laadt) \*

## Instructiebox

---

- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

106. \_\_\_\_\_ Kaninchen lebt in einer  
(H) \_\_\_\_\_. (Het) (hol) \*

## Instructiebox

---

- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

107. Die Mutter (s) \_\_\_\_\_ ihr Kind auf den  
Stuhl und bringt das Essen. (zet) \*

## Instructiebox

---

- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Pauze

Je hebt al 3/4 achter de rug! Als je wilt mag je nu weer even een korte pauze nemen. Je bent bijna klaar hoor!



## Experiment

108. Das böse Monster (f) \_\_\_\_\_ 43 kg  
 Pudding, 12 kg Milchreis, 15 Bratwürste  
 und 9 Dosen Thunfisch. (vreet) \*

## Instructiebox

- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

109. Der \_\_\_\_\_ mag am liebsten  
 Bananen, Trauben und \_\_\_\_\_. (aap)  
 (kaas) \*

## Instructiebox

---

- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

110. Lena (w) \_\_\_\_\_ ihr Haar in der  
Dusche mit Shampoo. (wast) \*

## Instructiebox

---

- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

111. Die Verkäuferin (e) \_\_\_\_\_ den Film  
mit Julia Roberts. (beveelt... aan) \*

## Instructiebox

---

- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

112. Der Astronaut landet auf \_\_\_\_\_ Mond und steckt eine (F) \_\_\_\_\_ in \_\_\_\_\_ Boden. (de) (vlag) (de) \*

## Instructiebox

---

- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

113. Der \_\_\_\_\_ Junge steckt eine (N) \_\_\_\_\_ in seinen Mund. (blonde) (noot) \*

## Instructiebox

---

- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

114. Herr Müller (s) \_\_\_\_\_ einen Roman. (schrijft) \*

## Instructiebox

---

- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

115. Die kleine Prinzessin (v) \_\_\_\_\_ ihre  
Krone im Badezimmer. (vergeet) \*

## Instructiebox

---

- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

116. Anna (k) \_\_\_\_\_ eine leckere Suppe  
für ihre Oma. (kookt) \*

## Instructiebox

---

- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

117. Der Taxifahrer (h) \_\_\_\_\_ den Mantel  
der Dame in der Hand. (houdt) \*

## Instructiebox

---

- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'



- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

118. \_\_\_\_\_ Semester dauert von September  
(b) \_\_\_\_\_ Januar. (Het) (tot) \*

## Instructiebox

---

- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

119. Der schlaue (F) \_\_\_\_\_ sucht \_\_\_\_\_  
Eingang des Hühnerstalls. (vos) (de) \*

## Instructiebox

---

- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

120. Die Pflanze (w) \_\_\_\_\_ sehr schnell,  
wenn sie genug Licht bekommt. (groeit) \*

## Instructiebox

---

- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???

- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

121. Der Patient (w) \_\_\_\_\_ auf den Arzt.  
(wacht) \*

## Instructiebox

---

- Vul de zinnnetjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

122. Der Architekt (m) \_\_\_\_\_ die Länge  
des Daches. (meet) \*

## Instructiebox

---

- Vul de zinnnetjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

123. Der Matrose (v) \_\_\_\_\_ das Schiff  
und geht an Land. (verlaat) \*

## Instructiebox

---

- Vul de zinnnetjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!

- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

124. \_\_\_\_\_ Schlüssel liegt (u) \_\_\_\_\_ der  
Matte. (De) (onder) \*

## Instructiebox

---

- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

125. Die Frau (t) \_\_\_\_\_ mit ihrem Tango-  
Lehrer. (danst) \*

## Instructiebox

---

- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

126. Der mutige Ritter (s) \_\_\_\_\_ den  
Drachen mit der Lanze. (steekt) \*

## Instructiebox

---



- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

127. „Shrek“ ist ein Film über einen  
(I)\_\_\_\_\_ (O)\_\_\_\_\_. (lieve)  
(oger) \*

## Instructiebox

- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

128. Der Jäger (f)\_\_\_\_\_ den Tiger und  
bringt ihn in den Zoo. (vangt) \*

## Instructiebox

- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

129. Jennifer mag am liebsten Fritten  
(o)\_\_\_\_\_ Mayonnaise. (zonder) \*

## Instructiebox

---

- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

130. Der Junge (z) \_\_\_\_\_ seinem Freund  
das neue Skateboard. (toont / laat... zien)

\*

Umlauten: ä - ö - ü - ß

## Instructiebox

---

- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

131. Der neue Lehrling (f) \_\_\_\_\_ dem  
Chefkoch in den Weinkeller. (volgt) \*

Umlauten: ä - ö - ü - ß

## Instructiebox

---

- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???
- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Experiment

132. Der \_\_\_\_\_ vermeidet die  
(g) \_\_\_\_\_ Straße. (fietser)  
(gevaarlijke) \*

## Instructiebox

---

- Vul de zinnestjes aan met het ontbrekende Duitse woord (inclusief eerste letter)
- Gebruik geen hulpmiddelen!
- Vul je antwoorden zo spoedig en zo spontaan mogelijk in!
- Als je het niet zeker weet, vul dan je eerste gedachte in.
- Als je het écht niet weet, schrijf dan: ???

- Schrijf Umlauten desnoods als Umlaut + klinker
- Schrijf Beta (ß) desnoods als 'ss'
- ...of kopieer ze hier: ä - ö - ü - ß

## Klaar!

---

Je bent nu helemaal klaar met het invullen van deze pilotstudie. Het enige dat je zo dadelijk nog moet doen is op "Verzenden" klikken.

Heel hartelijk bedankt voor je deelname! Je hebt hiermee een belangrijke bijdrage geleverd aan ons onderzoek.

Als je nog vragen of opmerkingen hebt, kun je ze hieronder vermelden of via e-mail sturen naar Eva Koch ([e.koch@student.ru.nl](mailto:e.koch@student.ru.nl)).

Als je nog mensen kent die voor deze studie in aanmerking komen, aarzel dan niet om hen van deze studie op de hoogte te brengen. Ze kunnen dan gewoon een e-mail sturen ([e.koch@student.ru.nl](mailto:e.koch@student.ru.nl)).

Vergeet niet om hieronder op "Verzenden" te klikken!

### 133. Plaats voor opmerkingen:

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Mogelijk gemaakt door  
 Google Forms

## Appendix D. Pilot study: Error codes for all test items

ERROR CODES:			
Item type	Error code	Signification	Example
<b>Critical verbs:</b>	0	no error	<i>blasen</i>
	1	phonologically correct, but orthographic error	bläst
	2	correct stem vowel (orth.), but other error	bleest
	3	correct stem vowel (phon.), but other error	bläset
	4	expected stem-vowel error (no vowel change), orth./phon.	bleeset
	5	other stem-vowel error (orth./phon.)	blast, blaast
	6	expected stem-vowel error and other error (orth./phon.)	bliest
	7	other stem-vowel error and other error (orth./phon.)	blaset
	8	wrong verb	blieset
	9	no response	pust
<b>Filler verbs:</b>	0	no error	???
	1	phonologically correct, but orthographic error	<i>folgen</i>
	2	correct stem vowel (orth.), but other error	folgt
	3	correct stem vowel (phon.), but other error	folkt
	4	expected stem-vowel error (overgeneralized vowel change), orth./phon.	folget
	5	other stem-vowel error (orth./phon.)	fohlget
	6	expected stem-vowel error and other error (orth./phon.)	fölgt, föllgt
	7	other stem-vowel error and other error (orth./phon.)	fulgt
	8	wrong verb	fölget
	9	no response	fulget
<b>Nouns &amp; adjectives:</b>	0	no error	läuft
	1	phonologically correct, but orthographic error	läuft
	2	correct noun/adjective, but declension error	läuft
	3	correct noun/adjective, but different error	läuft
	4	wrong noun	läuft
	5	no response	???
<b>Prepositions:</b>	0	no error	<i>Radfahrer</i>
	1	correct preposition, but error	Radfahrer
	2	wrong preposition	Radfarer
	3	no response	Radfahrern
<b>Determiners:</b>	0	no error	Rädfahrer
	1	error	Rader
	2	no response	???

#### Appendix E. Pilot study: Percentages of error types for critical items

The table on the following page contains the percentages of the different types of errors committed per critical item, as tested in the pilot study. The calculation of the percentages is based on the final sample of 42 participants. The resulting percentages were used as an indicator of the degree of difficulty of the different verbs. ‘Fressen (1)’ refers to the Dutch translation ‘eten’, while ‘fressen (2)’ refers to the Dutch translation ‘vreten’. Some of the columns display the merged percentages of different meaningful error type combinations:

0 & 1: no error (phonologically)

0, 1, 2 & 3: no stem-vowel error

4 & 6: expected stem-vowel error

5 & 7: different stem-vowel error

7, 8 & 9: target verb unknown

Critical item	0	1	0 & 1	2	3	0, 1, 2 & 3	4	5	6	4 & 6	7	5 & 7	8	9	7, 8 & 9
blasen	38.10	2.38	40.48	0.00	0.00	40.48	23.81	9.52	0.00	23.81	0.00	9.52	4.76	21.43	26.19
braten	11.90	4.76	16.67	4.76	0.00	21.43	23.81	0.00	45.24	69.05	0.00	0.00	2.38	7.14	9.52
brechen	61.90	0.00	61.90	2.38	0.00	64.29	28.57	2.38	0.00	28.57	0.00	2.38	2.38	2.38	4.76
empfangen	40.48	2.38	42.86	7.14	0.00	50.00	11.90	0.00	11.90	23.81	0.00	0.00	14.29	11.90	26.19
empfehlen	11.90	0.00	11.90	0.00	0.00	11.90	50.00	9.52	2.38	52.38	0.00	9.52	19.05	7.14	26.19
essen	76.19	0.00	76.19	0.00	0.00	76.19	23.81	0.00	0.00	23.81	0.00	0.00	0.00	0.00	0.00
fahren	52.38	0.00	52.38	0.00	0.00	52.38	45.24	0.00	0.00	45.24	0.00	0.00	2.38	0.00	2.38
fallen	45.24	4.76	50.00	4.76	2.38	57.14	40.48	0.00	0.00	40.48	0.00	0.00	0.00	2.38	2.38
fangen	78.57	0.00	78.57	2.38	0.00	80.95	16.67	0.00	2.38	19.05	0.00	0.00	0.00	0.00	0.00
fressen (1)	33.33	0.00	33.33	2.38	0.00	35.71	14.29	0.00	0.00	14.29	0.00	0.00	30.95	19.05	50.00
fressen (2)	45.24	2.38	47.62	0.00	0.00	47.62	26.19	0.00	0.00	26.19	0.00	0.00	14.29	11.90	26.19
geben	76.19	2.38	78.57	0.00	0.00	78.57	19.05	0.00	0.00	19.05	0.00	0.00	0.00	2.38	2.38
graben	26.19	0.00	26.19	0.00	0.00	26.19	21.43	0.00	2.38	23.81	0.00	0.00	23.81	26.19	50.00
halten	30.95	2.38	33.33	2.38	0.00	35.71	26.19	0.00	30.95	57.14	0.00	0.00	2.38	4.76	7.14
helfen	88.10	7.14	95.24	2.38	2.38	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
laden	21.43	2.38	23.81	4.76	0.00	28.57	2.38	0.00	50.00	52.38	0.00	0.00	4.76	14.29	19.05
lassen	33.33	4.76	38.10	0.00	0.00	38.10	52.38	0.00	2.38	54.76	0.00	0.00	4.76	2.38	7.14
laufen	40.48	0.00	40.48	0.00	0.00	40.48	54.76	0.00	2.38	57.14	0.00	0.00	2.38	0.00	2.38
lesen	69.05	9.52	78.57	0.00	0.00	78.57	19.05	0.00	0.00	19.05	0.00	0.00	2.38	0.00	2.38
messen	26.19	2.38	28.57	0.00	0.00	28.57	26.19	4.76	2.38	28.57	2.38	7.14	11.90	23.81	38.10
nehmen	95.24	2.38	97.62	2.38	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
saufen	30.95	2.38	33.33	2.38	0.00	35.71	45.24	0.00	9.52	54.76	0.00	0.00	2.38	7.14	9.52
schlafen	50.00	0.00	50.00	2.38	0.00	52.38	35.71	0.00	7.14	42.86	0.00	0.00	4.76	0.00	4.76
schlagen	35.71	2.38	38.10	11.90	0.00	50.00	14.29	0.00	2.38	16.67	0.00	0.00	16.67	16.67	33.33
schmelzen	11.90	0.00	11.90	0.00	0.00	11.90	26.19	0.00	4.76	30.95	0.00	0.00	40.48	16.67	57.14
sehen	61.90	0.00	61.90	2.38	0.00	64.29	35.71	0.00	0.00	35.71	0.00	0.00	0.00	0.00	0.00
sprechen	80.95	0.00	80.95	2.38	0.00	83.33	14.29	0.00	2.38	16.67	0.00	0.00	0.00	0.00	0.00
stechen	42.86	0.00	42.86	0.00	0.00	42.86	11.90	2.38	0.00	11.90	0.00	2.38	35.71	7.14	42.86
stehlen	19.05	11.90	30.95	2.38	0.00	33.33	59.52	0.00	0.00	59.52	0.00	0.00	2.38	4.76	7.14
sterben	47.62	0.00	47.62	9.52	4.76	61.90	19.05	9.52	4.76	23.81	2.38	11.90	0.00	2.38	4.76
stoßen	26.19	2.38	28.57	0.00	0.00	28.57	23.81	0.00	2.38	26.19	0.00	0.00	23.81	21.43	45.24
tragen	69.05	0.00	69.05	2.38	0.00	71.43	23.81	0.00	2.38	26.19	0.00	0.00	2.38	0.00	2.38
treffen	64.29	7.14	71.43	2.38	0.00	73.81	16.67	0.00	0.00	16.67	0.00	0.00	4.76	4.76	9.52
treten	42.86	2.38	45.24	0.00	0.00	45.24	9.52	7.14	14.29	23.81	4.76	11.90	2.38	16.67	23.81
verbergen	28.57	2.38	30.95	0.00	0.00	30.95	11.90	0.00	2.38	14.29	2.38	2.38	26.19	26.19	54.76
vergessen	66.67	0.00	66.67	0.00	0.00	66.67	28.57	0.00	4.76	33.33	0.00	0.00	0.00	0.00	0.00
verlassen	28.57	0.00	28.57	0.00	0.00	28.57	47.62	0.00	7.14	54.76	0.00	0.00	7.14	9.52	16.67
verraten	23.81	7.14	30.95	9.52	0.00	40.48	16.67	0.00	33.33	50.00	0.00	0.00	2.38	7.14	9.52
wachsen	23.81	0.00	23.81	0.00	0.00	23.81	40.48	0.00	7.14	47.62	0.00	0.00	7.14	21.43	28.57
waschen	33.33	0.00	33.33	0.00	0.00	33.33	45.24	0.00	0.00	45.24	0.00	0.00	21.43	0.00	21.43
werben	7.14	2.38	9.52	0.00	0.00	9.52	11.90	0.00	0.00	11.90	0.00	0.00	73.81	4.76	78.57
werfen	66.67	9.52	76.19	2.38	0.00	78.57	14.29	2.38	0.00	14.29	0.00	2.38	2.38	2.38	4.76

## Appendix F. Main experiment: Background questionnaire in *Google Forms*

6/1/2016

Vragenlijst bij het experiment

### Vragenlijst bij het experiment

Beste deelnemer,

Voor je aan het experiment begint, zouden we je nog even een paar korte vragen over jezelf en je taalachtergrond willen stellen.

Door te klikken op "Doorgaan" geef je automatisch ook je toestemming voor het gebruik van je gegevens voor wetenschappelijke doeleinden. Dit gebeurt volledig anoniem.

**\*Vereist**

### Persoonlijke informatie

#### 1. Wat is je leeftijd? \*

.....

#### 2. Wat is je geslacht? \*

.....

#### 3. E-mailadres

Je hoeft je e-mailadres enkel op te geven als je achteraf graag op de hoogte zou blijven van ons onderzoek.

.....

#### 4. Wat is je hoogst behaalde diploma? \*

Markeer slechts één ovaal.

- ☐ Secundair onderwijs
- ☐ Professionele bachelor
- ☐ Academische bachelor
- ☐ Bachelor-na-bachelor
- ☐ Master
- ☐ Master-na-master
- ☐ PhD
- ☐ Anders: .....

#### 5. Wat studeer je of wat heb je gestudeerd? \*

.....

**Als je studeert:** \_\_\_\_\_



**6. In welk jaar zit je?***Markeer slechts één ovaal.*

- ☐ Bachelor - jaar 1
- ☐ Bachelor - jaar 2
- ☐ Bachelor - jaar 3
- ☐ Master - jaar 1
- ☐ Master - jaar 2
- ☐ Anders: .....

**Als je niet studeert:**

---

**7. Wat is je huidige beroep?**

.....

**Informatie over je taalachtergrond****8. Wat is jouw moedertaal? \***

Als je meer dan één moedertaal hebt kun je ook meer dan één optie aanvinken en indien nodig gebruik maken van de optie 'Andere...'.  
*Vink alle toepasselijke opties aan.*

- ☐ Nederlands (NL)
- ☐ Nederlands (BE)
- ☐ Duits
- ☐ Anders: .....

**9. Uit welke regio ben je afkomstig? \***

.....

**10. Spreek je vaak met een regionaal accent of spreek je een dialect? En zo ja, het welke? \***

.....

**11. Heb je dyslexie of leesproblemen? \****Markeer slechts één ovaal.*

- ☐ Ja, ik ben gediagnosticeerd met dyslexie
- ☐ Ja, ik heb leesproblemen, maar ik ben niet officieel gediagnosticeerd met dyslexie
- ☐ Ja, ik heb leesproblemen anders dan dyslexie
- ☐ Nee, ik heb geen dyslexie of andere leesproblemen

12. Hoeveel jaar heb je Duitse les gehad op school? \*

---

13. Hoeveel uren Duitse les per week waren dat gemiddeld? \*

---

### Als je in Nederland naar school bent gegaan:

14. Heb je Duits als eindexamenvak gehad?

Markeer slechts één ovaal.

- ☐ Ja  
☐ Nee

15. Zo ja: wat was je cijfer?

---

### Andere:

16. Hoelang heb je via andere instellingen Duitse les gevolgd? \*

Markeer slechts één ovaal per rij.

	0 jaar	Enkele weken	Enkele maanden	1 jaar	2 jaar	3 jaar	4 jaar	5 jaar of meer
Avondschool	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Studie Duits aan universiteit of hogeschool	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Duits als keuzevak tijdens je studies aan universiteit of hogeschool	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Intensieve taalcursus	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Duolingo of andere apps	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

17. Heb je ooit gedurende een langere periode in een Duitstalige omgeving verbleven? Zo ja, licht kort toe hoe lang, waar, en in welke context.

---

18. Op welke leeftijd ben je voor het eerst intensief met de Duitse taal in contact gekomen? \*

---

**19. Hoe is dat gebeurd? \****Markeer slechts één ovaal.*

- ☐ Familie
- ☐ School
- ☐ Studie
- ☐ Anders: \_\_\_\_\_

**20. Hoe vaak gebruik je Duits in het algemeen? \****Markeer slechts één ovaal.*

	1	2	3	4	5	
zeer zelden	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	zeer vaak

**21. Hoe goed is jouw Duits in het algemeen? \****Markeer slechts één ovaal.*

	1	2	3	4	5	
heel slecht	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	heel goed

**22. Hoe goed is volgens jou je geschreven Duits? \****Markeer slechts één ovaal.*

	1	2	3	4	5	
heel slecht	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	heel goed

**23. Hoe goed is volgens jou je mondelinge Duits? \****Markeer slechts één ovaal.*

	1	2	3	4	5	
heel slecht	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	heel goed

**24. Hoe goed kun jij gesproken Duits begrijpen? \****Markeer slechts één ovaal.*

	1	2	3	4	5	
heel slecht	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	heel goed

**25. Hoe goed kun jij geschreven Duits begrijpen? \****Markeer slechts één ovaal.*

	1	2	3	4	5	
heel slecht	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	heel goed

26. Heb je nog opmerkingen in verband met je gebruik en je leerproces van de Duitse taal?

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## Andere vreemde talen

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Heb je nog andere vreemde talen geleerd? Zo ja, welke?

Hieronder kun je informatie geven over (maximaal) 3 andere vreemde talen. Begin met de andere vreemde taal die je het beste beheerst.

## Andere vreemde taal 1:

---

27. Over welke taal gaat het?

---

28. Beheers je deze taal beter of slechter dan Duits?

*Markeer slechts één ovaal.*

- ☐ beter
- ☐ slechter
- ☐ even goed

## Andere vreemde taal 2:

---

29. Over welke taal gaat het?

---

30. Beheers je deze taal beter of slechter dan Duits?

*Markeer slechts één ovaal.*

- ☐ beter
- ☐ slechter
- ☐ even goed

## Andere vreemde taal 3:

---

31. Over welke taal gaat het?

---

**32. Beheers je deze taal beter of slechter dan Duits?***Markeer slechts één ovaal.*

- ☐ beter
- ☐ slechter
- ☐ even goed

**Persoonlijke voorkeuren****33. Hou jij van dieren? \****Markeer slechts één ovaal.*

	1	2	3	4	5	
helemaal niet	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	heel veel

**34. Hou jij eerder van het leven in de natuur of ben jij een stadsmens? \****Markeer slechts één ovaal.*

- ☐ Natuur
- ☐ Stad

**35. Vind jij de bescherming van het milieu een belangrijke kwestie? \****Markeer slechts één ovaal.*

	1	2	3	4	5	
helemaal onbelangrijk	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	heel belangrijk

**36. Vind jij de gelijkheid tussen man en vrouw een belangrijke kwestie? \****Markeer slechts één ovaal.*

	1	2	3	4	5	
helemaal onbelangrijk	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	heel belangrijk

**37. Ga jij graag op reis? \****Markeer slechts één ovaal.*

- ☐ Ja
- ☐ Nee, ik blijf liever lekker thuis

**38. Naar waar ga jij graag op reis? \****Markeer slechts één ovaal.*

- ☐ Zon en strand
- ☐ Natuur, bossen en bergen
- ☐ Citytrips
- ☐ Anders: \_\_\_\_\_

**39. Hou jij eerder van zoete desserts of van hartig eten? \****Markeer slechts één ovaal.*

- ☐ Zoet  
☐ Hartig

**40. Kijk jij graag naar misdaadseries of krimi's? \****Markeer slechts één ovaal.*

- ☐ Ja  
☐ Nee

**41. Lees jij graag fantasyliteratuur? \****Markeer slechts één ovaal.*

- ☐ Ja  
☐ Nee

**42. Ziet dit personage er volgens jou sympathiek uit? \****Markeer slechts één ovaal.*

	1	2	3	4	5	
helemaal niet sympathiek	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	heel sympathiek



43. Ziet dit personage er volgens jou sympathiek uit? \*

*Markeer slechts één ovaal.*

	1	2	3	4	5	
helemaal niet sympathiek	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	heel sympathiek



44. Ziet dit personage er volgens jou sympathiek uit? \*

*Markeer slechts één ovaal.*

	1	2	3	4	5	
helemaal niet sympathiek	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	heel sympathiek





45. Ziet dit personage er volgens jou sympathiek uit? \*

*Markeer slechts één ovaal.*

	1	2	3	4	5	
helemaal niet sympathiek	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	heel sympathiek



46. Ziet dit personage er volgens jou sympathiek uit? \*

*Markeer slechts één ovaal.*

	1	2	3	4	5	
helemaal niet sympathiek	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	heel sympathiek



47. Ziet dit personage er volgens jou sympathiek uit? \*

*Markeer slechts één ovaal.*

	1	2	3	4	5	
helemaal niet sympathiek	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	heel sympathiek



48. Ziet dit personage er volgens jou sympathiek uit? \*

*Markeer slechts één ovaal.*

	1	2	3	4	5	
helemaal niet sympathiek	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	heel sympathiek



49. Ziet dit personage er volgens jou sympathiek uit? \*

*Markeer slechts één ovaal.*

	1	2	3	4	5	
helemaal niet sympathiek	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	heel sympathiek



**Klaar!**

---

Je bent klaar met het invullen van deze vragenlijst.

Klik nu hieronder op "Verzenden".

6/1/2016

Vragenlijst bij het experiment



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Mogelijk gemaakt door  
 Google Forms

## Appendix G. Main experiment: Error codes

ERROR CODES FOR CRITICAL AND CONTROL VERBS			
Error code	Signification	Example <b>critical</b>	Example <b>control</b>
		<i>graben</i>	<i>fegen</i>
0	no error	er gräbt	er fegt
1	correct stem vowel, but other error	er gräbet	er feget
2	expected stem-vowel error (but no other errors)	er grabt	er fiegt
3	other stem-vowel error (but no other errors)	er grubt	er fugt
4	expected stem-vowel error and other error	er grabet	er fieget
5	other stem-vowel error and other error	er grubet	er fuget
6	wrong verb	er macht	er putzt
7	no response		
F	filler item		
L	escape (doubts; check later)		



#### Appendix H. Main experiment: List of all test items

The table on the following pages lists all critical, control, and filler items. Some columns require some extra explanations: “Class” refers to verb class (weak, strong or irregular conjugation); “Cognate” indicates whether the item is cognate with a corresponding Dutch word; “Length” refers to the quantitative length of the stem vowel. “Structure” indicates the sentence structure that was used for the specific items in this experiment; we used the following abbreviations: S = subject; V = verb; OA = accusative object; OD = dative object; PP = prepositional phrase (case marking depends on preposition); ITR = intransitive verb. “Preposition(s)” refers to the prepositions that were presented in the trials in addition to a specific verb. “Syllables” indicates the number of syllables of the infinitive; “Complexity” indicates whether a specific infinitive was considered simple or complex (for compounds).

The list also gives information about the error scores as determined by means of the pilot study, but only for critical items.

We selected control verbs that had the same stem vowel in the infinitive as the critical items. Additionally, we also integrated four items having an *o* as stem vowel. Although we were using no *o-ö* vowel change items in the set of critical items, participants may still overgeneralize the vowel change to these control items. In addition, this might help to conceal our systematic usage of critical verbs with the stem vowels *a* and *e*.

Verb	Item type	Set	Class	Frequency (Mann)	Cognate	Dutch translation	Stem vowel	Length	Vowel change	Structure	Preposition(s)	Syllables	Complexity
fangen	critical	set A	strong	427	yes	vangen	a	short	a-ä	S + V + OA + PP	mit	2	Simple
vergessen	critical	set A	strong	837	yes	vergeten	e	short	e-i	S + V + OA + PP	in	3	Simple
geben	critical	set A	strong	10290	yes	geven	e	long	e-i	S + V + OD + OA		2	Simple
tragen	critical	set A	strong	1984	yes	dragen	a	long	a-ä	S + V + OA + PP	in	2	Simple
fahren	critical	set A	strong	2884	no	rijden	a	long	a-ä	ITR: S + V + PP + PP	mit, zu	2	Simple
werfen	critical	set A	strong	902	yes	werpen, gooien	e	short	e-i	S + V + OA + PP	in	2	Simple
schlafen	critical	set A	strong	399	yes	slapen	a	long	a-ä	ITR: S + V + PP + PP	auf, in	2	Simple
lassen	critical	set A	strong	5577	yes	laten	a	short	a-ä	S + V + OA + PP	in	2	Simple
stehlen	critical	set A	strong	144	yes	stelen	e	long	e-i	S + V + OA + PP	aus	2	Simple
treffen	critical	set A	strong	1523	yes	treffen, raken	e	short	e-i	S + V + OA + PP	mit	2	Simple
saufen	critical	set A	strong	15	yes	zuipen	au	diphtong	au-äu	S + V + OA + PP	aus	2	Simple
laden	critical	set A	strong	269	yes	laden	a	long	a-ä	S + V + OA + PP	in	2	Simple
treten	critical	set A	strong	1686	yes	treden ( <i>hier: stappen</i> )	e	long	e-i	S + V + OA + PP	vor, mit	2	Simple
empfangen	critical	set A	strong	450	?	ontvangen	a	short	a-ä	S + V + OA + PP	in	3	Simple
fressen	critical	set A	strong	100	yes	vreten	e	short	e-i	S + V + OA + PP	in	2	Simple
wachsen	critical	set A	strong	531	no	groeien	a	short	a-ä	ITR: S + V + PP + PP	in, neben	2	Simple
sprechen	critical	set B	strong	3598	yes	spreken	e	short	e-i	ITR: S + V + PP + PP	mit, über	2	Simple
essen	critical	set B	strong	400	yes	eten	e	short	e-i	S + V + OA + PP	mit	2	Simple
sehen	critical	set B	strong	6771	yes	zien	e	long	e-i	S + V + OA + PP	in	2	Simple
lesen	critical	set B	strong	944	yes	lezen	e	long	e-i	S + V + OA + PP	in	2	Simple
fallen	critical	set B	strong	1668	yes	vallen	a	short	a-ä	ITR: S + V + PP + PP	aus, in	2	Simple
laufen	critical	set B	strong	1290	yes	lopen	au	diphtong	au-äu	ITR: S + V + PP + PP	von, zu	2	Simple
sterben	critical	set B	strong	858	yes	sterven	e	short	e-i	ITR: S + V + PP + PP	in, durch	2	Simple
brechen	critical	set B	strong	361	yes	breken	e	short	e-i	S + V + OA + PP	mit	2	Simple
halten	critical	set B	strong	3971	yes	houden	a	short	a-ä	S + V + OA + PP	in	2	Simple
verraten	critical	set B	strong	234	yes	verraden	a	long	a-ä	S + V + OD + OA		3	Complex (ver-)
braten	critical	set B	strong	13	yes	braden	a	long	a-ä	S + V + OA + PP	in	2	Simple
waschen	critical	set B	strong	118	yes	wassen	a	short	a-ä	S + V + OA + PP	mit	2	Simple
blasen	critical	set B	strong	85	yes	blazen	a	long	a-ä	S + V + OA + PP	in	2	Simple
empfehlen	critical	set B	strong	382	?	aanbevelen	e	long	e-i	S + V + OA + PP	mit	3	Simple
schlagen	critical	set B	strong	1331	yes	slaan	a	long	a-ä	S + V + OA + PP	mit	2	Simple
messen	critical	set B	strong	294	yes	meten	e	short	e-i	S + V + OA + PP	mit	2	Simple

Verb	Item type	Set	Class	Frequency (Mann)	Cognate	Dutch translation	Stem vowel	Length	Vowel change	Structure	Preposition(s)	Syllables	Complexity
parken	control	set A	weak	25	yes	parkeren	a	short	none	S + V + OA + PP	vor	2	Simple
verpacken	control	set A	weak	44	yes	verpakken	a	short	none	S + V + OA + PP	in	3	Complex (ver-)
kochen	control	set A	weak	97	yes	koken	o	short	none	S + V + OA + PP	für	2	Simple
regeln	control	set A	weak	123	yes	regelen	e	long	none	S + V + OA + PP	in	2	Simple
senden	control	set A	irregular	168	yes	zenden	e	short	none	S + V + OA + PP	an	2	Simple
rennen	control	set A	irregular	172	yes	rennen	e	short	none	S + V + OA + PP	von, zu	2	Simple
tanzen	control	set A	weak	189	yes	dansen	a	short	none	ITR: S + V + PP + PP	mit, in	2	Simple
planen	control	set A	weak	381	yes	landen	a	long	none	S + V + OA + PP	mit	2	Simple
bezahlen	control	set A	weak	552	yes	betalen	a	long	none	S + V + OA + PP	in	3	Complex (be-)
kaufen	control	set A	weak	740	yes	kopen	au	diphtong	none	S + V + OA + PP	für	2	Simple
reden	control	set A	weak	906	no	praten	e	long	none	ITR: S + V + PP + PP	mit, über	2	Simple
folgen	control	set A	weak	1133	yes	volgen	o	short	none	S + V + OD + PP	in	2	Simple
brauchen	control	set A	weak	1799	no	nodig hebben	au	diphtong	none	S + V + OA + PP	für	2	Simple
setzen	control	set A	weak	2208	yes	zetten	e	short	none	S + V + OA + PP	auf	2	Simple
fragen	control	set A	weak	2461	yes	vragen	a	long	none	S + V + OA + PP	nach	2	Simple
gehen	control	set A	irregular	7302	yes	gaan	e	long	none	ITR: S + V + PP + PP	mit, zu	2	Simple
feigen	control	set B	weak	35	yes	vegen	e	long	none	S + V + OA + PP	aus	2	Simple
baden	control	set B	weak	63	yes	baden, een bad nemen	a	long	none	ITR: S + V + PP + PP	in	2	Simple
hassen	control	set B	weak	91	yes	haten	a	short	none	S + V + OA + PP	mit	2	Simple
jagen	control	set B	weak	166	yes	jagen	a	long	none	S + V + OA + PP	mit	2	Simple
klagen	control	set B	weak	169	yes	klagen	a	long	none	ITR: S + V + PP + PP	über, in	2	Simple
rauchen	control	set B	weak	186	yes	roken	au	diphtong	none	S + V + OA + PP	in	2	Simple
bestellen	control	set B	weak	304	yes	bestellen	e	short	none	S + V + OA + PP	in	3	Complex (be-)
retten	control	set B	weak	427	yes	redden	e	short	none	S + V + OA + PP	in	2	Simple
holen	control	set B	weak	716	yes	halen	o	long	none	S + V + OA + PP	aus	2	Simple
bauen	control	set B	weak	830	yes	bouwen	au	diphtong	none	S + V + OA + PP	aus	2	Simple
warten	control	set B	weak	989	yes	wachten	a	short	none	ITR: S + V + PP + PP	auf, in	2	Simple
kennen	control	set B	irregular	1449	yes	kennen	e	short	none	S + V + OA + PP	in	2	Simple
legen	control	set B	weak	1509	yes	leggen	e	long	none	S + V + OA + PP	in	2	Simple
bekommen	control	set B	strong	1523	no	krijgen	o	short	none	S + V + OA + PP	mit	3	Complex (be-)
stehen	control	set B	irregular	6771	yes	staan	e	long	none	ITR: S + V + PP + PP	in, mit	2	Simple
machen	control	set B	weak	8089	yes	maken	a	short	none	S + V + OA + PP	mit	2	Simple

Verb	Item type	Set	Class	Frequency (Mann)	Cognate	Dutch translation	Stem vowel	Length	Vowel change	Structure	Preposition(s)	Syllables	Complexity
pflanzen	filler	2x	weak	40	yes	planten	a	short	none	S + V + OA + PP	in	2	Simple
träumen	filler	2x	weak	156	?	dromen	äu	diphthong	none	ITR: S + V + PP + PP	von, mit	2	Simple
kleben	filler	2x	weak	80	yes	kleven / plakken	e	long	none	S + V + OA + PP	auf	2	Simple
begleiten	filler	2x	weak	237	yes	begeleiden	ei	diphthong	none	S + V + OA + PP	zu	3	Complex (be-)
bringen	filler	2x	irregular	3766	yes	brengen	i	short	none	S + V + OA + PP	zu	2	Simple
filmen	filler	2x	weak	40	yes	filmen	i	short	none	S + V + OA + PP	in	2	Simple
schließen	filler	2x	strong	1264	?	sluiten	i	long	none	S + V + OA + PP	in	2	Simple
schwimmen	filler	2x	strong	157	yes	zwemmen	i	short	none	ITR: S + V + PP + PP	in, mit	2	Simple
fischen	filler	2x	weak	20	yes	vissen	i	short	none	S + V + OA + PP	aus	2	Simple
rollen	filler	2x	weak	197	yes	rollen	o	short	none	ITR: S + V + PP + PP	von, zu	2	Simple
hören	filler	2x	weak	2278	yes	horen	ö	long	none	S + V + OA + PP	in	2	Simple
putzen	filler	2x	weak	64	yes	poetsen	u	short	none	S + V + OA + PP	mit	2	Simple
begrüßen	filler	2x	weak	618	yes	begroeten	ü	long	none	S + V + OA + PP	in	3	Complex (be-)
haben	filler	4x	irregular	59535	yes	hebben	a	long	none	S + V + OA + PP	mit	2	Simple
schreiben	filler	4x	strong	1824	yes	schrijven	ei	diphthong	none	S + V + OA + PP	über	2	Simple
bedienen	filler	4x	weak	206	yes	bedienen	i	long	none	S + V + OA + PP	in	3	Complex (be-)
finden	filler	4x	strong	4687	yes	vinden	i	short	none	S + V + OA + PP	in	2	Simple
fliegen	filler	4x	strong	629	yes	vliegen	i	long	none	ITR: S + V + PP + PP	von, zu	2	Simple
lieben	filler	4x	weak	582	no	houden van	i	long	none	S + V + OA + PP	mit	2	Simple
sitzen	filler	4x	irregular	1476	yes	zitten	i	short	none	ITR: S + V + PP + PP	auf, mit	2	Simple
spielen	filler	4x	weak	1960	yes	spelen	i	long	none	ITR: S + V + PP + PP	mit, in	2	Simple
trinken	filler	4x	strong	474	yes	drinken	i	short	none	S + V + OA + PP	aus	2	Simple
wohnen	filler	4x	weak	473	yes	wonen	o	long	none	ITR: S + V + PP + PP	in, mit	2	Simple
öffnen	filler	4x	weak	617	?	openen	ö	short	none	S + V + OA + PP	in	2	Simple
suchen	filler	4x	weak	2892	yes	zoeken	u	long	none	S + V + OA + PP	in	2	Simple
küssen	filler	4x	weak	184	yes	kussen	ü	short	none	S + V + OA + PP	in	2	Simple

Verb	Item type	Set	% Correct (0, 1)	% Expected vowel error (4, 6)	% Wrong verb / no answer (7, 8, 9)
fangen	critical	set A	78.57	19.05	0.00
vergessen	critical	set A	66.67	33.33	0.00
geben	critical	set A	78.57	19.05	2.38
tragen	critical	set A	69.05	26.19	2.38
fahren	critical	set A	52.38	45.24	2.38
werfen	critical	set A	76.19	14.29	4.76
schlafen	critical	set A	50.00	42.86	4.76
lassen	critical	set A	38.10	54.76	7.14
stehlen	critical	set A	30.95	59.52	7.14
treffen	critical	set A	71.43	16.67	9.52
saufen	critical	set A	33.33	54.76	9.52
laden	critical	set A	23.81	52.38	19.05
treten	critical	set A	45.24	23.81	23.81
empfangen	critical	set A	42.86	23.81	26.19
fressen	critical	set A	47.62	26.19	26.19
wachsen	critical	set A	23.81	47.62	28.57
sprechen	critical	set B	80.95	16.67	0.00
essen	critical	set B	76.19	23.81	0.00
sehen	critical	set B	61.90	35.71	0.00
lesen	critical	set B	78.57	19.05	2.38
fallen	critical	set B	50.00	40.48	2.38
laufen	critical	set B	40.48	57.14	2.38
sterben	critical	set B	47.62	23.81	4.76
brechen	critical	set B	61.90	28.57	4.76
halten	critical	set B	33.33	57.14	7.14
verraten	critical	set B	30.95	50.00	9.52
braten	critical	set B	16.67	69.05	9.52
waschen	critical	set B	33.33	45.24	21.43
blasen	critical	set B	40.48	23.81	26.19
empfehlen	critical	set B	11.90	52.38	26.19
schlagen	critical	set B	38.10	16.67	33.33
messen	critical	set B	28.57	28.57	38.10

### Appendix I. Main experiment: Trial list

The table on the following pages lists all trials and the corresponding item type: critical, control, or filler item; input or no-input item, and whether the trial represents a pretest (T1), first experimenter input, second experimenter input, or a posttest (T2). The abbreviation “pp” in the “person” column stands for ‘participant’, while “con” (confederate) refers to the experimenter. There is a legend at the end of the list.



trial#	person	item type	item description	trial#	person	item type	item description
1	con	filler2-1	exposure 1	61	con	filler4-2	exposure 4
2	pp	filler2-2	production 1	62	pp	critical-no-input-4	pretest
3	con	filler4-1	exposure 1	63	con	control-input-4	exposure 1
4	pp	critical-no-input-1	pretest	64	pp	control-no-input-5	pretest
5	con	filler4-2	exposure 1	65	con	critical-input-4	exposure 2
6	pp	control-input-1	pretest	66	pp	filler4-4	production 1
7	con	filler2-1	exposure 2	67	con	filler4-3	exposure 3
8	pp	critical-input-1	pretest	68	pp	critical-input-5	pretest
9	con	control-input-1	exposure 1	69	con	control-input-4	exposure 2
10	pp	control-no-input-1	pretest	70	pp	critical-input-4	posttest
11	con	critical-input-1	exposure 1	71	con	critical-input-5	exposure 1
12	pp	critical-no-input-2	pretest	72	pp	control-input-5	pretest
13	con	filler2-2	exposure 1	73	con	filler4-5	exposure 1
14	pp	control-no-input-2	pretest	74	pp	control-input-4	posttest
15	con	control-input-1	exposure 2	75	con	control-input-5	exposure 1
16	pp	control-input-2	pretest	76	pp	critical-no-input-4	posttest
17	con	critical-input-1	exposure 2	77	con	critical-input-5	exposure 2
18	pp	critical-no-input-1	posttest	78	pp	control-no-input-5	posttest
19	con	control-input-2	exposure 1	79	con	filler4-4	exposure 3
20	pp	control-input-1	posttest	80	pp	critical-no-input-5	pretest
21	con	filler2-3	exposure 1	81	con	control-input-5	exposure 2
22	pp	critical-input-1	posttest	82	pp	critical-input-5	posttest
23	con	filler4-1	exposure 2	83	con	filler4-3	exposure 4
24	pp	control-no-input-1	posttest	84	pp	critical-input-6	pretest
25	con	control-input-2	exposure 2	85	con	filler4-5	exposure 2
26	pp	critical-no-input-2	posttest	86	pp	control-input-5	posttest
27	con	filler4-2	exposure 2	87	con	critical-input-6	exposure 1
28	pp	control-no-input-2	posttest	88	pp	critical-no-input-6	pretest
29	con	filler2-3	exposure 2	89	con	filler2-5	exposure 1
30	pp	control-input-2	posttest	90	pp	control-no-input-6	pretest
31	con	filler2-4	exposure 1	91	con	filler4-6	exposure 1
32	pp	critical-input-2	pretest	92	pp	control-input-6	pretest
33	con	filler4-3	exposure 1	93	con	critical-input-6	exposure 2
34	pp	control-no-input-3	pretest	94	pp	critical-no-input-5	posttest
35	con	critical-input-2	exposure 1	95	con	control-input-6	exposure 1
36	pp	control-input-3	pretest	96	pp	control-input-7	pretest
37	con	filler4-2	exposure 3	97	con	filler4-5	exposure 3
38	pp	critical-no-input-3	pretest	98	pp	critical-input-6	posttest
39	con	control-input-3	exposure 1	99	con	control-input-7	exposure 1
40	pp	control-no-input-4	pretest	100	pp	critical-input-7	pretest
41	con	critical-input-2	exposure 2	101	con	control-input-6	exposure 2
42	pp	filler4-1	production 1	102	pp	critical-no-input-6	posttest
43	con	filler4-4	exposure 1	103	con	critical-input-7	exposure 1
44	pp	critical-input-3	pretest	104	pp	control-no-input-6	posttest
45	con	control-input-3	exposure 2	105	con	control-input-7	exposure 2
46	pp	critical-input-2	posttest	106	pp	control-input-6	posttest
47	con	critical-input-3	exposure 1	107	con	filler2-5	exposure 2
48	pp	control-no-input-3	posttest	108	pp	critical-input-8	pretest
49	con	filler2-4	exposure 2	109	con	critical-input-7	exposure 2
50	pp	control-input-3	posttest	110	pp	control-input-7	posttest
51	con	filler4-4	exposure 2	111	con	critical-input-8	exposure 1
52	pp	critical-no-input-3	posttest	112	pp	control-no-input-7	pretest
53	con	critical-input-3	exposure 2	113	con	filler2-6	exposure 1
54	pp	control-no-input-4	posttest	114	pp	critical-input-7	posttest
55	con	filler4-3	exposure 2	115	con	filler4-5	exposure 4
56	pp	critical-input-4	pretest	116	pp	control-input-8	pretest
57	con	filler4-1	exposure 3	117	con	critical-input-8	exposure 2
58	pp	critical-input-3	posttest	118	pp	control-no-input-8	pretest
59	con	critical-input-4	exposure 1	119	con	control-input-8	exposure 1
60	pp	control-input-4	pretest	120	pp	critical-input-9	pretest

trial#	person	item type	item description	trial#	person	item type	item description
121	con	filler4-6	exposure 2	181	con	control-input-13	exposure 2
122	pp	critical-input-8	posttest	182	pp	control-no-input-10	posttest
123	con	critical-input-9	exposure 1	183	con	critical-input-12	exposure 2
124	pp	control-input-9	pretest	184	pp	critical-input-13	pretest
125	con	control-input-8	exposure 2	185	con	filler4-8	exposure 3
126	pp	control-no-input-7	posttest	186	pp	control-input-13	posttest
127	con	control-input-9	exposure 1	187	con	critical-input-13	exposure 1
128	pp	critical-no-input-7	pretest	188	pp	critical-input-12	posttest
129	con	critical-input-9	exposure 2	189	con	filler4-9	exposure 1
130	pp	control-input-8	posttest	190	pp	control-no-input-11	posttest
131	con	filler4-7	exposure 1	191	con	filler2-8	exposure 2
132	pp	control-no-input-8	posttest	192	pp	control-no-input-12	pretest
133	con	control-input-9	exposure 2	193	con	critical-input-13	exposure 2
134	pp	critical-input-9	posttest	194	pp	critical-no-input-10	posttest
135	con	filler2-6	exposure 2	195	con	filler2-9	exposure 1
136	pp	critical-no-input-8	pretest	196	pp	control-input-14	pretest
137	con	filler4-6	exposure 3	197	con	filler4-8	exposure 4
138	pp	control-input-9	posttest	198	pp	critical-input-13	posttest
139	con	filler2-7	exposure 1	199	con	control-input-14	exposure 1
140	pp	critical-input-10	pretest	200	pp	critical-no-input-11	pretest
141	con	filler4-7	exposure 2	201	con	filler4-10	exposure 1
142	pp	critical-no-input-7	posttest	202	pp	control-no-input-13	pretest
143	con	critical-input-10	exposure 1	203	con	filler4-9	exposure 2
144	pp	control-input-10	pretest	204	pp	critical-input-14	pretest
145	con	filler4-8	exposure 1	205	con	control-input-14	exposure 2
146	pp	control-no-input-9	pretest	206	pp	control-no-input-12	posttest
147	con	control-input-10	exposure 1	207	con	critical-input-14	exposure 1
148	pp	control-input-11	pretest	208	pp	critical-no-input-12	pretest
149	con	critical-input-10	exposure 2	209	con	filler2-10	exposure 1
150	pp	critical-no-input-8	posttest	210	pp	control-input-14	posttest
151	con	control-input-11	exposure 1	211	con	filler4-11	exposure 1
152	pp	critical-no-input-9	pretest	212	pp	control-input-15	pretest
153	con	control-input-10	exposure 2	213	con	critical-input-14	exposure 2
154	pp	critical-input-10	posttest	214	pp	critical-no-input-11	posttest
155	con	filler4-6	exposure 4	215	con	control-input-15	exposure 1
156	pp	critical-input-11	pretest	216	pp	control-no-input-13	posttest
157	con	control-input-11	exposure 2	217	con	filler4-9	exposure 3
158	pp	control-input-10	posttest	218	pp	critical-input-14	posttest
159	con	critical-input-11	exposure 1	219	con	filler4-10	exposure 2
160	pp	control-no-input-9	posttest	220	pp	critical-input-15	pretest
161	con	filler2-7	exposure 2	221	con	control-input-15	exposure 2
162	pp	control-input-11	posttest	222	pp	critical-no-input-12	posttest
163	con	filler4-7	exposure 3	223	con	critical-input-15	exposure 1
164	pp	control-input-12	pretest	224	pp	control-no-input-14	pretest
165	con	critical-input-11	exposure 2	225	con	filler4-12	exposure 1
166	pp	critical-no-input-9	posttest	226	pp	control-input-15	posttest
167	con	control-input-12	exposure 1	227	con	filler2-11	exposure 1
168	pp	control-no-input-10	pretest	228	pp	critical-no-input-13	pretest
169	con	filler4-8	exposure 2	229	con	critical-input-15	exposure 2
170	pp	critical-input-11	posttest	230	pp	control-input-16	pretest
171	con	filler2-8	exposure 1	231	con	filler4-11	exposure 2
172	pp	control-input-13	pretest	232	pp	critical-no-input-14	pretest
173	con	control-input-12	exposure 2	233	con	control-input-16	exposure 1
174	pp	critical-input-12	pretest	234	pp	critical-input-15	posttest
175	con	control-input-13	exposure 1	235	con	filler4-12	exposure 2
176	pp	control-no-input-11	pretest	236	pp	control-no-input-15	pretest
177	con	critical-input-12	exposure 1	237	con	filler4-10	exposure 3
178	pp	control-input-12	posttest	238	pp	control-no-input-14	posttest
179	con	filler4-7	exposure 4	239	con	control-input-16	exposure 2
180	pp	critical-no-input-10	pretest	240	pp	critical-no-input-15	pretest



trial#	person	item type	item description
241	con	filler2-10	exposure 2
242	pp	critical-no-input-13	posttest
243	con	filler4-13	exposure 1
244	pp	control-input-16	posttest
245	con	filler2-12	exposure 1
246	pp	critical-no-input-14	posttest
247	con	filler2-13	exposure 1
248	pp	critical-no-input-16	pretest
249	con	filler4-12	exposure 3
250	pp	control-no-input-15	posttest
251	con	filler4-11	exposure 3
252	pp	control-no-input-16	pretest
253	con	filler4-13	exposure 2
254	pp	critical-no-input-15	posttest
255	con	filler2-9	exposure 2
256	pp	critical-input-16	pretest
257	con	filler4-9	exposure 4
258	pp	filler4-10	production 1
259	con	critical-input-16	exposure 1
260	pp	filler2-11	production 1
261	con	filler4-13	exposure 3
262	pp	critical-no-input-16	posttest
263	con	filler2-12	exposure 2
264	pp	filler2-13	production 1
265	con	critical-input-16	exposure 2
266	pp	control-no-input-16	posttest
267	con	filler4-12	exposure 4
268	pp	filler4-13	production 1
269	con	filler4-11	exposure 4
270	pp	critical-input-16	posttest

**pretest:** first participant production (=T1)  
**exposure 1:** first experimenter input  
**exposure 2:** second experimenter input  
**posttest:** second participant production (=T2)

**Lags for critical & control items:**  
pretest - exposure 1: 2 intermediate trials  
exposure 1 - exposure 2: 5 intermediate trials  
exposure 2 - posttest: 4 intermediate trials

**Item types:**  
**critical-input:** 16 items (4 trials per item)  
**critical-no-input:** 16 items (2 trials per item)  
**control-input:** 16 items (4 trials per item)  
**control-no-input:** 16 items (2 trials per item)

**Fillers: 78 slots**  
**filler2:** 13 items (2 trials per item)  
**filler4:** 13 items (4 trials per item)

## Appendix J. Main experiment: Questions of the retrospective interview

### *General questions:*

1. What do you think this experiment was about?
2. Did you notice something special during the experiment?

### *The target: Language-related questions*

3. The experiment was about grammar, the formal side of language. Did you think so? What grammatical aspects was the experiment about, according to you?
4. The experiment was about the verbs, and more specifically about the inflection of the verbs. What precisely was it about, then, according to you?
5. The experiment was about the stem-vowel change in the third person of the singular in certain strong verbs, as, for instance, in *graben-gräbt*, or *befehlen-befiehlt*. Did you think that, or didn't you notice this at all during the experiment?

### *The task/purpose: Learning-related questions*

6. By now you know that the experiment was about the vowel change in certain strong verbs. What was the purpose of the experiment?
7. The experiment was about learning. Many native speakers of Dutch have difficulties with the vowel change in German. We were investigating whether you would learn the vowel change during the experiment from the experimenter, making sentences containing the same verbs and thus giving you the chance to learn the correct inflection. Did you think so, or didn't you notice this at all?

### *Noticing the gap*

8. Can you remember if there were specific moments during the experiment on which you noticed that the verb form the experimenter was using differed from yours? If yes, did you try consciously to take over the correct form?

### *Explicit instruction in the past*

9. Have you ever studied the vowel change intensively (at school, at university, during evening classes, by means of self-study, or by other means)? If yes, do you have the impression that this helped you to master the vowel change?

#### Appendix K. Main experiment: Example of the retrospective interview

English transcription of a retrospective interview. The participant in question was part of the implicit group. The participant demonstrated some awareness of the target structure, but no awareness of the learning task.

**Experimenter:** Please explain, what do you think this experiment was about?

**Participant (*implicit condition*):** It was about spontaneous associations between images and how you can express them in a foreign language.

**Experimenter:** Okay, and did you notice something special or odd during the experiment?

**Participant:** There were some strange combinations – well, that was the hard part of it I guess, having combinations where you would say ‘it’s rather strange but it’s still possible’. For the rest, for myself, I found it difficult to have to concentrate on making the spontaneous associations between the pictures, on the one hand, but also having to concentrate on searching the correct datives or accusatives for the words.

**Experimenter:** Okay. Well, the experiment was actually about grammar.

**Participant:** Oh yes? Okay.

**Experimenter:** So, it was about the formal side of language. Did you think that, or not at all?

**Participant:** No, I didn’t think that.

**Experimenter:** Which grammatical aspects in specific was the experiment about, according to you?

**Participant:** Uh, dative and accusative, I think?

**Experimenter:** You mean declension.

**Participant:** Yes, declension.

**Experimenter:** However, the experiment was about the verbs, and more specifically about the inflection of the verbs.

**Participant:** Ouch!

**Experimenter:** So what do you think then, what was the experiment about in specific?

**Participant:** I remember, there were irregular verbs, and indeed, in the third person of the singular, it was about knowing or not knowing whether it was a regular or irregular verb.

**Experimenter:** Yes, so, by saying “regular”, “irregular”, do you mean...

**Participant:** For example, *essen* or *isst*, instead of *esst*.

**Experimenter:** So you are talking about the vowel change.

**Participant:** Yes.

**Experimenter:** Yes.

**Participant:** And Umlaut and so forth, ...

**Experimenter:** It was indeed about that vowel change, in the third person of the singular in certain “strong” verbs.

**Participant:** Yes, ouns.

**Experimenter:** As it is the case for *graben – gräbt*, or *befehlen – befiehlt*. And did you think this during the experiment, or did you not notice it at all?

**Participant:** Yes, it was a difficulty that I had noticed, and I was thinking, ouns, this is a little... Because I haven’t had any German classes for a couple of weeks, so I was thinking, oh no, this is not going well. Because indeed, I was hearing that you were applying those changes, so I thought, hmm, I should revise this! Because there is definitely room for improvement.

**Experimenter:** Okay. And – now that you know that this was about the vowel change – what was, according to you, the purpose of the experiment?

**Participant:** I don’t know, maybe also that as a Dutch native speaker, you also have the vowel changes, but... looking if you do it more spontaneously than, I don’t know... But on the other hand, Dutch can also be misleading, right? This is one of the difficult things of learning German for native speakers of Dutch, it helps in many cases but it is also difficult because sometimes you don’t know if something is Dutch or German.

**Experimenter:** Yes, because in Dutch, you do not have vowel changes for same verbs.

**Participant:** Yes, exactly, and so it’s really learning by heart and it is not the most fun aspect.

**Experimenter:** Okay. So the experiment was actually about learning. So indeed, many Dutch native speakers have difficulties with the vowel change, and I wanted to see whether it is possible for my participants to pick this up from me during the experiment – that is, that they are learning it from me during the experiment.

**Participant:** Yes.

**Experimenter:** And did you think that, or didn’t you notice this at all?

**Participant:** Oh, well I have not been thinking about it consciously. I noticed that you were saying it correctly, and I was thinking, oh, it was an aspect that I heard you saying and I was thinking, oh, right, but there were so many things I had to take account of. And if one is thinking that the task is more about associations, then you just think, okay, I will focus my attention on these associations, and I will see later how grammar works out. But indeed...

**Experimenter:** So, your focus was really on the meaning, and then maybe also on the declension...

**Participant:** Yes, right, that's it. I think that the verbs came in the third place for me.

**Experimenter:** Yes.

**Participant:** So if I did it correctly, I guess it was unconsciously.

**Experimenter:** Okay. And can you remember certain moments during the experiment where you noticed that the verb form that I was using differed from yours?

**Participant:** Yes, for one or two verbs I was thinking, oh, ouch, I didn't say it like that. But there was quite a lot of information, so it was difficult to remember what you said.

**Experimenter:** Yes. So you tried consciously to take them over from me? Or, in the end rather not.

**Participant:** No, because we were already further in the experiment then, and by the moment the verb came back...

**Experimenter:** And have you ever been treating the vowel change intensively?

**Participant:** Yes, I have! When I have to study for my exams, yes. Then I have a look on that little list with all the tables, of *gehen, geht*... But indeed, I know that I should be paying more attention to this.

**Experimenter:** Yes, but do you have the impression that you managed to master the vowel change well due to the studying? Or is it really something...

**Participant:** I should try to work on this more, I'm not spending enough time on this. If I would revise it every week, I would definitely...

**Experimenter:** But it really *is* difficult.

**Participant:** Yes, right, I feel like I'm not spending enough effort on it to be able to say, "I master this". It's just like when you are learning other languages, for instance Latin, you simply *have* to do it at school.

**Experimenter:** It is difficult.

**Participant:** Yes it's difficult, when I revise it a couple of times for my exam, then I start to know, okay, good, then I see a certain logic behind it, even if the verbs are irregular you can still see a logic behind it, but the last time I did this was about three or four weeks ago and it has been moving more to the background again since then.

**Experimenter:** Yes, language learning is always about *use it or lose it*.

**Participant:** Yes, it really is! And summer holidays are fatal for this.

**Experimenter:** But this also the reason why I am looking at this. Because I know that this is something difficult, so it's perfect to investigate if people will learn this or not. Because I know for sure that people are going to make errors on this. Except for some people who have been living in Germany for a long time, for instance. But until now, I haven't had any participant who did not make any errors.

**Participant:** No, of course. If you know that the exercise is about this, you will of course spend much more attention on it, and then...

**Experimenter:** I actually have another experimental condition in which the participants know that this is about the vowel change. But even they are still making errors.

**Participant:** Yes, of course, they will also make errors, make they will think longer about 'oh, wait, how was this'...

**Experimenter:** Right, so this is what I'm trying to compare.

**Participant:** That's very interesting.

**Experimenter:** Will people take this over from me spontaneously? Or, I say it to them on forehand, will they perform better or not? What I also noticed is that the person who know that this is about the vowel change still are focusing on so many different things, so that sometimes they even forget to pay attention to it and think 'yes, I think that in the end this was actually about declension'. But no, this is not about declension.

## Appendix L. Main experiment: Instruction sheet of the phonemic discrimination task

Bij dit luisterexperiment krijg je steeds een klank te horen.

Kies dan de klinker die volgens jou het meest op deze klank lijkt.

Eerst ga je dit met 3 klinkers oefenen (a, e, ie).

Daarna gebruiken we 5 verschillende klinkers:



/a/

Zoals in...

D: Mann, dann, Nase, Lage, Tasse...

NL: aap, later, vaak, maken...



/ɛ/

Zoals in...

D: Käse, Ende, kennen, Feld, Fest, Mädchen...

NL: ik ben, jij kent, mens, wet, opletten, verf...



/e/

Zoals in...

D: gegen, bewegen, Regen, Leben, Mehl...

NL: één, been, alleen, eend, wanneer, leren, egel...



/i/

Zoals in...

D: lieben, Biene, viel, nie, Benzin, Termin, Video...

NL: niets, liegen, video, vlieg, iemand, gieten...



/ɪ/

Zoals in...

D: im, mit, Kinn, gewinnen, immer, Zimmer, Film...

NL: kind, wit, vis, kip, liggen, willen...

## Appendix M. Main experiment: Instruction sheet of the word knowledge assessment

### KENNIS WERKWOORDEN

We zouden nu graag te weten willen komen welke werkwoorden van het experiment je op voorhand al kende of niet. Volg aandachtig de instructies:



#### Woorden die je NIET kende:

Hiermee bedoelen we woorden waarvoor geldt:

- *Ik kende dit woord niet op voorhand*
- *Ik weet nu nog steeds niet wat het betekent*

→ **Doorstreep woorden!**

Voorbeeld: ~~glauben~~



#### Woorden die je enkel PASSIEF kent:

Hiermee bedoelen we woorden waarvoor geldt:

- *Ik begrijp dit woord wel*
- *Ik zou er niet spontaan op komen als ik het woord uit het Nederlands zou moeten vertalen*
- *Ik zou dit woord niet spontaan kunnen gebruiken wanneer ik Duits spreek*

→ **Omcirkel deze woorden.**

Voorbeeld: glauben



#### Woorden die je ACTIEF kent:

Hiermee bedoelen we woorden waarvoor geldt:

- *Dit woord kende ik al*
- *Ik zou het woord van het Nederlands naar het Duits kunnen vertalen*
- *Ik zou dit woord spontaan kunnen gebruiken wanneer ik Duits spreek*

→ **Je hoeft niets met deze woorden te doen.**

Voorbeeld: glauben



bekommen	holen	regeln
fallen	treten	reden
fangen	rauchen	schlafen
waschen	empfehlen	raten
tragen	bauen	bezahlen
stehen	parken	saufen
werfen	retten	baden
tanzen	verraten	hassen
lachen	kennen	umgeben
fegen	legen	sprechen
verlassen	gehen	lesen
fragen	warten	brauchen
folgen	entdecken	kochen
klagen	heben	geben
vergessen	fressen	mahlen
jagen	sehen	halten
machen	fahren	verpacken
treffen	wachsen	empfangen
messen	schlagen	laufen
blasen	stehlen	besprechen
bestellen	planen	sterben
senden	setzen	kaufen
essen	rennen	brechen
lassen	laden	braten

## Appendix N. Main experiment: Descriptive statistics of the pre-measure

*Descriptive statistics of accuracy scores (%) on the pre-measure.*

	<i>Explicit instruction</i>	<i>Implicit instruction</i>
Sample size	10	10
Mean	58.75	60.42
95% CI for mean (lower bound)	49.17	52.07
95% CI for mean (upper bound)	68.33	68.76
Standard Deviation	13.39	11.66
Median	50.00	62.50
Minimum score	50.00	50.00
Maximum score	87.50	87.50

#### Appendix O. Main experiment: Results for individual test items

The tables on the following pages list the test results for all individual critical and control items. Results are given for the three different test moments, as well as for input and no-input items, and for the implicit and explicit instruction conditions. The column “Knowledge” refers to the percentage of participants who had active or passive knowledge of the verb’s meaning, as assessed by the word knowledge task at the end of the experimental session.

**Control items:** In order to find out which control items appeared to be problematic, we examined the columns “T1”, “T2”, “T3”, and “Overall”. The following items had overall accuracy scores lower than 90% and were considered problematic: *bezahlen*, *kaufen*, *planen*, *verpacken*, *hassen*, *jagen*, *klagen*, and *legen*.

Verb	Group	Knowledge	T1	T2	T3	Overall	T1-input	T2-input	T3-input	T1-no-input	T2-no-input	T3-no-input
empfangen	CRIT_A	95	68.42	78.95	78.95	75.44	77.78	88.89	77.78	60	70	80
fahren	CRIT_A	100	70	65	70	68.33	55.56	66.67	77.78	81.82	63.64	63.64
fangen	CRIT_A	100	70	80	85	78.33	88.89	88.89	88.89	54.55	72.73	81.82
fressen	CRIT_A	100	40	60	70	56.67	33.33	77.78	66.67	45.46	45.46	72.73
geben	CRIT_A	100	75	70	95	80	77.78	66.67	100	72.73	72.73	90.91
laden	CRIT_A	100	40	65	35	46.67	33.33	88.89	44.44	45.46	45.46	27.27
lassen	CRIT_A	100	60	50	65	58.33	55.56	77.78	66.67	63.64	27.27	63.64
saufen	CRIT_A	95	63.16	63.16	68.42	64.91	66.67	77.78	66.67	60	50	70
schlafen	CRIT_A	100	65	65	60	63.33	77.78	77.78	66.67	54.55	54.55	54.55
stehlen	CRIT_A	100	30	45	50	41.67	22.22	55.56	55.56	36.36	36.36	45.45
tragen	CRIT_A	100	90	70	75	78.33	88.89	66.67	88.89	90.91	72.73	63.64
treffen	CRIT_A	100	70	75	95	80	66.67	77.78	100	72.73	72.73	90.91
treten	CRIT_A	90	50	77.78	72.22	66.67	55.56	100	77.78	44.44	55.56	66.67
vergessen	CRIT_A	100	65	70	85	73.33	66.67	77.78	77.78	63.64	63.64	90.91
wachsen	CRIT_A	95	47.37	57.9	78.95	61.41	62.5	87.5	100	36.36	36.36	63.64
werfen	CRIT_A	95	68.42	78.95	89.47	78.95	55.56	66.67	77.78	80	90	100
blasen	CRIT_B	100	45	50	60	51.67	45.46	45.46	63.64	44.44	55.56	55.56
braten	CRIT_B	100	30	40	35	35	27.27	54.55	45.46	33.33	22.22	22.22
brechen	CRIT_B	100	35	70	65	56.67	27.27	81.82	63.64	44.44	55.56	66.67
empfehlen	CRIT_B	100	15	40	35	30	9.09	54.55	45.46	22.22	22.22	22.22
essen	CRIT_B	100	70	85	95	83.33	63.64	90.91	90.91	77.78	77.78	100
fallen	CRIT_B	100	65	75	70	70	63.64	72.73	63.64	66.67	77.78	77.78
halten	CRIT_B	100	45	50	60	51.67	36.36	54.55	54.55	55.56	44.44	66.67
laufen	CRIT_B	100	70	75	80	75	72.73	81.82	81.82	66.67	66.67	77.78
lesen	CRIT_B	100	65	85	85	78.33	63.64	81.82	81.82	66.67	88.89	88.89
messen	CRIT_B	75	33.33	73.33	73.33	60	20	80	80	60	60	60
schlagen	CRIT_B	100	70	85	70	75	63.64	81.82	81.82	77.78	88.89	55.56
sehen	CRIT_B	100	60	70	90	73.33	63.64	72.73	90.91	55.56	66.67	88.89
sprechen	CRIT_B	100	80	75	90	81.67	81.82	90.91	90.91	77.78	55.56	88.89
sterben	CRIT_B	100	70	65	65	66.67	63.64	54.55	63.64	77.78	77.78	66.67
verraten	CRIT_B	100	45	50	50	48.33	45.46	63.64	54.55	44.44	33.33	44.44
waschen	CRIT_B	100	40	50	50	46.67	36.36	45.46	45.46	44.44	55.56	55.56

Verb	T1-input-exp	T2-input-exp	T3-input-exp	T1-input-imp	T2-input-imp	T2-input-imp	T1-no-input-exp	T2-no-input-exp	T3-no-input-exp	T1-no-input-imp	T2-no-input-imp	T3-no-input-imp
empfangen	100	100	80	50	75	75	50	50	50	66.67	83.33	100
fahren	80	80	80	25	50	75	100	60	60	66.67	66.67	66.67
fangen	100	100	80	75	75	100	60	60	80	50	83.33	83.33
fressen	40	100	100	25	50	25	40	40	80	50	50	66.67
geben	80	60	100	75	75	100	100	80	80	50	66.67	100
laden	40	100	40	25	75	50	60	60	20	33.33	33.33	33.33
lassen	60	80	60	50	75	75	60	40	40	66.67	16.67	83.33
saufen	60	100	80	75	50	50	40	40	40	80	60	100
schlafen	100	100	80	50	50	50	60	60	60	50	50	50
stehlen	40	60	80	0	50	25	40	60	40	33.33	16.67	50
tragen	80	60	80	100	75	100	100	80	40	83.33	66.67	83.33
treffen	80	100	100	50	50	100	80	80	80	66.67	66.67	100
treten	80	100	100	25	100	50	66.67	66.67	66.67	33.33	50	66.67
vergessen	80	100	100	50	50	50	60	60	80	66.67	66.67	100
wachsen	60	100	100	66.67	66.67	100	20	40	60	50	33.33	66.67
werfen	80	80	100	25	50	50	100	100	100	60	80	100
blasen	40	60	60	50	33.33	66.67	60	100	80	25	0	25
braten	40	60	0	16.67	50	83.33	40	20	20	25	25	25
brechen	60	100	60	0	66.67	66.67	40	60	60	50	50	75
empfehlen	0	80	60	16.67	33.33	33.33	20	20	40	25	25	0
essen	60	100	100	66.67	83.33	83.33	80	80	100	75	75	100
fallen	80	80	40	50	66.67	83.33	80	100	100	50	50	50
halten	40	60	40	33.33	50	66.67	60	40	60	50	50	75
laufen	60	80	60	83.33	83.33	100	80	80	80	50	50	75
lesen	80	100	100	50	66.67	66.67	80	100	100	50	75	75
messen	20	100	80	20	60	80	66.67	66.67	66.67	50	50	50
schlagen	80	100	80	50	66.67	83.33	80	100	80	75	75	25
sehen	60	100	100	66.67	50	83.33	20	40	100	100	100	75
sprechen	80	100	100	83.33	83.33	83.33	80	60	80	75	50	100
sterben	80	60	80	50	50	50	100	100	80	50	50	50
verraten	80	100	60	16.67	33.33	50	60	40	40	25	25	50
waschen	40	40	20	33.33	50	66.67	60	60	60	25	50	50

Verb	Group	Knowledge	T1	T2	T3	Overall	T1-input	T2-input	T3-input	T1-no-input	T2-no-input	T3-no-input
bezahlen	CONTR_A	100	90	85	75	83.33	88.89	88.89	88.89	90.9	81.82	63.94
brauchen	CONTR_A	100	95	95	90	93.33	100	88.89	77.78	90.91	100	100
folgen	CONTR_A	100	95	100	100	98.33	88.89	100	100	100	100	100
fragen	CONTR_A	100	90	100	95	95	88.89	100	100	90.91	100	90.91
gehen	CONTR_A	100	100	100	100	100	100	100	100	100	100	100
kaufen	CONTR_A	100	55	75	50	60	33.33	55.56	55.56	72.72	90.91	45.45
kochen	CONTR_A	100	95	100	100	98.33	88.89	100	100	100	100	100
parken	CONTR_A	100	100	100	100	100	100	100	100	100	100	100
planen	CONTR_A	95	57.9	63.16	84.21	68.42	66.67	55.56	77.78	50	70	90
reden	CONTR_A	95	100	100	100	100	100	100	100	100	100	100
regeln	CONTR_A	100	100	95	100	98.33	100	100	100	100	90.91	100
rennen	CONTR_A	100	100	95	95	96.67	100	88.89	88.89	100	100	100
senden	CONTR_A	100	100	100	100	100	100	100	100	100	100	100
setzen	CONTR_A	100	100	100	75	91.67	100	100	88.89	100	100	63.64
tanzen	CONTR_A	100	90	95	90	91.67	77.78	88.89	77.78	100	100	100
verpacken	CONTR_A	100	55	60	80	65.00	44.44	66.67	77.78	63.64	54.55	81.81
baden	CONTR_B	100	95	100	95	96.67	100	100	100	88.89	100	88.89
bauen	CONTR_B	95	94.74	89.47	94.74	92.98	90.91	81.82	90.91	100	100	100
bekommen	CONTR_B	100	100	100	100	100	100	100	100	100	100	100
bestellen	CONTR_B	100	100	100	95	98.33	100	100	90.91	100	100	100
fegen	CONTR_B	85	100	100	88.24	96.08	100	100	80	100	100	100
hassen	CONTR_B	90	61.11	83.33	83.33	75.92	63.64	90.91	81.82	57.14	71.43	85.71
holen	CONTR_B	95	94.74	94.74	94.74	94.74	90.91	90.91	90.91	100	100	100
jagen	CONTR_B	100	35	80	70	61.67	36.36	81.82	72.73	33.33	77.78	66.67
kennen	CONTR_B	100	95	100	95	96.67	100	100	100	88.89	100	88.89
klagen	CONTR_B	100	75	75	75	75	90.91	100	90.91	55.56	44.44	55.56
legen	CONTR_B	94	52.63	78.95	36.84	56.14	54.55	90.91	36.36	50	62.5	37.5
machen	CONTR_B	100	100	100	100	100	100	100	100	100	100	100
rauchen	CONTR_B	100	90	95	85	90	100	100	90.91	77.78	88.89	77.78
retten	CONTR_B	95	100	100	100	100	100	100	100	100	100	100
stehen	CONTR_B	100	100	100	100	100	100	100	100	100	100	100
warten	CONTR_B	100	100	100	100	100	100	100	100	100	100	100

Verb	T1-input-exp	T2-input-exp	T3-input-exp	T1-input-imp	T2-input-imp	T2-input-imp	T1-no-input-exp	T2-no-input-exp	T3-no-input-exp	T1-no-input-imp	T2-no-input-imp	T3-no-input-imp
bezahlen	80	80	80	100	100	100	100	80	80	83.33	83.33	50
brauchen	100	100	100	100	75	50	100	100	100	83.33	100	100
folgen	80	100	100	100	100	100	100	100	100	100	100	100
fragen	80	100	100	100	100	100	100	100	100	83.33	100	83.33
gehen	100	100	100	100	100	100	100	100	100	100	100	100
kaufen	40	80	80	25	25	25	80	80	80	66.67	100	16.67
kochen	80	100	100	100	100	100	100	100	100	100	100	100
parken	100	100	100	100	100	100	100	100	100	100	100	100
planen	60	60	100	75	50	50	60	60	100	40	80	80
reden	100	100	100	100	100	100	100	100	100	100	100	100
regeln	100	100	100	100	100	100	100	80	100	100	100	100
rennen	100	80	80	100	100	100	100	100	100	100	100	100
senden	100	100	100	100	100	100	100	100	100	100	100	100
setzen	100	100	80	100	100	100	100	100	60	100	100	66.67
tanzen	60	100	60	100	75	100	100	100	100	100	100	100
verpacken	40	80	80	50	50	75	40	60	80	83.33	50	83.33
baden	100	100	100	100	100	100	80	100	100	100	100	75
bauen	100	80	100	83.33	83.33	83.33	100	100	100	100	100	100
bekommen	100	100	100	100	100	100	100	100	100	100	100	100
bestellen	100	100	80	100	100	100	100	100	100	100	100	100
fegen	100	100	100	100	100	66.67	100	100	100	100	100	100
hassen	60	100	80	66.67	83.33	83.33	75	75	75	33.33	66.67	100
holen	100	100	100	83.33	83.33	83.33	100	100	100	100	100	100
jagen	20	80	80	50	83.33	66.67	20	60	80	50	100	50
kennen	100	100	100	100	100	100	80	100	80	100	100	100
klagen	80	100	100	100	100	83.33	60	60	40	50	25	75
legen	40	100	60	66.67	83.33	16.67	25	25	25	75	100	50
machen	100	100	100	100	100	100	100	100	100	100	100	100
rauchen	100	100	100	100	100	83.33	80	80	80	75	100	75
retten	100	100	100	100	100	100	100	100	100	100	100	100
stehen	100	100	100	100	100	100	100	100	100	100	100	100
warten	100	100	100	100	100	100	100	100	100	100	100	100

## Appendix P. Main experiment: Results for individual critical items with input

The following table focuses on the results for all individual critical items with input. The column “T1-T2” indicates the direction of the change in accuracy scores from test moment 1 to 2 (increase, decrease, or steady), and the column “T2-T3” indicates the direction of the change for scores between test moment 2 and 3.

Verb	Group	T1-input	T2-input	T3-input	T1-T2	T2-T3
empfangen	CRIT_A	77.78	88.89	77.78	increase	decrease
fahren	CRIT_A	55.56	66.67	77.78	increase	increase
fangen	CRIT_A	88.89	88.89	88.89	steady	steady
fressen	CRIT_A	33.33	77.78	66.67	increase	decrease
geben	CRIT_A	77.78	66.67	100	decrease	increase
laden	CRIT_A	33.33	88.89	44.44	increase	decrease
lassen	CRIT_A	55.56	77.78	66.67	increase	decrease
saufen	CRIT_A	66.67	77.78	66.67	increase	decrease
schlafen	CRIT_A	77.78	77.78	66.67	steady	decrease
stehlen	CRIT_A	22.22	55.56	55.56	increase	steady
tragen	CRIT_A	88.89	66.67	88.89	decrease	increase
treffen	CRIT_A	66.67	77.78	100	increase	increase
treten	CRIT_A	55.56	100	77.78	increase	decrease
vergessen	CRIT_A	66.67	77.78	77.78	increase	steady
wachsen	CRIT_A	62.5	87.5	100	increase	increase
werfen	CRIT_A	55.56	66.67	77.78	increase	increase
blasen	CRIT_B	45.46	45.46	63.64	steady	increase
braten	CRIT_B	27.27	54.55	45.46	increase	decrease
brechen	CRIT_B	27.27	81.82	63.64	increase	decrease
empfehlen	CRIT_B	9.09	54.55	45.46	increase	decrease
essen	CRIT_B	63.64	90.91	90.91	increase	steady
fallen	CRIT_B	63.64	72.73	63.64	increase	decrease
halten	CRIT_B	36.36	54.55	54.55	increase	steady
laufen	CRIT_B	72.73	81.82	81.82	increase	steady
lesen	CRIT_B	63.64	81.82	81.82	increase	steady
messen	CRIT_B	20	80	80	increase	steady
schlagen	CRIT_B	63.64	81.82	81.82	increase	steady
sehen	CRIT_B	63.64	72.73	90.91	increase	increase
sprechen	CRIT_B	81.82	90.91	90.91	increase	steady
sterben	CRIT_B	63.64	54.55	63.64	decrease	increase
verraten	CRIT_B	45.46	63.64	54.55	increase	decrease
waschen	CRIT_B	36.36	45.46	45.46	increase	steady