Beyond Surface Constituency: Exploring the Nature of Syntactic Priming through the Evidence from English- and Russian-speaking Adults and Children

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Declaration

     I, Alina Vadimovna Konradt, confirm that the work presented in this thesis is my own. Where information has been derived from other sources, I confirm that this has been indicated in the thesis.

Abstract

Syntactic priming is the phenomenon by which the comprehension or production of a given sentence is facilitated by the processing of another sentence with similar or identical syntax. I propose that syntactic priming taps into the abstract syntactic representation which incorporates the information on the predicate's argument structure and thus defend the Argument Structure Priming Hypothesis. This stands in contrast to the widely accepted conceptualisation of syntactic priming, Constituent Structure Priming, where priming concerns mere linear constituent order (Bock & Loebell, 1990). I also argue against the idea of Patient Prominence Priming, where the utterance's discourse function is assumed to play a role in priming (Vasilyeva & Waterfall, 2012). Seven production priming experiments were conducted with Russian and English adults and 4- to 7-year olds to investigate whether and to what extent these three conceptualisations of syntactic priming are empirically valid. The findings in both languages for both adults and children highlight the significance of argument structure for priming, supporting the Argument Structure Priming Hypothesis, while providing little evidence for Constituent Structure Priming or Patient Prominence Priming. I also explored the Argument Prominence Hierarchy hypothesis (Titov 2012). On this hypothesis the linear order of arguments in a sentence is governed by their relative interpretive status, which is defined by a number of features, animacy being one of them. My findings demonstrate that the participants were sensitive to the animacy distribution in the events they described, exactly as predicted. This allows me to attribute the data in the literature supporting the two alternative conceptualisations of syntactic priming, Constituent Structure Priming and Patient Prominence Priming, to asymmetric distribution of animacy in the experimental items participants described as part of a priming task. Finally, the striking similarity between the syntactic behaviour of adults and children in the present experiments, permits us to sustain the Continuity account of language acquisition.

Impact Statement

The dissertation explores one of the core issues in the modern psycholinguistic research which concerns the psychological correlates of grammatical operations in language. To address this matter, the priming methodology, widely employed across psychology and linguistics, was utilised. The methodology is based on the phenomenon whereby particular cognitive constructs are subconsciously activated in implicit memory through the exposure to a given stimulus thus affecting the processing of another stimulus (Razzouk, Cohen, Almoosa & Patel, 2011). The present experimental work, which includes studies with both mature speakers and young children, explores this methodological approach enhancing the current understanding of its advantages to the benefit of further research within the field of theoretical linguistics, psycholinguistics, as well as the clinical research, speech and language therapy and cognitive psychology. On a more conceptual level, a better understanding of the priming mechanisms and the way they function provides us with an insight into the subconscious influence external language stimuli might have on the human mind. Such knowledge might forward the attempts to isolate the domain of individual linguistic expression from that which is driven and conditioned purely by what we hear.

The empirical findings obtained as part of the present enquiry highlight the role of lexical properties carried by verbs and nouns which constrain the syntactic choices made during language processing and production in both adults and children. Providing the evidence for the psychological reality of syntactic processes, these findings have direct implications for advancing the linguistic theory and for our understanding of language processing as a whole. Importantly, the striking similarities between the child and adult grammars, which emerged in the current data, have the potential to inform research undertaken in clinical populations such as ASD and Williams Syndrome (e.g. Perovic & Wexler, 2007; Schaeffer, 2017) to advance the ability to evaluate the deviations from the typical acquisition of grammar in order to produce diagnosis and devise appropriate support. This is especially so, as the priming methodology, being cognitively non-taxing, can be appropriate for and, thus, applicable to a wide range of clinical populations and age ranges.

Dedication

To Hannah, whose birth was the beginning of this journey.

Table of Contents

List of Tables

List of Figures

1.   Introduction and Thesis Overview

1.1.   Syntactic Priming: An Overview of the Phenomenon

A primary concern within the field of psycholinguistics is the nature of linguistic representations involved in language comprehension and production. A key question is, therefore, what kind of information is stored and subsequently activated during language processing? Second, but by no means less important question, particularly in the light of the continuity hypothesis of language acquisition (Chomsky, 1965; Pinker, 1984), is whether children and adults fundamentally differ with respect to the information they preserve and call into operation when interpreting and producing speech. Despite the monumental effort that has gone into addressing these questions since the beginning of psycholinguistic research, there is still much work to be done. This dissertation offers experimental evidence that syntactic representations which guide language processing go not only beyond superficial discourse-functional level of the message transmitted or received, but also beyond surface constituent structure of the sentences comprehended or produced. This chapter offers an overview of the priming methodology, presents the theoretical framework underpinning the thesis including the Minimalist Program and Levelt's (1989) speech production model, and outlines the main hypothesis defended in the dissertation. I follow by outlining a number of prominent syntactic priming accounts that exist in the literature and conclude by highlighting the implications of the current work for language acquisition.

A widely employed methodology allowing to explore the focal psycholinguistic issues outlined above utilises the phenomenon of priming. In psychology, priming refers to a subconscious operation whereby certain cognitive constructs are activated in implicit memory through the exposure to a given stimulus, and subsequently become more accessible and therefore capable of affecting the processing of another stimulus (Razzouk, Cohen, Almoosa & Patel, 2011; Sohn, Takayama, Eckles & Ballagas, 2009). In linguistics, overall, this conception of priming is also accepted, although the definition may vary depending on the model of memory and, thus, the theory of priming adopted. For linguistic priming "cognitive constructs" are essentially elements of linguistic knowledge, for example, abstract syntactic frames or the links formed within cohorts of semantically related lexical items. Crucially, through observing a subconscious activation of specific linguistic aspects and either their

subsequent reproduction or a greater ease of their comprehension, priming allows us to isolate these aspects and hypothesise that they are represented in the model of human grammar.

Linguistic priming is broadly divided into semantic and syntactic, each of which describes an aspect of linguistic knowledge found to be susceptible to a priming effect. Semantic priming, often observed in lexical decision tasks, is characterised by a faster response to a target word (e.g. *bread*) when it is preceded by associated word (e.g. *butter*) compared to when preceded by an unrelated word (Meyer & Schvaneveldt, 1971; Shelton & Martin, 1992). Non-behavioural measures such electroencephalographic event-related potential (ERP) brain response have also been used to study semantic priming effects, for example, the N400 response, the semantic component of ERP, was shown to be reduced when a target word (e.g. *nurse*) is preceded by a semantically related word (e.g. *doctor*) (Bentin, McCarthy & Wood, 1985; Lau, Holcomb & Kuperberg, 2013).

Syntactic priming (alternatively termed *structural priming*) occurs when comprehension or production of a given sentence (target) is facilitated by processing of another sentence with identical syntactic structure (prime) (Tooley & Traxler, 2010). Several models of priming have been proposed, amongst which are *the spreading activation model* (Bencini, 2002; Dell, 1986; Collins & Loftus, 1975; Pickering & Branigan, 1998) and *the procedural learning model* (Bock & Griffin, 2000)[1]. Both of them recognise the activation of abstract syntactic representations but diverge in how they explain the processes underpinning this activation and the network which facilitates it. I do not express a preference to any of the two, since what matters for the experimental work reported in this dissertation is not so much the type of network which makes priming possible, but the direct link between priming effects and the aspects of syntactic information represented in the human brain.

Syntactic priming in comprehension is characterised by a speaker's tendency to exhibit computational relief when processing target sentences that followed the syntactic construction encountered shortly prior to hearing or reading these targets.

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[1] Other models of priming have also been proposed. Those include the models such as *the retrieval* (or *a compound cue*) *theory* (Ratcliff & McKoon, 1988) and *the exemplar model* (Snider, 2008). These modes do not recognise that priming constitutes activation of abstract syntactic representations. The discussion surrounding the differences between them is beyond the scope of this thesis.

Syntactic priming in production, the focus of the thesis, is marked by repetition of recently experienced sentence structures; for example upon hearing a passive prime such as *A cat was chased by a dog*, a speaker is more likely to produce a passive target when describing an unrelated transitive event than after hearing the canonical active such as *A dog chased a cat*. This tendency is believed to occur not only in spoken, but also in written language, albeit it can be short-lived (Berkovitch & Dehaene, 2019; Branigan, Pickering & Cleland, 1999; Cleland & Pickering, 2006;; Pickering & Branigan, 1998). Thus, whenever the replication of syntactic choices observed more frequently than expected by chance, we are dealing with the syntactic priming effect (Reitter, Keller & Moore, 2011).

Direct non-behavioural measures have also been employed to investigate this effect. For example, in an attempt to identify neuronal correlates of syntactic priming, the brain response during priming tasks have been explored using functional magnetic resonance imaging (e.g. Segaert, Kempen, Petersson, & Hagoort, 2013). Furthermore, both eye-tracking (e.g. Arai, Van Gompel & Scheepers, 2007; Traxler, Tooley & Pickering, 2014) and ERP experiments (e.g. Ledoux, Traxler & Swaab, 2007) have been conducted to study the phenomenon, the results of which show striking parallels to those obtained in behavioural experiments.

The claim that the exposure to a specific syntactic construction subsequently facilitates parsing and production of similar or identical syntactic structures is supported by a large body of evidence drawn from both, studies attending to naturally occurring speech (e.g. Kempen, 1977) and experimental work (Pickering & Ferreira, 2008 for review). The effects have been studied across languages to investigate abstract syntactic knowledge and implicit learning mechanisms (Dell & Ferreira, 2016 for review), and were found to be reliable and robust (Mahowald, James, Futrell & Gibson, 2016 for meta-analysis).

Priming research has been conducted with monolinguals, second language learners, bilingual populations (Bernolet, Hartsuiker & Pickering, 2013; Bock, 1986; Chang, Bock, Dell & Griffin, 2000; Chang, Bock & Goldberg, 2003; Desmet & Declercq, 2006; Fleischer, Pickering, McLean & 2012; Hartsuiker, Pickering & Veltkamp, 2004; Loebell & Bock, 2003; Messenger, Branigan & McLean 2011; Nitschke, Kidd & Serratrice, 2010; Ziegler, Snedeker & Wittenberg, 2018 amongst others), aphasics (Saffran & Martin, 1997) and patients with amnesia (Ferreira, Bock, Wilson, & Cohen, 2008; Heyselaar, Segaert, Walvoort, Kessels & Hagoort, 2017).

The effects of syntactic priming in children were also extensively explored (Huttenlocher, Vasilyeva & Shimpi, 2004; Messenger, Branigan, McLean & Sorace, 2012; Rowland, Chang, Ambridge, Pine & Lieven, 2012; Savage, Lieven, Snedeker & Thothathiri, 2006; Shimpi, Gámez, Huttenlocher & Vasilyeva, 2007; Theakston & Tomasello, 2006; Thatcher, Branigan, McLean & Sorace, 2008; Thothathiri & Snedeker, 2008 amongst others).

1.2.   Priming Procedure

A typical procedure which assesses syntactic (or structural) priming in production involves participants either reading or hearing a set of sentences produced by the experimenter which are scripted to follow a syntactic construction of interest (primes), after which the subjects are asked to describe a set of events (targets), often depicted either as drawings or basic animations (e.g. Bock, 1986; Bunger, Papafragou & Trueswell, 2013). The responses to the targets are recorded and analysed for possible prime structure repetition.

Experimental designs, however, may vary in many respects. The presentation of primes and targets could differ. For example, a prime could be delivered as an utterance only (e.g. Bock & Loebell, 1990) or presented with a corresponding depicted event (Bernolet et.al., 2013); each prime could be paired with a target (e.g. Bock, Loebell & Morey, 1992), or alternatively, a block design might be adopted where five or ten primes are presented before a participant is required to describe targets (e.g. Savage et.al, 2006; Shimpi et.al., 2007). The majority priming experiments which do not follow a block design include fillers to avoid carryover effect from one prime to the next (e.g. Bock, 1986; Bock & Loebell, 1990); still some researchers abandon them in order to reduce fatigue when testing children (e.g. Gámez, Waterfall & Huttenlocher, 2008; Vasilyeva & Waterfall, 2012). In some studies participants are asked to repeat prime sentences before providing target descriptions (e.g. Bencini & Valian, 2008; Bock, 1886; Bock & Loebell, 1990; Bock et.al., 1990; Huttenlocher et.al., 2004; Savage et.al., 2006); in others, prime repetition is not a part of the procedure (e.g. Bernolet, Hartsuiker, Pickering 2009; Bernolet, Collina & Hartsuiker, 2016; Buckle, Lieven & Theakston, 2017; Fleischer et.al., 2012; Gámez et.al., 2009; Gámez & Vasilyeva, 2015; Messenger et.al., 2012; Valilyeva et.al, 2010).

Specific aims pursued by a given experiment would further dictate the variations in the procedure. For example, prime sentence repetition could be manipulated if a study aims to explore whether such repetition is necessary for priming to occur or not (e.g. Savage, Lieven, Theakston & Tomasello, 2003; Shimpi et.al., 2007) or to compare the strength of priming with or without the repetition (e.g. Huttenlocher et.al, 2004; Jungers & Hupp, 2009). In order to investigate long-term effects of priming, a lag-manipulation might be included, i.e. a condition where the target comes immediately after the prime would be compared to the one where a number of utterances intervene between a prime and a target (e.g. Bernolet et.al., 2016). Another factor that might be manipulated is the level of lexical similarity between a prime and a target (e.g. verb or noun phrase overlap) which is often aimed at establishing the effects of lexical boost on syntactic priming (e.g. Bock, 1989; Cleland & Pickering, 2003; Mahowald, James, Futrell & Gibson, 2016 for meta-analysis; Pickering & Branigan, 1998).

One of the key considerations of a priming study design is whether to run the procedure within or between subjects. While the vast majority of syntactic priming experiments are run within participants, i.e. the primes following the competing constructions in question (e.g. active and passive) are presented to every participant, some researchers select a between subject design (e.g. one group of subjects would be hear or read active and the other – passive primes). The choice is often dictated by the age of the participants tested. More often than not the priming procedures run with children adopt the latter (e.g. Bencini & Valian, 2008; Buckle, Lieven, & Theakston, 2017; see Vasilyeva, Waterfall & Gómez, 2012 for review) in order to minimise the effects of low attention span and fatigue in young participants. Between-subject design is utilised with adults too to avoid cross-prime contamination effects and to maximise the effect of priming (e.g. Kaschak, Loney & Borreggine, K.L., 2006), although this design is more often utilised in comprehension studies (Thothathiri, M., Snedeker, J. 2008).

Yet one more decision when designing a priming procedure is whether to incorporate a baseline. Although its necessity recognised by some researchers (Bencini & Valian, 2008; Gámez, et.al., 2009; Melinger & Dobel, 2005), surprisingly, this aspect generally does not seem to be considered critical. Many priming experiments do not include a baseline at all (Bock, 1986; Bock & Griffin, 2000; Bock et.al., 1992; Chang et.al., 2003; Gámez & Vasilyeva, 2015; Savage et.al., 2003;

Vasilyeva & Waterfall, 2012; Ziegler, Bencini, Goldberg & Snedeker; 2019 amongst others); others incorporate a control condition in which the subjects are exposed to a structure unrelated to the main prime(s), for example, if passive and active primes are tested, noun coordination primes are set as a baseline (Bernolet et.al., 2009; Fleischer et.al., 2012). I will argue in the next chapter that a baseline is vital in order to assess the true magnitude of the syntactic priming effects.

Priming designs may also vary in the way they disguise the experimental aims. Many studies present the procedure as a recognition memory test where the participants are asked to indicate if a sentence or an image has occurred previously in the task (e.g. Bock, 1986; Bock & Loebell, 1990; Ziegler et.al., 2019). Other researchers utilise confederate scripting technique whereby the experimenter's confederate and the participant are taking turns to describe images and then match them to these descriptions while the experimenter's descriptions are scripted to follow the prime structures (Bernolet, Hartsuiker & Pickering, 2012; Branigan, Pickering & Cleland, 2000; Fleischer et.al., 2012; Gruberg, Ostrand, Momma & Ferreira, 2019). Priming tasks conducted with children are often masked as a card game of "Snap!" where the experimenter and the participant lay out a card from their set one after another and describe them while aiming to "snap" the cards when they match; the experimenter's cards are scripted to follow a given prime construction (Messenger, Branigan, McLean & Sorace, 2012). Lastly, while the majority of syntactic priming studies are run in the lab, some researchers recently employed online techniques (Ziegler & Snedeker, 2018; Ziegler et.al., 2018; Ziegler et.al., 2019).

Before moving onto the theoretical framework adopted in this thesis, several factors found to interact with priming should be highlighted. Reitter et.al. (2011) distinguishes four such factors: (i) *cumulative effects*: multiple primes were observed to enhance priming; (ii) '*inverse frequency interaction*' (590) whereby the less frequent constructions, e.g. a passive, would lead to stronger priming effects compared to more frequent, e.g. an active (see Hartsuiker & Kolk, 1998; Jaeger & Snider, 2008); (iii) *lexical boost*, or a more pronounced priming effect in contexts where one or more lexical items in a prime sentence (often a verb) is repeated in the target; (iv) *priming decay effects*: the strength of priming is being lost as unrelated linguistic material interposes between a prime and a target. Any well-designed priming procedure as well as its analysis must take these factors into consideration.

1.3.   Theoretical Assumptions

In order to introduce the main hypothesis explored in the dissertation, it is necessary to stipulate the theoretical basis from which it evolved. The next two sections will be concerned with competence, or linguistic knowledge speakers possess, and section 1.3.3 will address performance, i.e. a model of how this knowledge is used to produce speech.

1.3.1.   Key Concepts Underpinning the Main Hypothesis

The literature on priming rarely contains transparent statements on precise theoretical backdrops against which the claims about the loci of syntactic priming are made. This is particularly true of the priming work reviewed in the Chapters 2 and 3, which by large adopts psychological perspectives on linguistic priming. As a consequence, it is often unclear what is understood by the terms *syntactic structure*, *argument structure* or *information structure* in this literature. One of the main aims of this section is to establish what the former two concepts are taken to mean in the account of syntactic priming I propose in the dissertation, while the latter will be discussed in section 2.4 of the next chapter. An additional aim here is to briefly overview the Minimalist Program (MP) of Generative Grammar framework (Chomsky, 1993, 1998) my proposal is grounded in[2].

Following a generalised version the Minimalist Program (adopted from Casadio, 1999, Kennedy, 2000) the grammar has four components: 1. a lexicon, consisting of lexical entries each of which possess a number of properties that would define its subsequent syntactic behaviour; 2. a computation system that generates the structure by merging these lexical elements and assigning labels to the structural formations; 3. logical form (LF), a level of representation at which the sentence is interpreted; and 4. phonological form (PF), an articulatory-perceptual level of representation. The main

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[2] The theoretical distinctions within the MP, e.g. the derivational and representational theories which rise from this framework (see Hunter, 2018 for the overview), is beyond the scope of this dissertation. Suffice it to say that a representational framework (Brody, 1995) will be assumed here.

tool of the computational system is a recursive structure-building operation *Merge*, which is constrained by the principles of economy. The operation is of the two types: (i) *external Merge*, which draws items from a *numeration* (or a set of items selected from the lexicon in the number required for the sentence generation); and (ii) *internal Merge*, which entails movement and produces the structure which surfaces and is then interpreted at LF (Chomsky, 2001). Thus, to derive a sentence, lexical units are fetched from the numeration and undergo Merge operations defined by their respective syntactically active features. Once these are completed, i.e. at the *spell-out* stage, the structure interfaces with LF and PF.

Reflecting the ubiquitous "displacement" property of natural language, syntactic units are often interpreted in positions that differ from those where they are overtly realised (Chomsky, 2009; Nunes, 2011). The chains, emerging as a consequence of movement from the base position where a silent copy/trace[3] of a given item remains, to the landing site where the item is pronounced, could be viewed as interpretively constructed grammatical objects (Brody, 1996). *Syntactic structure* is therefore understood here as a "record" of the structure-building operation *Merge*, thus incorporating information on the movement chains' architecture and their identity. It is noteworthy that this conception of syntactic structure is in stark contrast to the approach adopted in both classic and recent priming work, which appeals to a shallow, surface representation of syntactic structure (e.g. Bock, 1986; Bock & Loebell, 1990; Ziegler, Snedeker & Wittenberg, 2018; see Pickering & Ferreira, 2008 for review), the view I will return to in Chapter 3.

The mental lexicon from which the lexical items are drawn, is a structurally organised body of knowledge, where the properties of its entries predict the syntactic composition of a sentence (Beckmann, 1994). Following Reinhart (2016), I assume here that the lexicon is 'an active component of the grammar, containing information about events and their participants and allowing the application of valence-changing operations [i.e. the operations that alter the number of arguments a given predicate selects]' (Reinhart in Horvath & Siloni, 2016: 129). Each lexical entry carries the information about its general Merge-capacities and the restrictions on it, defining the

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[3] While it should be acknowledged that there are two theoretically distinct approaches to movement - the trace theory and, following Chomsky (1993) the copy theory (see Nunes (2011) for discussion), the differences between the accounts are not relevant for the discussion developed in the thesis.

item's syntactic behaviour, its subsequent interpretation and realisation at the output. This information includes the item's categorical and sub-categorical aspects (e.g. noun, verb, adjective etc.), its agreement potential (e.g. for person, gender or number), the sound attributes that determine how the word should be realised at the output, and the semantic properties relevant for syntax (e.g. animacy). Most importantly, especially for the hypothesis I defend in this thesis, predicative lexical items incorporate the information on their *argument structure*, the term I turn to next.

I adopt Grimshaw's (1990) understanding of *argument structure* as 'the lexical representation of grammatical information about a predicate' (1). The representation contains arguments' theta(θ)-grid, i.e. number and type of θ-roles (external/internal), and it is structured to reflect prominence relations between the arguments, determining the syntactic configurations projected by the predicate. This prominence is conditioned by two equally weighted dimensions – (i) thematic and (ii) aspectual (or event-structural) characteristics of a predicate (Grimshaw, 1990). While thematic role values (e.g. agent, patient, goal etc.) are not directly encoded in argument structure, they nevertheless impact on the structure building since they are ranked in terms of their prominence. The first, thematic, dimension of argument prominence relations, is defined by *the thematic hierarchy* which is said to be operative across languages. There is a variation in the exact presentation of the thematic hierarchy (see Levin, 2005 for overview), but I will assume the standard formulation adopted from Grimshaw (1990) shown in (1) below.

1.   *Thematic Hierarchy*

        Agent > Experiencer > Goal/Source/Location > Theme/Patient

In addition to the thematic hierarchy, the second dimension of argument prominence relations is aspectual, and it has to do with event-structural characteristics of a clause. Grimshaw (1990: 26-27) argues that events can be broken down into sub-events, e.g. the event expressed in a sentence *John broke the vase* could be divided into [activity] and [state]. *John* is the argument that participates in the first [activity] sub-event of *causing to break* and is thus more prominent than *the vase*, the argument which participates in the second sub-event of *acquiring the state of being broken*.

This idea could be developed a little further in order to capture the difference in the behaviour of dative alternation verbs, e.g. *give* or *send*. I will return to this issue in section 1.4 when I discuss the main hypothesis of this thesis. A sub-event of [CAUSE] itself could be of different kinds. In a double object dative construction (DOD), e.g. *John gave Mary a book*, an event of *giving* can be characterised as [cause a change of state]; and in a prepositional object dative (POD), e.g. *John gave a book to Mary*, as [cause a change of place] (Pinker, 1989). The event structure of DOD denotes possession, and may be annotated as [X CAUSE [Y HAVE Z]], while the event structure of POD denotes movement to a goal and may be annotated as [X CAUSE [Z GO TO Y]]. Such representation makes it clear that the hierarchical relations between Y and Z differ in DOD and POD. It could thus be said that the event structure affects the prominence relations between the arguments within a sub-event.

In sum, following Grimshaw, the prominence ranking is a result of a complex imposition of the thematic hierarchy and event-structural properties of a predicate[4]. The question of how these two dimensions interact is perhaps less important for the present discussion; what is of relevance here is that this ranking ultimately determines the way predicates merge with their arguments during the syntactic structure-building process. Specifically, a predicate is first merged with an argument that is ranked the lowest on the thematic hierarchy, meaning that it would be the most embedded, while an argument that is ranked the highest would be the least embedded (Grimshaw, 1990; Kiparsky, 1985; Levin, 2005). The impact of predicates' event-structural properties on the syntactic structure goes beyond the depth of arguments' embedding, which will be discussed in section 1.4 (Figure 1. 3).

The concept of argument prominence will be developed further in the next section to incorporate more recent theoretical work. As I will demonstrate in the subsequent empirical chapters, it has important implications for reinterpreting our understanding of priming, allowing to argue for alternative explanations to the experimental findings reported in prominent syntactic priming literature. In section 1.4

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[4] Another way of conceptualising the two dimensions which condition arguments' prominence outlined by Grimshaw (1990) is to say that it is the arguments' position in the event structure that fully defines their ranking in the thematic hierarchy (Baker, 1997; Jackendoff, 1990 in Levin, 2005). Yet another alternative is that the ranking of arguments is determined by clusters of their even-based properties, e.g. the properties of agent would include volitional involvement in the event/state, sentience, movement etc. (Dowty, 1991).

I will return to the notion of argument structure in order to explore the argument-structural properties that matter for the main hypothesis developed in this thesis, utilising examples from Bock and Lobell's (1990) priming experiment as well as those used in the experiment reported in Chapter 4 to illustrate them.

1.3.2. Argument Prominence Hierarchy

The hypothesis presented in this section, which I will term *Argument Prominence Hierarchy Hypothesis*, or *APH Hypothesis* for short, is concerned with the linear order or arguments in spontaneous sentence production. The hypothesis brings to light the significance of the animacy distribution in a sentence, which appears to have played an important role in the structural choices the participants made across a number of priming experiments. This factor, which has been largely ignored in a number of influential priming studies, is not related to the structure of the primes themselves and therefore does not directly bear on the issue of the exact location of priming within the syntactic computation per se. Rather, it highlights the effects of the relative interpretive salience of the arguments in the target events described as part of the priming procedure. The theoretical basis underpinning my position with respect to the previous priming studies discussed in the dissertation is as follows. Syntactic priming aside, Titov (2012, 2017) proposed that in addition to the thematic hierarchy outlined in (1) above, the linear order of arguments in a sentence is regulated by the *Argument Prominence Hierarchy* (APH) outlined in (2). Whenever the two hierarchies misalign the latter will override the former.

2.   *Argument Prominence Hierarchy (APH)*

±presupposed > ±referential > ±human> ±animate

'Whenever a higher-ranked feature is operative, it overrides all the lower-ranked features, i.e. the interpretation of the latter becomes immaterial for the ordering of objects. However, whenever a higher-ranked feature is vacuously satisfied (i.e. the arguments carry equal values of this feature) a lower-ranked feature regulates the order of objects.'

(Titov, 2017: 14)

Titov (2012; 2017) showed through the rigorous analysis of both, syntactically flexible Russian and relatively rigid English, that in the process of sentence formation there is a precondition for the more interpretively prominent material to precede the less prominent. This prominence (or salience) is defined by the features outlined in the APH. Thus, for example, a [+human] argument would be more salient and therefore precede a [+animate/-human] argument. In morphologically rich languages like Russian with a relatively free word order, the APH controls the phenomenon of neutral scrambling. For instance, the event where a dog bites a boy is most likely to be described with an O(bject)V(erb)S(ubject) order as *Mal'čika ukusila sobaka*/BoyACC bit dogNOM. The passive could also be used (e.g. *Mal'čik byl ukušen sobakoj*/BoyNOM was bitten dogINSTR), although the construction is infrequent in Russian and requires additional interpretive licence. In English, the encoding of argument prominence is more restricted as it is morphologically poorer and therefore syntactically less flexible (Titov, 2012, 2017). Thus, the event of the kind shown above would mostly likely be described with a passive.

Anticipating the discussion somewhat, in my interpretation of the findings emerged from existing priming experiments, e.g. Bock & Loebell (1990, Exp.1 and Exp.2), Vasilyeva and Waterfall (2012, Exp.2, Exp.3) amongst others, I will propose that Titov's (2012; 2017) *Argument Prominence Hierarchy Hypothesis* plays an important role in determining the structural choices participants make during a syntactic priming procedure. This proposal is not unexpected since animacy has been widely demonstrated to guide syntactic preferences in spontaneous narratives and in non-priming experiments (see Vihman & Nelson, 2019 for review). The results of my own experiments reported in the subsequent chapters also strongly support this view and allow to further hypothesise that priming may be enhanced by the effects of the animacy distribution in targets, to which some experimental evidence lends support (Gámez and Vasilyeva, 2015).

Having highlighted relevant aspects of a competence theory of grammar, a suitable production model should also be introduced. In order to understand what could potentially give rise to syntactic priming effects, I will now present a brief summary of one such model and explore possible loci of priming.

1.3.3.   Levelt's 'Speaking' Model

A prominent and influential model of speech production proposed by Levelt (1998), and often referred to as 'Speaking', is largely built on evidence from studies which analyse speech errors, and it aims to explain a series of incremental processes that lead to fluent speech. The model is rooted in lexical grammar and as such sits well with the Minimalist Program. One of the core concepts within the model is the notion of *lemma*. This term originally brought in from lexicography (Kempen & Huijbers, 1983), is used in psycholinguistics to describe solely and exclusively a set of semantic and syntactic properties held in the mental lexicon for each lexical entry. It is, in short, a bundle of 'declarative knowledge about the word's meaning and grammar' (Levelt, 1989: 236). Such knowledge is said to be independent from a set of phonological and morphological characteristics held for each word in the lexicon (Kempen & Hoenkamp, 1987). Following Levelt, semantic aspects of lemma specify the word's conceptual structure. For example, the conceptual structure for *give* has the following three argument slots, each of which would receive a grammatical function: 'X, a PERSON, which is both the agent of the causative EVENT and the source of the PATH; Y, a THING, which is the theme, and Z, PERSON, which is the goal of the PATH' (189). Syntactic information contained within a lemma include such aspects as the entry's syntactic category, its grammatical functions assignment profile, argument-structural specifications and diacritic feature variables like tense, aspect, mood, person and number. One of the main assumptions underpinning Levelt's model is that there is nothing in the speaker's message that can by itself call specific grammatical forms into operation, and that the syntactic structure generation is governed by the following two aspects: (i) the characteristics of the *lemma* component contained within the lexical units evoked by the intended message, and (ii) the order in which individual *lemmas* are activated (see p.181). In other words, the lexical entry's syntactic behaviour is determined entirely by its lemmatic properties.

Levelt (1998) proposes that an utterance is generated in two main phases – planning, or conceptual preparation, and formulating. Let us consider the model using "the blueprint of the speaker" adopted from Levelt's later work in Figure 1. 1 below.

Figure 1. 1 A blueprint of the speaker, adopted from Levelt (1999: 87).
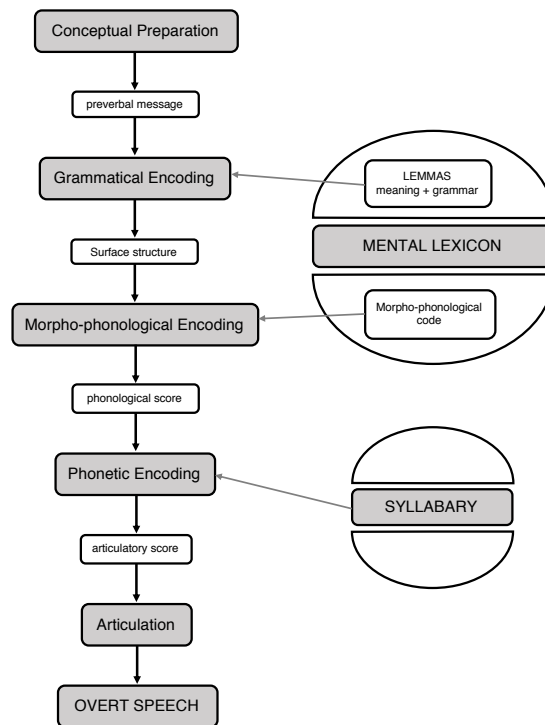
Planning constitutes the preparation of preverbal message and proceeds in two steps: Macroplanning, where the communicative intention is established and the content for the subsequent speech act is selected; and Microplanning, where the information structure is assigned. Formulating incorporates grammatical and phonological encoding. At the grammatical encoding phase, the lemmas which satisfy the conceptual requirement of the message are retrieved (the order of their retrieval is defined by the item's accessibility – see the discussion below); the message is examined for predicate-argument relations; and grammatical dependences are established and mapped onto a surface structure. This surface constituent structure then enters phonological encoding where the words' sound forms are accessed, and prosodic patterns are generated. The output of this phase is a fluent string of speech.

As the system of sentence generation functions in a parallel and incremental manner, lemmas are grammatically and phonologically encoded as soon as there are retrieved, and it is possible for one fragment of a message to be at the later phase of its generation while other fragments may just be entering initial phases. Note that drawing on experimental evidence, Levelt (1998) also suggests that there is a

possibility of forward and backward feedback between each of these phases described (see the discussion on pp. 281-282).

Lexical items' accessibility is said to play an important role in the order of their retrieval, which, in turn, affects grammatical encoding. Specifically, Levelt suggests that lemmas for the entries with high conceptual accessibility are retrieved early; as a consequence, these items tend to take syntactically prominent positions, meaning that they are being assigned prominent grammatical functions (e.g. subject). Topicalization is one of the factors underpinning high accessibility, which explains why topics (or discourse given concepts that convey pragmatic aboutness (Reinhart, 1981)), often occupy subject positions. Topicalization aside, Levelt, following Fillmore (1977), identifies a number so-called "human interest" factors which may also contribute to high lexical accessibility. Those include humanness, change of state and definiteness; thus, prominent syntactic positions would be more likely to be occupied by human entities than non-human, by an object that changes state than that which does not, and by a definite referent compared to an indefinite.

Having mapped out the theoretical framework this thesis adopts, I will now turn to the main hypothesis I argue for in this dissertation.

1.4.   The Main Hypothesis

Following the competence and performance models of grammar outlined above, at least two conceivable loci of syntactic priming could be identified. Let us use Levelt's "blueprint of the speaker" introduced earlier and repeated here in Figure 1. 2 below to illustrate these possible loci. First, priming could be sensitive to orders derived by movement. This corresponds to the surface structure in the Levelt's model (highlighted yellow), which is said to be the output of the grammatical encoding phase. It includes linear surface orders of constituents or, perhaps, their structural hierarchy post movement (at the spell-out). Such view appears to be one of the most prevalent in the priming literature (see Pickering & Ferreira, 2008 for review), and I shall come back to it in section 1.5.2 of this chapter.

Second, it could be proposed that syntactic priming may be operative at the level of grammatical encoding itself (highlighted green, Figure 1. 2 below), that is, beyond the shallow level of surface constituency. This is the view I will ultimately defend in the thesis.

Figure 1. 2 Possible priming loci incorporated into "the blueprint of the speaker", a production model adopted from Levelt (1999: 87).
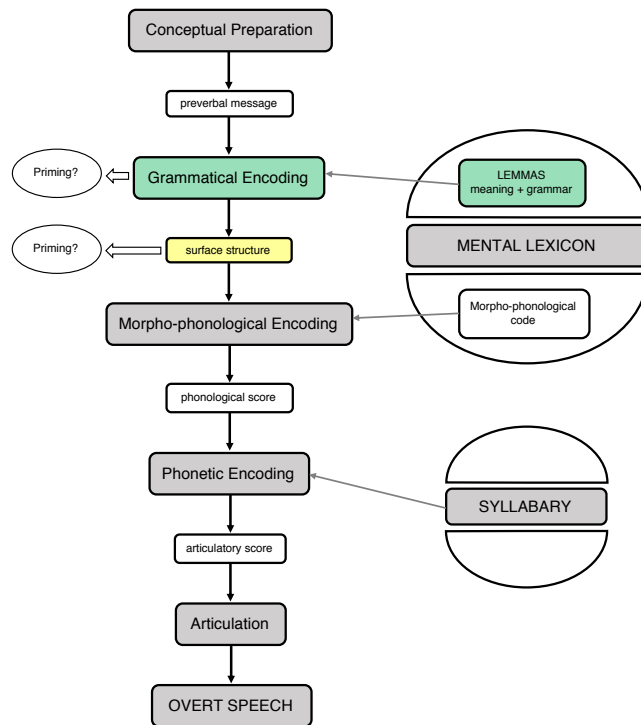
Pickering and Branigan (1998) offer a priming model which seems relevant for the current proposal. They found that double object datives (DOD) prime DODs and that prepositional object datives (POD) prime PODs[5]. They suggest that syntactic priming could be conceived as an activation of what they call 'lemma stratum nodes'. It is assumed that for each lexical entry, there is a lemma node that contains the word's basic form, and as such it is stripped from any morphological features; the

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[5] Priming effect in DOD and POD have been studied extensively in adults and children and found to be consistent and reliable (e.g. adults: Bernolet, Collina & Hartsuiker, 2016; Bock, 1986; Bock, Chang & Onishi, 2007; Cho-Reyes & Thompson, 2012; Gruberg et.al., 2019; Thothathiri, Snedeker, J. 2008; Ziegler & Snedeker, 2018 amongst others; children: Buckle, Lieven, & Theakston, 2017; Peter, Chang, Pine, Blything & Rowland, 2015 amongst others).

node is connected to conceptual/semantic feature nodes, e.g. animacy or humanness nodes, and to syntactic property nodes, e.g. the nodes that specify the entry's grammatical category and other node(s) that reflect its 'combinatorial potentials', in their terminology – 'combinatorial nodes' (636). For example, the lemma for the verb *give* is linked with the VERB, NP_NP and NP_PP nodes. If *give* is used in a DOD structure, the VERB and NP_NP nodes are activated; if it appears in a POD construction, the VERB and NP_PP nodes are activated instead. This activation subsequently affects the syntactic choices speakers make in a priming task. The combinatorial nodes which are fired up during parsing of a prime may stay active long enough to influence the lemma selection at the early stages of sentence production, specifically, at the grammatical encoding phase. In the case of *give*, such activation prompts the selection of another predicate (e.g. *send*) which is connected to the same NP_NP or NP-PP nodes, but since only one of these nodes is active depending on whether a DOD or POD prime was heard, only one of these constructions is triggered in production. It should be added that the lexical boost effect emerging when the verbs in primes and targets match, may be attributed to the cumulative strength of multiple combinatorial node activation.

Pickering and Branigan (1998), however, do not specify whether the notion of combinatorial nodes reflects the verb's argument structure itself or the constituent order that is created by the syntactic computation as a consequence of this argument structure. Therefore, this perspective can potentially accommodate both priming loci outlined above (highlighted green and yellow in Figure 1. 2 above). The issue with the model is that on one hand, it appeals to the lemma stratum, which is one of the components of the grammatical encoding stage, but on the other hand, the model relies on linear representation of constituents, which is part of the surface structure, the output of the grammatical encoding.

I propose to restrict the model and suggest that the properties Pickering and Branigan call 'combinatorial' are better captured in terms of argument structure specifications. One way to approach this would be to say that since semantically DOD constructions encode caused possession and POD encodes caused motion (Beavers, 2011), verbs like *give* and *give to* constitute two distinct predicates with distinct thematic structures at the level of argument structure (or lemma stratum), despite undoubtedly being conceptually related. *Give* selects goal and theme as its two internal arguments, while *give to* selects theme and location. Recall that

according to the thematic hierarchy outlined in (1), theme is ranked the lowest, which means that it has to be embedded deeper than goal or location. As shown in Figure 1. 3 below, the theme NP *a letter* is indeed lower than the goal NP *Mary* in DOD (a), but in POD (b), the theme and location are embedded at the same level[6]. This can be explained by the interplay between the thematic hierarchy and the event-structural properties of these verbs. I have suggested earlier (section 1.3.1) that event structure dictates the prominence of arguments within each sub-event. With DOD reflecting the [X CAUSE [Y HAVE Z]] event and POD reflecting the [X CAUSE [Z GO TO Y]] event, the hierarchical relations between the theme (Z) and the goal/location (Y) in those two differ: goal > theme in DOD; theme > location in POD.

Figure 1. 3 Syntactic representations of double object and prepositional object constructions.
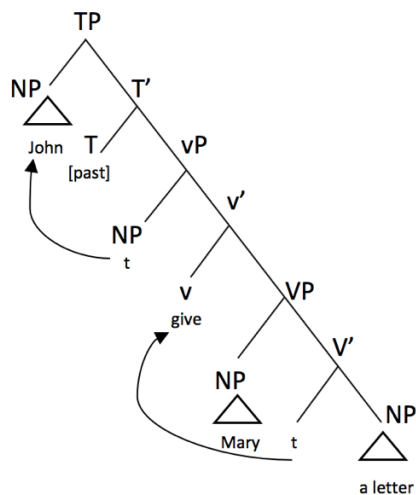
(a) John gave Mary a letter.
Surface constituent structure (DOD):
NP-V-NP-NP
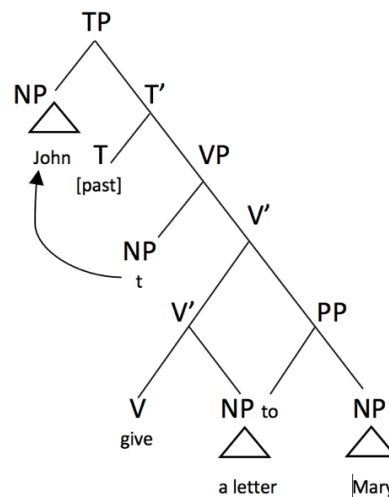
(b) John gave a letter to Mary.
Surface constituent structure (POD):
NP-V-NP-PP

These argument-structural distinctions could be represented within the multi-node lemma stratum network. Such nodes would reflect not only the arguments' θ-grid characteristics, but also their prominence ranking as per the thematic and event-

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[6] In English, other grammatical considerations apply that ensure that the NP argument is merged earlier than the PP argument in a POD construction. This has to do with the fact that English is a VO language with no morphological case marking on full nouns (see Neeleman and Weerman, 1997). The details are not relevant for the current discussion, which is about argument structure.

structural hierarchy. Consider Figure 1. 4. If we represent the thematic hierarchy ranking with roman numerals and the event-structural hierarchy ranking with arabic numerals on the θ roles, the combinatorial nodes for *give* and *give to* could be conceptualised as in (a) and (b) respectively.

Figure 1. 4 Lemma stratum node representations for the *give* and the *give to*, where i, iii, iv are thematic hierarchy ranking indices, and 1, 2 are event structural ranking indices.

Thematic hierarchy: Agent > Experiencer > Goal/Source/Location > Theme
                [i]   [ii]   [iii]   [iv]

(a)   *give*   ⟶ $[\underline{\theta}, \theta_1, \theta_2]$ [X CAUSE [Y HAVE Z]]
                        | | |
                       [i] [iii] [iv]

(b)   *give* ⟶ $[\underline{\theta}, \theta_1, \theta_2]$ [X CAUSE [Z GO TO Y]]
    (*to*) | | |
                       [i] [iv] [iii]

Nevertheless, the exact priming locus cannot be deduced on the basis of the DOD-POD comparison because the two constructions are distinct in both their shallow syntactic representations, i.e. surface constituent structure NP-NP vs. NP-PP, and their lemma stratum representations – see the (a) and (b) examples in Figure 1. 4. above.

Thus, in order to establish which of the two representations syntactic priming is sensitive to, a comparison should be drawn between sentences which have the same surface phrase structure but differ in their argument structure representations. Unergative, passive and unaccusative verbs can potentially project constructions which are identical in terms of their surface constituent order but have distinct argument structures, which makes them suitable candidates. Consider the examples from the study by Bock and Loebell (1990, Exp. 2), which will be at the centre of our discussion in Chapter 3. In this experiment the primes containing passive verbs (e.g. *The construction worker was hit by the bulldozer*) were pitched against the locative primes containing unergative or unaccusative verbs (e.g. *The construction worker was digging by the bulldozer*[7]; and *The 747 was landing by the airport's control tower*,

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[7] This is arguably a transitive construction where the verb *dig* takes an optional internal argument, which is omitted. Bock and Loebell (1990) evidently treat it as an intransitive.

respectively). The sentences follow the identical NP-aux-V-PP phrase order. While in all three cases the verbs are one-place predicates, only the unaccusative and the passive verbs' theta-role is internal. The combinatorial nodes that these verbs' lemma nodes are linked with could then be visualised in the same way it was done for dative constructions earlier, see in Figure 1. 5 below for an interim representation.

Figure 1. 5 Combinatorial node representations for the passive (*hit*), the unaccusative (*land*) and the unergative (*dig*) (to be revised).

Thematic hierarchy: Agent > Experiencer > Goal/Source/Location > Theme
[i] [ii] [iii] [iv]

passive (*hit*)	unaccusative (*land*)	unergative (*dig*)
[θ] | [iv]	[θ] | [iv]	[θ] | [i]
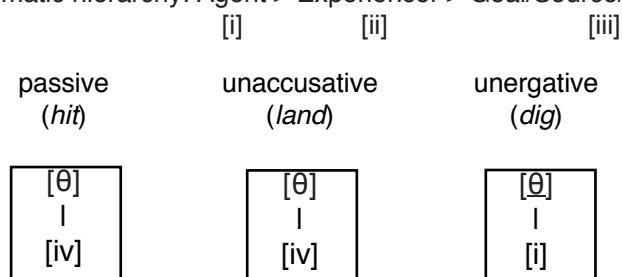
These combinatorial lemma values specify the architecture of the movement chains and including the positions filled by the moved constituents (i.e. grammatical subjects); and they clearly differ between the passive and the unaccusative on one hand and the unergative on the other, see Figure 1. 6 (a, b, c).

Figure 1. 6 Partial syntactic representations of the passive (a), unaccusative (b) and unergative locative constructions (c) used in Bock & Loebell's (1990) study.
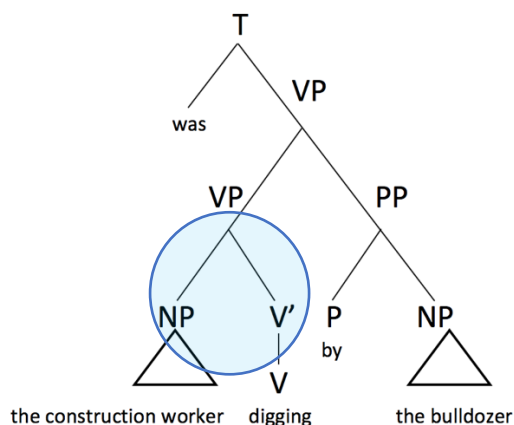
(a) The construction worker was digging by the bulldozer.
Surface constituent structure (unergative):
NP-aux-V-PP
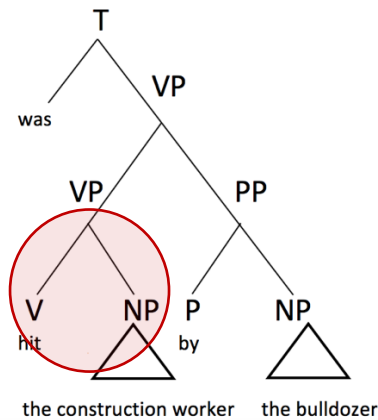
(b) The construction worker was hit by the bulldozer.
Surface constituent structure (passive): **NP-aux-V-PP**
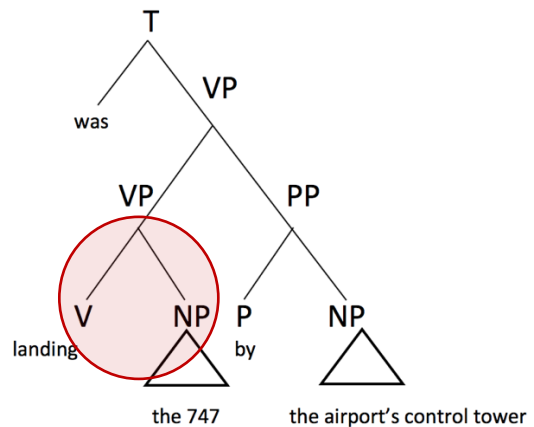
(c) The 747 was landing by the airport's control tower.
Surface constituent structure (unaccusative): **NP-aux-V-PP**

Given the *VP-internal Subject Hypothesis*, according to which the subject is generated within VP (e.g. Koopman & Sportiche, 1991), in the passive and the unaccusative primes the subject fills the complement of the verb position at the foot of the chain, while in the unergative prime it takes the specifier of VP position.

Further, the passive and the unaccusative locative primes also diverge. This divergence is not immediately apparent, but, once again, it has to do with the argument-structural, in this case valence-changing, operations. The external θ-role of a passive verb is suppressed by a lexicon-based operation referred to as *existential closure* (annotated as ∃) (Chierchia, 1998) or *saturation* (Reinhart, 2002). Such operation existentially closes the external argument; it is no longer syntactically projected, although still realised semantically (Reinhart, 2016). Importantly, Grimshaw (1990) argues, the suppressed argument position is encoded in the argument structure. In contrast, in the case of an unaccusative verb, the external θ-role is removed altogether by *expletivization*, a different lexical operation – *reduction* (Reinhart, 2002) (annotated as R)[8], see Figure 1. 7 below. Presumably, this operation is also represented in the argument structure.

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[8] From this it follows that *break* in *The vase was broken by John*, for example, and *break* in *The vase broke*, are two distinct predicates with distinct argument structural representations.

Figure 1. 7 Partial syntactic representations of the passive and unaccusative locative primes from Bock and Loebell (1990, Exp. 2), where $\exists\underline{\theta}$ = existentially closed (saturated) external $\underline{\theta}$-role, and R$\underline{\theta}$ = reduced (expletivized) external $\underline{\theta}$-role.

(a) The 747 was alerted by the airport's conrol tower.
Surface constituent structure:
NP-aux-V-PP

(b) The 747 was landing by the airport's control tower.
Surface constituent structure:
NP-aux-V-PP
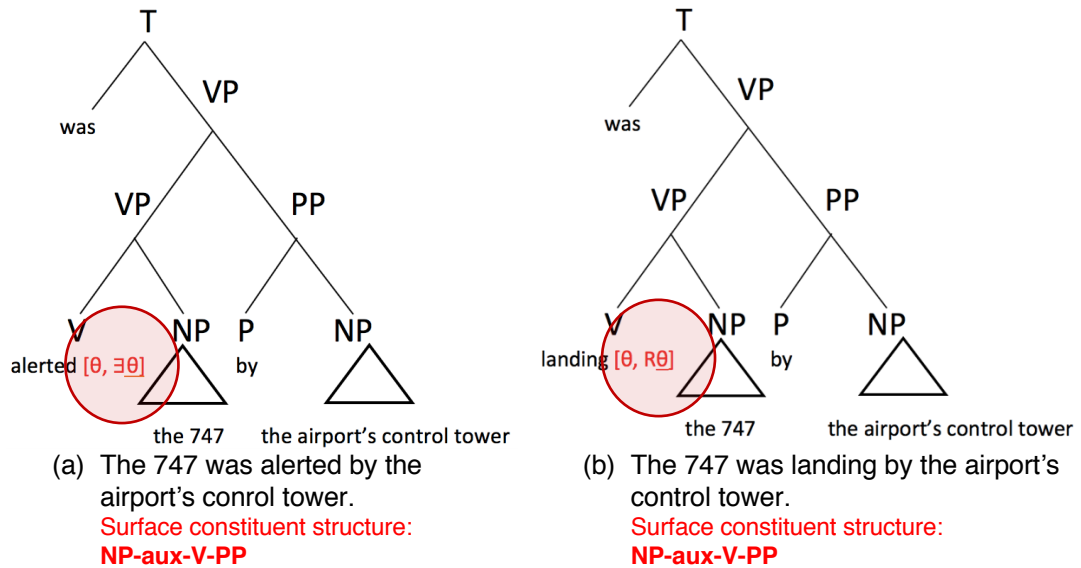
We can now adjust the combinatorial node representations for the passive and unaccusative verbs presented earlier to include the valence-operations the external $\underline{\theta}$-role must undergo – $\underline{\theta}\exists$ for the passive and $\underline{\theta}$R for the unaccusative, and represent it in the following way:

Figure 1. 8 Revised combinatorial node representations for the passive *alert* and the unaccusative *land*.

Thematic hierarchy: Agent > Experiencer > Goal/Source/Location > Theme
[i] [ii] [iii] [iv]

passive
(*alert*)

unaccusative
(*land*)

$$[\exists\underline{\theta}, \theta]$$
|
[iv]

$$[R\underline{\theta}, \theta]$$
|
[iv]
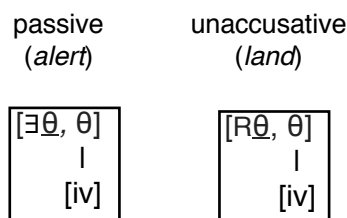
Another important factor to consider here is the status of the prepositional *by*-phrase in a passive construction, which may also play a role in syntactic priming. Theories vary on how exactly to treat the transfer of the external theta-role to the NP in the *by*-phrase. Jaeggli (1986), for example, suggests that the lexical entry of the

passive *-en* lists its capacity to optionally subcategorise for a *by*-phrase, and if it does, the external theta-role is transferred to this *by*-phrase and presumably transmitted to the NP by the preposition (Lasnik, 1988). Importantly, the suffix only gains this capacity once it is affixed to the verb's stem (Jaeggli, 1986). If we assume that it is the preposition *by* itself licences and assigns the external θ-role to its NP, then a *by*-phase would be expected in other sentence types such as unaccusative constructions or middles, where they are, indeed, not permitted (Bruening, 2013), see (3a,b) below.

3. (a)   *The door opened by John. *(unaccusative)*
          The door was opened by John. *(passive)*

    (b)   *The book read easily by John. *(middle)*
          The book was read by John. *(passive)*

On Grimshaw's (1990) view, the *by*-phrase is licensed by the suppressed external argument. The *by*-phrase is said to maintain an intermediate status of an *a(argument) adjunct* as it 'resemble[s] arguments in [its] mode of licensing, yet unlike arguments [it is] not theta-marked, and [it does] not satisfy argument structure positions' (109). These theoretical variations, however, are not essential for the purposes of our discussion. The crucial point is that the *by*-phrase in the passive appears to have a unique status from the argument-structural point of view, the status which most certainly cannot be acquired by PPs in non-passive constructions such as the locative sentences utilised in Bock and Loebell's (1990) experiment. This factor will play an important role for interpreting the results obtained in the first experiment reported in Chapter 2, and I will return to it in section 2.8.4.

Another example of sentences which adhere to the same surface constituent order while containing the verbs with distinct argument structure are the constructions I explore in Chapter 4. These are Russian three-place predicate structures such as *Devočka postavila kuvshin na stupen'ki*/GirlNOM placed jugACC on stepsACC and monotransitive constructions with a PP adjunct like *Devočka razbila kuvšin na stupen'kax*/GirlNOM broke jugACC on stepsPREP. Both of them follow an NP-V-NP-PP phrase structure; but while the former is projected by the verb which takes two internal arguments – an NP (*jug*) and a PP (*on steps*), the verb in the latter takes a single internal NP argument (*jug*). The PP *on steps* is an adjunct in the monotransitive

sentence and does not form part of the verb's argument structure. The combinatorial nodes for these two constructions could be conceptualised as shown in Figure 1. 9 below. Note that following Marantz (1984), the PP argument is said to have an internal thematic structure, which is marked by "[…]" in the figure below. While the exact representation of this thematic structure is not essential for our purposes, it is nevertheless important to indicate its presence, if only to distinguish from the combinatorial node identity of give to suggested in Figure 1. 4 (c).

Figure 1. 9 Combinatorial node representations for the 3-argument verb *postavit' na* (place on), and the 2-argument monotransitive verb with a PP adjunct *razbit'* (break).

Thematic hierarchy: Agent > Experiencer > Goal/Source/Location > Theme
                        [i]   [ii]   [iii]   [iv]

3-place predicate structure: 2-place predicate structure:
PP part of argument structure   PP adjunct
(*postavit' na*/place on)   (*razbit'*/_break)

$$[\underline{\theta}, \theta, \theta[\ldots]]$$
$$\quad | \quad\quad |$$
$$[iv] \quad [iii]$$

$$[\underline{\theta}, \theta]$$
$$\quad |$$
$$[iv]$$
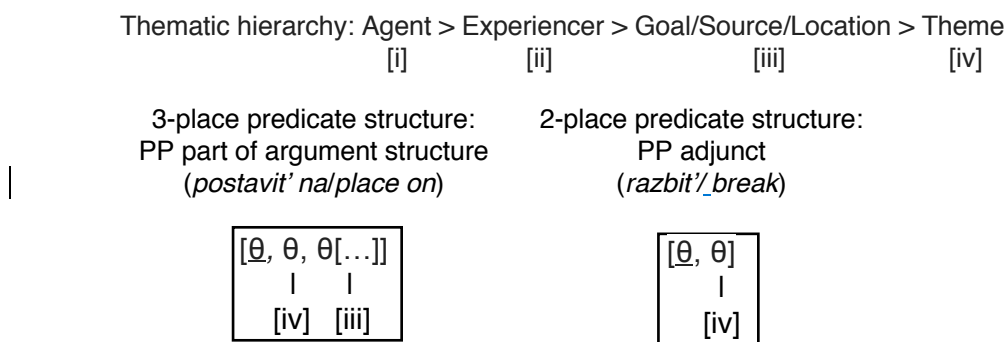
Let us now return to the second of the two possible loci of priming introduced at the start of this section, the grammatical encoding phase (see Levelt's "blueprint of the speaker", Figure 1. 2). Recall that I suggested that while the model of priming at the multi-node lemma stratum proposed by Pickering and Branigan (1998) can be adopted for our purposes, it was necessary to restrict it. The combinatorial nodes the activation of which is argued to evoke priming, must reflect properties that go beyond linear constituent order. We are now in the position to summarise such properties; they include: (i) a predicate's event-structural aspects, (ii) the number and type (external/external) of θ-roles it assigns (or its θ-grid specifications), and (iii) valence-changing operations such as existential closure and reduction. The position I argue for in this thesis is that these argument-structural characteristics can be demonstrated to play a crucial role in priming. The overarching hypothesis guiding the present research enquiry is thus formulated in (4). I will term this *Argument Structure Priming Hypothesis* to signal that it stands in opposition to alternative conceptualisations of syntactic priming, the proponents of which argue that it operates on a more superficial, shallow level of surface constituency.

4.   *Argument Structure Priming Hypothesis*

> Syntactic priming taps into the abstract syntactic representation that forms part of the lemma stratum; as such it is sensitive to the argument-structural information which includes the number of arguments a predicate subcategorises for, their prominence ranking as per the thematic and event structure hierarchy, and the valence-changing operations the verb may undergo.

Since the argument structure of a predicate determines the way a given syntactic structure will unfold by defining the architecture of the chains formed as a result of movement operations, the underlying representation which reflects this architecture could potentially be primed. The empirical evidence I provide in Chapters 3 and 4, however, does not lend support to the above. As we shall see, it appears that certain argument-structural aspects shared between the prime and the target may evoke priming even in the absence of the similarity in their underling syntactic representations. At the same time, I would like to stress that this not being a theoretical study, I will not be able to discuss or debate the exact nature of the mapping between argument-structural aspects of the lexicon and the syntactic representation here. There are various theories in the literature exploring the nature of the interface between syntactic representation and the lexicon. It is not the aim of this dissertation to evaluate these or adjudicate between them. All I claim is that the level(s) of representation relevant for syntactic priming seem to include argument-structural properties. If the subsequent empirical results and their interpretation turn out to be on the right track, then they will potentially constrain or shape the theoretical conceptualisation of the lexicon-syntax mapping.

Before presenting the existing approaches to syntactic priming, let us return to the idea summarised at the beginning of this chapter: through observing a subconscious activation of specific linguistic aspects, priming allows to isolate these aspects and claim that they are represented in the model of human grammar. Thus, if the hypothesis I have put forward here is correct, it is reasonable to suggest that the argument-structural aspects of a predicate such as the number of arguments it subcategorises for and the lexical (valence-changing) operations its arguments may

undergo are represented in the human brain during language processing. This is of course not new but given the conception of syntactic priming frequently found in the literature, it still seems important to state.

1.5.   Alternative Accounts of Syntactic Priming:

In this thesis I advocate for the existence of truly *syntactic priming*, proposing that priming is susceptible to the argument-structural aspects of a sentence. However, the syntactic priming literature is dominated by alternative approaches. The three main positions discussed in this chapter are *Discourse Function* (or, as I will term it, *Patient Prominence*) *Priming* (Bernolet, Hartsuiker & Pickering, 2009; Fleischer, Pickering & McLean, 2012; Vasilyeva & Waterfall, 2012), *Thematic Role Priming* (Chang, Bock, Goldberg, 2003; Hare & Goldberg, 1999; Salamoura & Williams, 2007; Ziegler & Snedeker, 2018), and *Constituent Structure Priming* (Bock, 1996; Bock & Griffin, 2000; Bock & Loebell, 1990; Bock, Loebell & Morey, 1992), the latter being the prevailing approach for over thirty years[9]. I shall explore those accounts in turn, but first the necessary terminology must be presented.

A brief outline of the basic terms is generally acceptable for most papers reporting priming studies. For the priming work discussed in this thesis, however, a short footnote on the interchangeable use of the terms *syntactic* and *structural priming* (alternatively, syntactic/structural persistence or repetition) would not surface, as the two terms pave fundamentally distinct paths in approaching the phenomenon. The difference is not trivial. While many priming researchers embrace *syntactic* and *structural priming* as synonymous expressions, some make a specific stance on the matter. For Pickering and Ferreira (2008: 2) the phenomenon is necessarily *structural* as this term describes 'abstract linguistic priming that need not be syntactic, and [...] does not presuppose the existence of specifically syntactic representations'. This view is in line with the findings from the pioneering and probably the most influential line of priming experiments conducted by Bock and colleagues (Bock, 1986; Bock & Loebell, 1990; Bock et.al., 1992) which suggest that in a complete absence of metrical (i.e. rhythm or phonological forms of functional words or morphemes), lexical, or

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[9] Other accounts such as the event-structure priming (Ziegler, Snedeker and Wittenberg, 2018) have recently emerged, but they lack systematic experimental evidence.

thematic similarity between primes and targets, a linear order of constituents of a prime is subject to repetition under priming.

My approach is in stark contrast to the view of Pickering and Ferreira (2008). I argue for the existence of syntactic priming as per Argument Structure Priming Hypothesis. I propose that surface structure match between primes and targets is not sufficient and perhaps even unnecessary for priming to occur and that the constituent order repetition might in fact be a collateral consequence of the effects driven by the argument structure similarities between primes and targets. I suggest that during natural language parsing argument-structural aspects leave memory traces which may subsequently affect the early stages of production, specifically, the grammatical encoding phase.

In the remaining part of this section I will consider the existing proposals concerning syntactic priming effects and contrast them with my own hypothesis.

1.5.1.　　　　Patient Prominence Priming

Some experimental literature suggests that priming can be activated at the level of *Information Structure*, which sometimes is also referred to as the level of *Discourse Function or Communicative Goal*[10] (Bernolet et.al., 2009; Fleischer et.al., 2012; Vasilyeva & Waterfall, 2012). The idea of discourse function priming is grounded in the *functionalist* and *meaning-mapping* approaches to syntactic knowledge (e.g. Bates & MacWhinney, 1989; Osgood & Bock, 1977, respectively). The two accounts vary in some respect but are akin in their perspective on syntax as an epiphenomenon of communicative functions speakers aim to achieve. Functionalists argue that syntactic structures are developed and constrained to serve these functions; similarly, the proponents of meaning-mapping view assert 'pragmatic, conceptual and semantic correlates to structural distinctions' (Bock and Loebell, 1990: 4).

On these accounts priming of the passive construction (e.g. *The cat was chased by the dog*) is treated not as a retrieval of an abstract syntactic structure, but as an activation of the communicative function passives project. This function is argued to

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[10] In must be noted here that by no means I embrace the view of information structure which equates it with discourse function or communicative goal.

be the conceptual emphasis on (or the prominence of) the thematic object or patient (*the cat*, in our example) over the thematic subject or agent (*the dog*)[11] (Bernolet et.al., 2009; Fleischer et.al., 2012; Vasilyeva & Waterfall, 2012). The word order appears to have the crucial role in defining this function (Johnson-Laird, 1968), rather than the fact that the 'logical object' (Jaeggli, 1986) becomes the grammatical subject in a passive: it is suggested that alternative word orders, e.g. object-verb-subject (OVS), available in some languages, might serve the same function purely due to the linear precedence of the patient over the agent (Fleischer et.al., 2012; Vasilyeva & Waterfall, 2012). On this approach, the discourse function carried by a given construction would drive the priming effects while the structural similarity between the prime and the target could be an artefact of expressing this function.

This account makes the following predictions. As English is limited in its choice of constructions where the patient precedes the agent, English speakers would resort to the passive when primed by passives. The speakers of Slavic languages such as Polish or Russian on the other hand have access to a wider selection of patient-agent order structures. Thus, after hearing a passive prime, Russian speakers would be expected to produce either a passive (e.g. *Dom byl osveščen molniej*/HouseNOM was illuminated lightningINSTR), an O(bject)V(erb)S(ubject) (e.g. *Dom osvetila molnija*/HousetACC illuminated lightningNOM), O(bject)S(ubject)V(erb) (e.g. *Dom molnija osvetila*/HouseACC lightningNOM illuminated) or V(erb)O(bject)S(ubject) (e.g. *Osvetila dom molnija* /Illuminated houseACC lightningNOM) targets (Fleischer et.al, 2012; Vasilyeva & Waterfall, 2012).

In contrast, on my hypothesis such responses would be completely unexpected. This is because the information such as 'patient prominence' is not available at the lemma stratum and presumably cannot be encoded in the argument structure. In fact, given the Minimalist assumption of Inclusiveness (Chomsky, 1995), namely, that information used by the syntactic computation must find its origin in the lexical items taking part in the derivation, it cannot be encoded in syntax. This is because notions

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[11] Following other researchers in the field of priming and despite a slight inadequacy of the terms, the argument (either actual as in a prime, or intended as in a target) that carries the thematic role of *agent*, *experiencer*, *cause* or *instrument* will be referred to as *agent*, while the argument that is either *patient* or *theme* would be referred to as *patient*. Where appropriate I will also refer to the former as *thematic subject*, and the latter as *thematic object*.

like 'prominence' are intrinsically non-lexical[12]. There is no sense in which an element can be assigned the property of 'prominent', because prominence on an item can only be established in relation to another item, and its encoding in syntax would violate Inclusiveness (Szendroi 2001, 2017). Furthermore, 'patient', i.e. the actual thematic label of a particular θ-role, is arguably not the kind of information the syntactic computation has access to (Williams, 1980) (as discussed earlier in the chapter, only the argument's ranking as per the thematic and event-structural hierarchy that is visible to syntax). Consequently, it is not possible for syntactic priming to be sensitive to this kind of information. Thus, the first corollary of the hypothesis I have proposed in (4) is as follows:

5.　　　　　*Corollary 1*

　　　　　Thematic object/patient prominence is not encoded in the argument structure and, therefore, is not subject to syntactic priming.

　　　　Chapter 2 is devoted to exploring the Patient Prominence Priming account. As no increase of the patient-first structures was detected either after hearing the passive or the OVS primes by Russian speakers, I will conclude that the Patient Prominence Priming hypothesis is wrong, and that Corollary 1 of my own Argument Structure Priming Hypothesis is borne out. I will offer an alternative interpretation for the results of the previous experimental work which appear to support the Patient Prominence Priming hypothesis. These findings, under my interpretation, are directly related to the Argument Prominence Hierarchy Hypothesis (Titov, 2012, 2017) presented in section 1.3.2. Specifically, I will argue that the results could be attributed to the asymmetrical distribution of animacy and humanness features in the target items.

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[12] The concept of prominence was discussed earlier in the chapter in terms of accessibility affecting and the order of lemma retrieval during the grammatical encoding stage of speech production as per Level't (1989) 'Speaking" model. Recall however, that following Fillmore (1977), the only lexical aspects which were said to increase lexical accessibility and thus affect the speed of retrieval was humanness (this perhaps could be expanded to animacy in general), change state and definiteness (Levelt, 1989). None of these aspects could be conceivably primed within the priming framework outlined in the thesis.

1.5.2.   Constituent Structure Priming

The most widely accepted view of syntactic priming is underpinned by the *autonomous* or *form-mapping* approach to syntax (as opposed to *functionalist*), which maintains that discourse concepts or functions are entirely separate from the abstract syntactic representations which are used to present them (Bock & Loebell, 1990; Garrett, 1989). Bock and colleagues as well as many who followed this view (see Branigan & Pickering, 2017, 2015 for review) argued that syntactic priming is purely structural and as such independent from conceptual, linguistic or non-linguistic aspects (Bock, 1986; Bock, 1989; Bock & Loebell, 1992; Saffran & Martin, 1997). This was demonstrated by Bock and Loebell (1990, Exp. 2) who showed that a structure with a locative adjunct *by*-phrase such as *The construction worker was digging by the bulldozer* and a passive construction such as *The construction worker was hit by the bulldozer* are equally suitable to prime another full passive. On this account passive priming is viewed as an activation of the abstract syntactic structure irrespective of any communicative purpose it may serve (Frazier & Fodor, 1978).

However, while Bock and Loebell's findings are a powerful indication of the structural autonomy, it is crucial to highlight that what the advocates of this priming account understand by abstract syntactic structure is actually not a hierarchical representation of a sentence which includes the information on the architecture of movement chains and thus the positions of silent copies/traces of moved constituents. Rather, the syntactic structure is understood as *linear surface ordering of constituents* in a sentence. Neither the hierarchical relationships within or between the constituents in a sentence, nor the verb's argument structure are considered here. Recall, that Pickering and Ferreira (2008), strong supporters of this view, refer to this type of priming as *structural*. It is, however, an ambiguous label, which suggests that hierarchical syntactic configurations are indeed involved in priming. I will, thus, refer to this account as *Constituent Structure Priming*, contrasting it with the main hypothesis introduced in (4), on which syntactic priming is indeed *syntactic* and as such is susceptible to the argument structure of the prime.

Let us consider how constituent priming could function using an example with a passive again. Since a full passive sentence follows the [noun phase]-[verb]-[prepositional phrase] (NP-V-PP) sequence, a speaker could be primed to produce a passive target by being exposed to any construction that adheres to the NP-V-PP

constituent frame, e.g. not only by the passive such as *The cat was chased by the dog*, but also by a construction with a locative PP such as *The lightning was flashing above the house* as it has the exact same constituent frame.

Interestingly, even the recent priming literature, which appear to advocate for a constrained approach to syntactic priming, accept this view, suggesting only some adjustments to this model of priming (e.g. Thothathiri & Snedeker, 2011; Tooley & Bock, 2014; Ziegler & Snedeker, 2018; Ziegler, Snedeker & Wittenberg, 2018 amongst others). So, what I call Constituent Structure Priming, continues to be by far the most widely accepted account of syntactic priming today. This view stands in stark opposition to the Argument Structure Priming I argue for, which states that the argument-structural make-up of a predicate is subject to priming, while the linear order of constituents in not sufficient for priming to occur.

The linear surface constituent order priming hypothesis will be scrutinised in Chapter 3 and 4. The data reported there show no priming between the structures that only share their linear constituent order: intransitive constructions with a locative adjunct did not prime passives in English speakers, despite the two structures having the identical NP-V-PP frame. Furthermore, the full 3-place predicate primes, which adhered to the NP-V-NP-PP phrasal order did not prime the constructions that repeated this constituent frame in Russian speakers. Considering these findings, I will demonstrate that syntactic priming cannot boil down to a mere surface phrase structure repetition, once again suggesting that the effects observed in the data that seemingly support the constituent order priming account were, in fact, again APH-driven. Namely, they arose due to an unequal distribution of animacy in the targets.

However, one might suggest that by taking a more sophisticated approach to syntax, the Constituent Structure Priming account could be amended and rescued, and there might be no need to appeal to argument structure to explain syntactic priming effects. It could perhaps be hypothesised that the aspects of the hierarchical surface syntactic representation are subject to priming (i.e. the structure at the spell-out which only includes those copies of moved constituents that are pronounced). How would such priming be manifested and what predictions could then be made about the direction it takes?

Let us return to the examples from the study by Bock and Loebell's (1990, Exp. 2) to demonstrate the idea. Recall that the study pitted passive sentences like *The construction worker was hit by the bulldozer* against locative constructions like *The*

construction worker was digging by the bulldozer. Consider these structures at the spell-out phase in Figure 1. 10. (a, b) below. Once all the syntactic operations are complete, the structures appear identical. The surface structure priming predicts an increase of passive target responses after hearing both, the passive and the locative primes compared to a baseline. Such predictions imply that that priming at the spell-out is, in essence, equal to the Constituent Structure Priming overviewed above. While the predictions were borne out in the Bock and Loebell's study, as I highlighted earlier, this is not what was observed in the present experiments reported in Chapter 3. These experiments show that just as the linear constituent order repetition, the surface syntactic representation is an epiphenomenal aspect of syntactic priming and as such is not sufficient for priming effects to emerge.

Figure 1. 10 Syntactic representations of the passive and the locative primes.

(a) The construction worker was hit by the bulldozer.

(b) The construction worker was digging by the bulldozer.
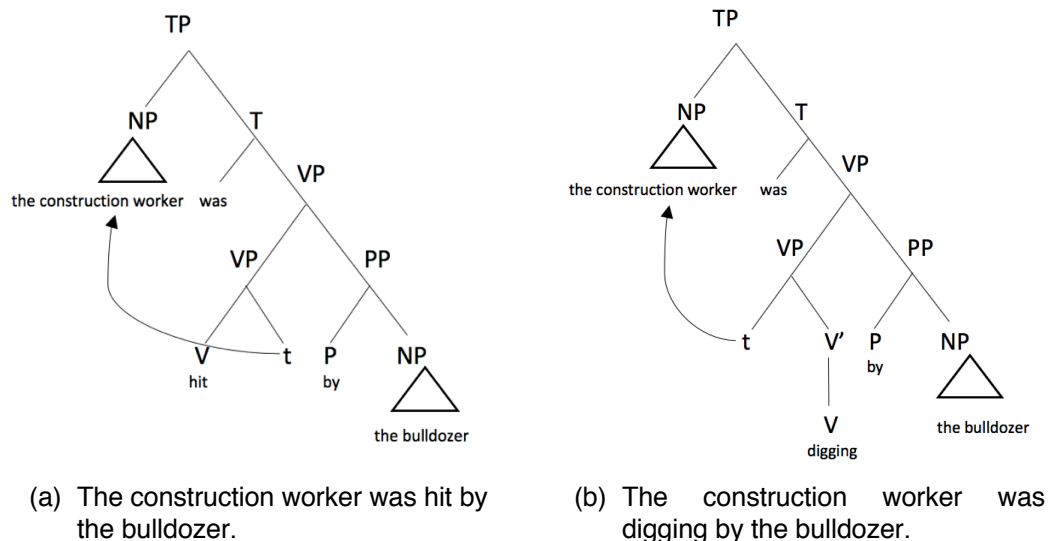
The above suggests that this account, whether we appeal to the simple option, i.e. the constituent structure repetition, or the amended version, i.e. the surface syntactic representation priming, does not reflect the state of things, despite being the most prominent and influential for over thirty years of priming research. Anticipating the empirical evidence against this account, I formulate the second corollary of the main hypothesis as follows:

6.   *Corollary 2*

The linear surface structure or order of constituents in a sentence is not subject to syntactic priming.

To the extent that my hypothesis is correct and Corollary 2 holds, one would not expect priming to occur unless there is a match between the argument structure between a prime and a target. Rather, any constituent order or surface structure similarity found between a prime and a target is a by-product of the truly syntactic, specifically, argument-structural priming which takes effect at the lemma stratum, i.e. at the early stages of sentence production before the surface syntactic structure (as per Levelt's (1989) model) is complete.

1.5.3.   Thematic Role Priming

Somewhat refining the Constituent Structure Priming account, Chang, Bock and Goldberg (2003) proposed that the mapping of thematic[13] roles might play a role in syntactic priming too. Somewhat similar to the Patient Prominence (or Discourse Function) Priming hypothesis because it appeals to the idea of linear order of argument presentation, the approach taps into the conceptual, namely semantic, features of sentential elements. The account, widely acknowledged and accepted by many (e.g. Cho-Reyes & Thompson, 2012; Edmonds & Mizrahi, 2011; Thothathiri & Snedeker, J., 2011; Ziegler & Snedeker; 2018), makes use of such notions as *agent*, *patient*, *theme* and *goal* amongst others, which are said to be the thematic roles typically taken on by an NP in a sentence, and which indirectly complement the NP's grammatical role in a given syntactic construction.

While keeping the phrasal structure of the prime constant (i.e. NP-V-NP-PP), Chang et.al. (2003, Exp. 1) manipulated the order in which thematic roles of the

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[13] It must be highlighted that the proponents of the Thematic Role Priming account and the researchers arguing against it alike use the term *thematic* to describe such semantic values of arguments as agent, experiencer, instrument, theme, agent, goal, recipient etc. I adopt the same approach, distinguishing a *thematic role* from a *theta(θ)-role*, the latter being defined as external or internal without the semantic labels attached to it (see section 1.3.1).

internal argument NPs were presented by priming the participants either with the [theme-first] sentences such as *The maid rubbed polish onto the table* or the [goal-first] sentences such as *The maid rubbed the table with polish*. The analysis showed that the participants were more likely to produce [goal-first] targets after the [goal-first] primes than after the [theme-first] primes, thus, providing support for the Thematic Role Priming hypothesis.

One of the main criticisms of the study was that the [goal] arguments in the this experiment were concrete count nouns (e.g. *table*) while the [theme] arguments were mass or plural nouns (e.g. *polish*, *pins*), which might have affected the responses since the latter two are similar to each other in many ways but differ from the former (Thothathiri & Snedeker; 2011; Ziegler & Snedeker; 2018)[14]. There are, however, other issues with the experiment and the interpretation of this study's results, and these are more problematic.

First, there is a theoretical issue, which is that only the predicate's θ-grid and the prominence of its arguments, but not their actual semantic information, i.e. the label of the thematic roles such as 'theme' or 'goal', is standardly assumed to be present in the syntax (e.g. Grimshaw, 1990; Haegeman, 1994 amongst others). This theoretical assumption questions the syntactic nature of this kind of priming.

Second, there is another concern, and it is related to the argument structure of the prime constructions tested. A closer examination of the experimental items reveals that in many cases the PPs in the goal-first primes appear to be thematic adjuncts rather than the true arguments (e.g. *The maid rubbed the table with polish*; *The bus splashed the pedestrian with water; The gardener planted the daffodils on the hill top; The housecleaner stacked dishes on the countertop*). Those elements have been termed *non-core participants* (Rákosi, 2012) or *circumstantial phrases* (Cinque, 2006), as they appear to combine the properties of arguments and adjuncts, behaving like arguments in some syntactic tests and like adjuncts in others. Some authors analyse non-core participants as part of the argument structure (Bresnan 1982). Others suggest that that these phrases have a special argument-structural

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[14] Two more production priming experiments, Hare and Goldberg (1999) and Salamoura and Williams (2007), which established an influence of thematic role mapping, were also criticised by Thothathiri and Snedeker (2011) for the similar issues with the experimental stimuli as those found in the study conducted by Chang at.al. (2003).

status which may distinguish them from canonical arguments (Needham & Toivonen, 2011, Webb, 2008). Yet others propose to treat non-core participants as adjuncts (Zaenen & Crouch, 2009). The priming effects could, thus, be attributed to the difference in the argument structure of the theme-first and goal-first primes rather than to the linear order of their presentation. Therefore, not only do the results of the Chang et.al.'s (2003) experiment not contradict the main hypothesis I argue for in this thesis, but they also provide valuable evidence in its support.

Let us turn to another experiment which explored whether the thematic roles played role in syntactic priming. Bock and Loebell (1990, Exp.1) asked whether the difference between the thematic roles of the NPs inside of a [location] PP matter for priming by pitching such prepositional object dative (POD) primes like *The wealthy widow gave her old Mercedes to the church* against the constructions with a locative prepositional phrase (PLoc) like *The wealthy widow drove her old Mercedes to the church*. The proportion of the POD responses produced in the two conditions, i.e. after the POD primes and after the PLoc primes, was compared to a condition where the participants were exposed to the double object dative (DOD) primes like *The wealthy widow sold the church her old Mercedes*.

The results showed that the former two types of primes (POD and PLoc) triggered similarly higher proportion of the POD targets compared to the DOD condition. Bock and Loebell argue against the priming which distinguishes between the POD and the PLoc primes, interpreting their results as evidence for Constituent Structure Priming, highlighting that the thematic roles have no effect on it. Ironically, while this interpretation does not go against my main hypothesis and is in line with the theoretical assumption that the thematic roles are not encoded in syntax, the data itself are challenging for my account of priming which places great importance on the argument structure of the primes.

However, Ziegler and Snedeker (2018) ran a norming study on the nine priming sentences Bock and Loebell provided in their report which showed that the sentences containing motion verbs with non-alternating dative verbs like *drive*, *move* and *return* were equally likely to be perceived as denoting a transfer of possession as were the dative sentences, which, the researchers argue, might have contributed to the

increase of POD targets in the PLoc condition[15]. Ziegler and Snedeker thus advocate for what they called the *Narrow Role Priming* hypothesis, which states that priming is sensitive to more nuanced thematic role distinctions such as sub-categorisation of a broad thematic role of *goal* into *recipient* and *destination/location* roles.

To verify Bock and Loebell's (1990, Exp.1) findings, Ziegler and Snedeker (Exp.11) run an experiment testing POD (e.g. *The boy gave the lamp to the rooster*), DOD (e.g. *The boy gave the rooster the lamp*) and locative constructions (PLoc) (e.g. *The boy lugged the lamp past the rooster*) making sure that the verbs used in these locative primes cannot be interpreted in the way *drive*, *move* and *return* were potentially interpreted in the Bock and Loebell's study. The results yielded significantly more POD targets in the POD condition (73%) than in the PLoc condition (62%) and in the DO condition (49%). These findings are considered in terms of the differences between the thematic roles carried by the NPs in the prepositional phrases of the two prime constructions: it is the *recipient* in the POD sentences and the *destination* in the PLoc sentences.

I propose, however, that the difference between the POD responses and the PLoc condition in the Ziegler and Snedeker's study can also be explained by the fact that the prepositional phrases in the POD primes contained the internal argument of the verb (indirect object) while in the locative primes the prepositional phrases were clearly adjuncts[16]. If so, it would mean that the difference in the argument structure of the prime verbs indeed affected the target responses (see Chapter 4 for discussion).

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[15] In addition, Bock and Loebell's (1990) Experiment 1 had a major confound, which was driven by the APH: the intended arguments in the target events were not of equal interpretive prominence (i.e. [+animate] or [+human] recipient and [-animate] theme), the issue I will return to later in Chapter 2 and 3. Such animacy asymmetry generally promoted the production of the DOD responses across the conditions, which brings into question the overall strength of the findings.

[16] The increase of the POD targets in the PLoc condition compared to the DOD condition could be explained by the match/mismatch of animacy mapping between the primes and the targets. Consider the result of the study by Bock, Loebell and Morey's (1992), who observed stronger priming of the active construction for those targets that matched the prime in animacy mapping compared to those that did not: more active inanimate agent/animate patient target responses (e.g. *The alarm clock awaken the boy*) were produced after hearing inanimate agent/animate active primes (e.g. *The boat carried five people*) and inanimate patient/animate agent passive primes (e.g. *The boat was carried by five people*) than after hearing animate agent/inanimate

Setting aside the issues with the experiments on Thematic Role Priming, what predictions would the account make for the passive construction? As the approach builds on the constituent priming hypothesis, both a passive prime such as *The construction worker was hit by the bulldozer* and a locative construction prime of the type *The construction worker was digging by the bulldozer* would be expected to elicit more full passive targets, i.e. those constructions which follow the same NP-aux-V-PP constituent structure as the two primes. Crucially, a greater increase in the proportion of full passive responses would be predicted after hearing the passive prime than after hearing the locative prime since the former matches the target not only in the its constituent structure (i.e. NP-aux-V-PP), but also in its the thematic mapping, while the latter only matches the target in the constituent structure, but is distinct in its thematic mapping (i.e. passive prime: [patient-agent]; locative prime: [agent-location]).

These predictions are not supported by Bock and Loebell's findings, because the proportion of the full passive responses was the same in the passive and the locative condition. Importantly, the results of the two present experiments run with English adults and children reported in Chapter 3 are also inconsistent with the Thematic Role Priming account. Passive priming was found only in the passive condition (e.g. *The bucket was scratched by the gate*), while the proportion of the full passive responses in the locative condition (e.g. *The bucket was standing by the gate*) remained as low as it was observed in the baseline.

Furthermore, the current Russian data reported in Chapter 2 run with Russian speakers are also problematic for the Thematic Role Priming account, showing that compared to the no-prime baseline, participants were equally more likely to produce [agent-patient] SVO targets after hearing both [agent-patient] SVO primes and [patient-agent] OVS primes.

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patient active primes (e.g. *Five people carried the boat*) or animate patient/inanimate agent passive primes (e.g. *Five people were carried by the boat*). Consistent with these findings, in Ziegler and Snedeker's (2018) study, the animacy mapping in the PLoc primes, i.e. [-animate] theme/[+animate] location (e.g. *The boy lugged the lamp past the rooster*), matched that of POD targets, i.e. [-animate] theme/[+animate] recipient (e.g. *The girl gives money to the cat*), but did not match that of the DOD primes, i.e. [+animate] recipient/[-animate] theme (e.g. *The boy gave the rooster the lamp*).

I therefore conclude, that there is no evidence that goes against the simpler hypothesis that the argument structure is responsible for priming.

1.6. The Implications for Language Acquisition

1.6.1. A Brief Overview of the Language Acquisition Models

The issues outlined in this chapter so far were addressed in relation to the adult grammar, but in order to build a full picture of language system or even one of its components, it is necessary to assess the quality of changes the system undergoes during its acquisition and development. This dissertation takes the nativist position on language acquisition. This approach, rooted in the work of Chomsky (e.g. 1965, 1986), is underpinned by the idea of human genetic domain specific language endowment, termed Universal Grammar (UG) which restricts the variations between languages, making sure that language is acquired despite the limited input received by the child. UG is a component of Language Acquisition Device (LAD), an infant innate capacity to acquire language. The approach is in the direct opposition to the experienced-based view of language acquisition, which maintains that cues from the input and general learning mechanisms are sufficient to acquire language, and that there is no need to postulate the existence of innate linguistic universal principles.

Extensive research in language acquisition observed differences in the way adults and children display their linguistic competence (see Guasti, 2004; Lust, 2010). One of the main questions within this research is the nature of these differences. On experience-based view, since language is seen to develop gradually, 'the differences between child and adult language is a matter of degree' (Crain & Thornton, 2015: 77). In other words, the older the child and the more linguistic experience she has – the closer her grammar is to the adult's. To maintain the nativist position on language acquisition, it is necessary to show that the divergence between the child's and the adult's grammars does not mount to the divergence in competence or their abstract linguistic knowledge, but boils down to the performance, the actual use of language.

The two competing models within the nativist paradigm form part of the debate on the problem of apparent divergence between the child and adult language competence, the *Maturation Hypothesis* (Borer & Wexler, 1987) and the *Continuity*

Hypothesis (Crain, 2002; Pinker, 1984). From the perspective of the former, children's grammatical knowledge determined by their biological maturation: linguistic properties are innate, but dormant until they are ready to mature, just like many other innate biological systems (Borer & Wexler, 1987). Thus, following the Maturation Hypothesis a given linguistic property might not be available to the child at some time in their development, and at this point the child's grammar differs from the adult's qualitatively. Once the property is matured, the child's and the adult's grammatical competence should match.

Conversely, the Continuity Hypothesis suggests that all innate grammatical universals are available to the child early on and stay constant through to adulthood. On this approach, 'child and adult language can differ only in the ways that adult languages can differ from each other' (Crain and Thornton, 2015: 78). Following the Continuity Hypothesis, the child's aim throughout the process of grammar acquisition is to adjust the parameters on which languages might vary. Importantly, whenever we fail to observe the child's grammatical competence, it is more likely than not a consequence of some or other computational demands which might stem from specific elements of the language system (e.g. see Reinhart, 2004 for processing costs associated with reference set computation in acquisition of stress shift and focus). Moreover, an experimental task employed to measure a particular linguistic component might require additional cognitive resources. These two issues have a potential to mask children's true grammatical competence, and would be considered obstacles by both, the Maturation and the Continuity models of language acquisition. While I do not specifically advocate for either the models in this dissertation and my aims, as discussed below, lie elsewhere, it is worth noting that by Occam's razor the Continuity hypothesis should be assumed unless there is evidence to another hypothesis that is simpler.

1.6.2. Priming: Do children Take Holistic Shortcuts?

As established earlier, I argue against Patient Prominence and linear surface constituent order as syntactic representations that are necessary to postulate in mature speakers, suggesting that in the process of sentence derivation the argument structure plays a critical role. My main goal is to show that during sentence parsing argument-structural representations which incorporate information on predicates' θ-

grid and prominence relations between arguments subsequently determining their syntactic behaviour, leave memory traces which affect the early stages of production and are detectable through priming. The next question is whether this is also the case with young children.

If priming tasks run with children can pick up memory traces of, say, a patient prominence, a given surface linear constituent order, or a linear thematic role mapping order, it could perhaps be taken as evidence that, when constructing a sentence, children rely on these simpler concepts until the necessary leap in language development occurs. If such holistic shortcuts are indeed taken by children, it would be incompatible with the Continuity hypothesis since children's grammar would be qualitatively different from that of adults (considering that in the present studies adults did not show priming which is triggered either by patient prominence or constituent structure).

If those primitive non-syntactic concepts indeed aid children's sentence processing, we could formulate the following predictions for Russian and English-speaking children. If children rely on the thematic object (or patient) prominence to construct description of transitive events, considering that the Russian passive is a highly infrequent construction, after hearing both, Russian full passive and OVS primes, Russian-speaking children would be expected to increase the production of OVS (e.g. Myšku oblil šlang/MouseACC splashed hoseNOM) as well as such agentless structures as impersonal active construction (e.g. *Myšku oblili*/MouseACC splashed (they)), since in those sentence types the patient either precedes the agent (i.e. in a passive and an OVS) or is the only argument overtly realised (i.e. impersonal active constructions). English-speaking children would increase the production of passive themselves, the effect which could not be distinguished from any other kind of more structurally involved conception of priming discussed in the previous sections, but they also could increase the production of agentless construction responses such as unaccusatives.

It is also possible that priming in children makes use of another simpler, but more structural notion: the linear constituent order. This could arise either because they simply do not have access to complex syntax or because the memory traces of these syntactic representations are not strong enough to trigger the priming effects. In that case, English-speaking children would be expected to produce passive target sentences after hearing both full passives and intransitive constructions with a

locative adjunct. Russian-speaking children would be equally likely to produce SVO and OVS targets after either SVO or OVS primes since the two follow the same constituent order (NP-V-NP).

Finally, If the linear thematic role presentation and the constituent order worked in tandem to support young children's sentence production, a boost to constituent priming effects are expected whenever a prime and a target match not only in their surface constituent structure, but also in their thematic role ordering, as Chang at.al. (2003) proposed. Thus, the increase of full passive responses in the passive condition should be greater in the locative condition compared to a baseline for English children. For Russian children, a greater increase of the OVS responses is expected after hearing OVS primes than after hearing SVO primes compared to a baseline, and the other way around.

The child data presented in this dissertation does not lent support to any of the above. Instead, the data appear to provide evidence to an alternative perspective: children, despite their limited short-term memory capacity, maintain the information about the argument-structural make-up of the prime, and such information is registered through priming. This suggests that their grammar as well as their language processor is much closer to the adult's than the experience-based models would ever predict. The data are, thus, consistent with the Continuity assumption to language acquisition.

1.6.3. Are Children Susceptible to the APH during Priming?

Another aspect explored in this manuscript is concerned with the role of the argument prominence hierarchy (APH) not only in spontaneous sentence production, but also during a priming procedure. The data reported in Chapters 2, 3 and 4 suggest that one of the APH features, specifically animacy, does indeed modify priming effects in both English- and Russian-speaking adults.

While animacy was found to be a strong predictor of the structure selected by young children in spontaneous speech and non-priming procedures[17] (Harris, 1978;

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[17] Gámez and Vasilyeva (2015) also observed the effects of animacy in priming, but in their experiment humanness was not controlled for.

Drenhaus, & Féry, 2008; Prat-Sala, Shillcock & Sorace, 2000; Vihman & Nelson, 2019 for review), the following question still arises: Would the influence of animacy in targets of a priming task be just as effective in children as it was found to be in adults? Or would, perhaps, the impact of animacy override the priming effects or vice versa? The child data discussed in the subsequent chapters suggest that the influence of animacy on children's performance in priming procedure is comparable to that of the adult participants.

1.6.4. Benefits of Employing Priming Methodology with Young Children

One of the main difficulties of the language acquisition research is that there is always a doubt whether the methods employed in experimental work attempting to investigate children's grammatical competence measure precisely this competence rather than reflecting other non-linguistic cognitive abilities. This, of course, also applies to experimenting with adults, but the potential for Type 2 errors is greater with children whose cognitive capacity is developing at this stage. In some cases, priming methodology seems to achieve more informative results than other methods traditionally used to assess children's grammatical competence.

For example, the Truth Value Judgement Task or Picture Selection Tasks were extensively employed in experiments which demonstrated difficulties in acquisition of the passive. These tasks suffer from the explicit presence of two or more alternatives and the necessity to make a conscious choice between them, the process which happens unconsciously in real time language processing and production (Pinto & Zuckerman, 2018; Zuckerman, Pinto, Koutamanis & Spijk, 2016). Such methods, thus, require additional computational effort which can be taxing for the child's cognitive resources, and therefore have a potential to underestimate her true linguistic knowledge (Schmitt & Miller, 2010).

At the same time the studies which utilised priming, successfully elicited the production of passives. For example, Huttenlocher et.al. (2004) observed passive priming in English-speaking children aged 4- to 5; while Messenger et. al. (2012) and Shimpi et.al. (2007) – in 3- to 4-year olds. Bencini & Valian, 2007 found that English-speaking children as young as 2 year 11 months produced more passives after hearing passives than after hearing active constructions. Furthermore, bilingual

Spanish-English 6-year olds were shown to exhibit cross-language priming of passives – from Spanish to English and vice versa (Gámez & Vasilyeva, 2019). The above are only a few examples of effective elicitation of passive through priming[18].

To sum up, testing children is informative because it allows us to explore and explain the changes the human language system undergoes during its development and, as a consequence, assess the nature of differences between the adult and the child grammar. To maintain the nativist position on language acquisition, one of the objectives psycholinguistics faces is to provide evidence that the differences between the two grammars are not of qualitative, but of quantitative nature. The syntactic priming methodology is well fit to deliver such evidence.

1.7. Thesis Overview

The dissertation is organised as follows. In Chapter 2 I will review the existing evidence for the Patient Prominence Priming, highlighting the issues related to the lack of control for animacy and the absence of a true baseline in the studies supporting the Patient Prominence Priming account. I will then report on the three priming experiments which were run with the native Russian-speaking adults (Experiment 1) and children (Experiment 2), and with the native English-speaking children (Experiment 3) in order to test the Patient Prominence Priming hypothesis. The Russian speakers were assigned to either the passive, SVO, OVS or no-prime baseline condition, and the English-speaking children were assigned to the same conditions except for the OVS. Following the proposal that, in line with the APH hypothesis, an asymmetric distribution of animacy in targets may impact on the syntax of the responses elicited in a priming task, the targets' animacy was controlled for and manipulated in all three experiments.

As the results do not lend support to the Patient Prominence Priming hypothesis, I will argue that the information on the thematic object prominence does not impact on syntactic structure selection during language production. I will also

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[18] It is noteworthy that passives were also found in spontaneous speech of Sesotho-speaking children aged 2 year 8 months (Demuth, 1989). This was argued to be due to the fact that a passive is much more frequent and functional in Sesotho compared to English.

discuss the effects of the animacy asymmetry in the targets which were observed in the experiments and the potential that priming effects and the animacy distribution might interact. In addition, as a minor issue, I will explore the possibility that the unique status of the *by*-phrase in the passive could potentially explain the pattern of the OVS and agentless construction responses such as unaccusatives, accusative unaccusatives, and impersonal actives which emerged in the Russian adult data. Finally, I will compare the responses recorded for the child and the adult groups, emphasising the striking similarities between these data sets.

In Chapter 3 I will first revisit the seminal priming work by Bock and colleagues. I will then report the results of Experiments 4 and 5 run with the English-speaking adults and children in which I adopted the design used by Bock and Loebell (1990, Exp.2), again controlling for the targets' animacy and including a baseline. Just like Bock and Loebell, I pitted full passive primes against intransitive primes with a locative *by*-phrase, which both adhered to the NP-V-PP constituent frame, testing the hypothesis that priming functions on the level of linear constituent order. While Bock and Loebell found that both types of the prime elicited passive responses equally well, which was explained by their identical surface constituent order, the data obtained in the present experiments did not replicate their results: only the passive primes were observed to trigger the passive responses. Based on these results I will argue that constituent order similarity is not sufficient for priming to occur, and that syntactic priming cannot be reduced to the repetition of a given linear surface constituent order. Instead, it appears to be sensitive to the argument structure of the verbs in the primes as per Argument Structure Priming Hypothesis stated in (4). I will also examine the child data, which suggest that children's grammar is qualitatively similar to that of adults, as the young participants exhibited the same susceptibility to the primes' argument structure representations as that detected in the adults' responses.

In Chapter 4 I will address the linear surface Constituent Structure Priming hypothesis cross-linguistically, reporting on the final experiment conducted with Russian-speaking adults. 3-place predicate constructions with an optional indirect object PP and 2-place predicate (monotransitive) constructions with a PP adjunct were utilised as primes in this study. A no-prime baseline as in Experiments 1-5 was also included. The Constituent Structure Priming hypothesis predicted an equal increase of the targets that followed the NP-V-NP-PP constituent frame after hearing both, the 3-argument verb primes and the 2-argument verb primes with a locative

adjunct, since the constituent order in these primes is also NP-V-NP-PP. There predictions were not confirmed. Although there were more NP-V-NP-PP responses observed in the monotransitive conditions compared to the baseline, no such increase was detected in the 3-argument verb condition providing only partial support to the Constituent Structure Priming hypothesis.

The Argument Structure Priming Hypothesis I argue for in this thesis, which is that priming is sensitive to the syntactic information of the prime's argument-structural properties, predicted an increase of responses containing 3-argument verbs after hearing 3-argument verb primes compared to a the no-prime baseline and the monotransitive condition, despite the fact that the 3-argument verb primes and the monotransitive primes had identical constituent structures. The predictions were borne out. Furthermore, when the dependent measure was the proportion of the 3-place predicate target responses where the optional indirect object PP was not realised overtly, the results were also found to support the predictions: the proportion of such incomplete 3-argument verb responses was twice and high in the 3-argument verb condition compared to that in the monotransitive condition, and no difference in production of such structures was observed between the monotransitive and baseline conditions. I will interpret the findings as evidence that the locus of priming might indeed be found at the argument structure and this effect is devoid from the effects of linear constituent order priming.

Chapter 5 will conclude the thesis. I will draw on the data from all six experiments in relation to the hypotheses tested. The following pivotal findings will be highlighted: (1) The animacy in the targets of a priming procedure affects the syntactic structure produced by the participants, and, thus, must be controlled for; (2) The patient prominence in the prime makes no impact on the syntactic structure selected for the target; (3) For priming to occur the prime and the target must share syntax, and the measure of this syntactic similarity cannot be surface constituent order as claimed in the previous priming work, instead, the constructions must share some lemmatic, specifically, argument-structural information. (4) Children are sensitive to the argument structure representations of primes and rely on the notion of patient emphasis no more than the adults do.

The discussion on a number of unanswered questions and the future paths for investigation within the field of syntactic priming concludes the dissertation.

2.   **Patient-Prominence Priming**

2.1.   Introduction

In this chapter I will outline the position held by the supporters of the Patient Prominence Priming account, starting by identifying two main approaches to meaning-to-syntax mapping, *autonomous* and *functionalist.* This will be followed by the review of the existing experimental work supporting the Patient Prominence Priming account. I will then report on the three experiments run to explore the patient-prominence priming and use these data to argue against the necessity to pose it, appealing to the argument prominence hierarchy (Titov, 2012, 2017) to provide an alternative explanation for the findings previously claimed to support the existence of Patient Prominence Priming.

A large body of experimental research accumulated over the last thirty-some years demonstrates the effects of structural repetition in comprehension and production. These effects, often called *structural* or *syntactic priming*, occur whenever a speaker replicates a given syntactic construction more frequently after being exposed to this construction than it would have been expected by chance (Reitter, Keller & Moore, 2011). Using the appropriate terminology, an exposure to a *prime* structure would promote comprehension or production of a *target* which adheres to the structure of the prime. The research exploring the phenomenon is often used as a foundation to argue that structural priming is a true window to our understanding of the architecture of language, and that its capacity to tackle important questions about linguistic representation as well as accessing such representations during language processing is second to none (Branigan & Pickering, 2015). The above is underpinned by the following logic: observing a repetition of a particular linguistic aspect in an utterance after the exposure to another utterance which shares this aspect but is otherwise unrelated, allows us to isolate this aspect as a relevant feature of syntactic representation susceptible to priming. However, despite the extensive work carried out in the field, one of the main concerns is still to identify the exact loci of priming (Ziegler, Snedeker & Wittenberg, 2017). It is yet unclear which elements of grammar leave memory traces that are pertinent and strong enough to affect the processing of the subsequent linguistic material.

Interestingly, the issue is perhaps related more to the choice of theoretical foundation which guides the interpretation of the existing findings, rather than the findings themselves. Pickering and Ferreira (2008) highlight two main theoretical paradigms, each explaining the process of meaning-to-syntax mapping (and therefore the phenomenon of structural priming itself) from rather different angles: *autonomous* and *functionalist*. According to the former, which underpins now a very well-established account of priming, syntax has an independent level of representation. On this approach, abstract syntactic frames can be (re)produced in a sentence that is metrically, lexically and semantically unrelated. The proponents of the autonomous account may interpret passive construction priming as an activation of the passive structure irrespective of any communicative purpose it may serve (Frazier & Fodor, 1978).

However, it must be stressed that the priming researchers whose views fall within the autonomous approach appear to identify syntactic structure as a linear ordering of phrasal elements (Bock, 1986; Pickering & Ferreira, 2008 for overview; Ziegler et.al., 2018 amongst others) rather than a hierarchical formation which takes into consideration predicate-argument relationships. For example, a passive structure would be perceived merely as a [noun phrase]-[verb phrase]-[prepositional phrase] (NP-V-PP) sequence and a prepositional object dative construction (POD) as a NP-V-NP-PP; those would be just as successful at triggering respective passive and POD targets as any other structure following the same linear phrasal structure (Bock & Loebell, 1992). As outlined in Chapter 1 section 1.5.2, I shall call this view *Constituent Structure Priming* and argue against it, distinguishing this account from truly *syntactic priming*, which incorporates hierarchical aspects of underlying syntactic representations as a consequence of verbs' argument structure. While this issue is addressed in the next chapter, here I challenge the priming account which appears to have grown from the functionalist paradigm.

For functionalists, the language system is built from form-meaning units, which exist autonomously from the semantic content of individual words in a sentence (Goldberg, 1995). Importantly, under this approach syntactic knowledge is perceived as epiphenomenal to the knowledge of communicative goals and purposes (Pickering and Ferreira, 2008). The main idea that characterises this account is that 'the forms of natural languages are created, governed, constrained, acquired and used in the service of communicative functions' (Bates & MacWhinney, 1989: 73). Thus, greatly

simplifying, the functionalists would interpret an effect of, say, passive priming not as a retrieval of an abstract syntactic frame, but as an activation of a particular discourse or communicative function related to the passive, e.g. prominence of the *patient* of the action over the *agent*. In other words, priming is driven by the discourse function a given construction carries, and any effects triggered by the syntactic identity of primes and targets would only be corollary.

The predictions the functionalist account makes for priming drastically differ from those of the autonomous approach. The expectation here is that during a priming task a speaker would produce the targets that share a discourse function with the primes, but not necessarily the primes' syntax. Any structural similarity between the primes and the targets would be consequential to the (re)production of that discourse function. Despite the strong evidence supporting the Constituent Structure Priming, the findings from several recent experiments call for revisiting the functionalist account as well as the hypothesis emerging from it, suggesting the existence of structural priming above and beyond syntax.

On this hypothesis, termed either *Information Structure Priming* (Bernolet, Hartsuiker & Pickering, 2009; Fleischer, Pickering & McLean, 2012), *Prominence Priming* (Pickering & Ferreira, 2008), or *Discourse Priming* (Vassilieva & Waterfall, 2012), hearing a prime where the [patient] argument linearly precedes the [agent] argument and, consequently, is emphasised, triggers the production of any syntactic construction that abides to the prime's communicative purpose, namely, the emphasis on the patient. I will, thus, refer to it as *the Patient Prominence Priming.* The primary objective of the chapter is to challenge this hypothesis, contrast it with the main hypothesis posed in this dissertation which states that priming is susceptible to the argument structure of a prime sentence, and to adjudicate the two.

2.2.   Psychological Approach: Information Structure or Patient Prominence?

Since some supporters of *the Patient Prominence Priming* account I address in this chapter present it as *the Information Structure Priming* (Bernolet, Hartsuiker & Pickering, 2009; Fleischer, Pickering & McLean, 2012), an explanation for such terminology is due. The psychological approach to *information structure* (IS) adopted

in the literature advocating for the Information Structure Priming substantially differs from that assumed in the theoretical and experimental linguistics, and the explicit references to the linguistic theory of the information structure are rarely made there. I shall come back to the discussion on the theoretical motivations for questioning this account in section 2.4 later in the chapter.

Bernolet et.al. (2009) suggest that the dichotomy of *more important information* vs. *less important information* is one of the main aspects of the IS. The terms *emphasis*, *prominence*, *salience* or simply *importance* are used widely and interchangeably, but it is unclear what is behind them and which aspects of linguistic theory they relate to. The authors argue that in many languages, the IS changes are achieved syntactically or prosodically (by variation in pitch contours, duration and loudness), which in itself does not contradict the linguistic notion of IS. However, the concept of the IS seems to be built around emphasizing a particular part of a sentence, specifically, its thematic object (or the patient of a transitive event being described) in order to indicate its importance. 'To achieve syntactically' is understood as to place the important element in the subject position, to mention it linearly first, or to combine these two strategies. It is noteworthy, that although Büring (2007) is cited by Bernolet et.al. (2009) in reference to prosody as a tool for capturing the importance of specific sentential fragments, Büring himself speaks of *prosodic prominence* and says nothing about the importance of prosodically marked elements.

Setting aside the confusion with prosodic prominence, *emphasis* appears to correspond to some extent to the notion of topic: '[…] one element of each sentence [which] receives emphasis [is] often called the topic' (Bernolet et.al, 2009: 300). This is the understanding I will assume here to reconcile the approach to the information structure adopted by Bernolet and colleagues with the one that stems from the linguistic theory outlined in section 2.4. As unsatisfactory as it may be, this has to suffice in order to attempt to address the potential for the so-called information structure priming phenomenon.

It is, however, crucial to highlight that, from the point of view of the linguistic theory, specifically, the interface-based approach proposed by Reinhart (1981, 1996, 2005) adopted here (see section 2.4), the idea of the information structure priming is 'unstatable'. This is because the information structure is assumed to be context-dependent and not encoded in syntax (Reinheart, 1981). Moreover, the patient

prominence, however it may be understood, is not encoded in syntax either, therefore I argue that it cannot be subject to syntactic priming.

2.3.   Patient Prominence Priming: The Experimental
        Evidence

The first experimental work supporting the Patient Prominence Priming claim was conducted by Bernolet and colleagues (2009) using native Dutch-speaking participants with a high level of proficiency in English. The study investigated whether aspects of information structure can persist from Dutch primes to English targets. The idea was to see if the speakers' choice in determining which parts of utterance should carry the *emphasis* in their target responses are influenced by the *emphasis* distribution in the primes. In a series of priming experiments participants heard Dutch actives (*De bliksem treft de kerk/*Lightning strikes the church), PP-initial (*Door de bliksem wordt de kerk getroffen/*By lightning is the church struck), PP-medial (*De kerk wordt door de bliksem getroffen/*The church is by lightning struck), PP-final passive primes (*De kerk wordt getroffen door de bliksem/*The church is struck by lightning) and NP-conjunction control sentences (e.g. *the nun and the hippo*). The subjects were then asked to describe images depicting transitive events in English. The primes and targets were matched for animacy, a third of them having animate patient and inanimate agent and the rest containing either all animate or all inanimate arguments. The participants produced more English passives in PP-medial and PP-final conditions than after hearing NP-conjunction control sentences, while the PP-initial passive primes and NP-conjunctions elicited almost the same proportion of passives, although the PP-initial passives triggered more passives than in the active primes. There was also a numerical increase in production of passive targets in the PP-final condition compared to the PP-medial condition, but the difference did not reach statistical significance.

The authors maintain that these patterns of responses does not reconcile with the structural priming account (understood here as constituent order priming), as the three Dutch passive prime types followed different linear constituent orders, yet the results in the PP-medial condition were much the same as in the PP-final condition. Crucially, these two structures are claimed to have very similar patterns of emphasis, which lead to suggest that priming could function at a level of information structure,

which is indeed understood by the authors as patterns of emphasis. The researchers argue further that languages that utilise syntax to realise information structure, emphasise important elements by placing them in the subject position and allowing them to appear first in a sentence; additionally these two strategies work in tandem to reflect the salience level in a given element, e.g. an agent that is realised as a subject, but does not appear in the initial sentence position would be less salient than a subject agent that does (Bernolet et.al., 2009). Some authors, however, suggest that the grammatical function of an emphasised entity does not reflect the level of salience, while being placed early in a sentence does (Prat-Sala & Branigan, 2000).

Further support for the Patient Prominence Priming comes from another cross-language priming experiment which adopted the same methodology. Fleischer, Pickering and McLean (2012) suggest that passives and object-verb-subject-ordered (OVS) actives, which are available in languages with relatively free word order like Polish, have similar information structure (specifically, their role is to *emphasise* the patient of a transitive event). Fleischer and colleagues then argue that patient emphasis patterns can be shared between languages, hypothesising that this information could be susceptible to cross-linguistic priming, and that Patient Prominence Priming goes beyond lexical and even structural similarity.

To test the hypothesis the researchers conducted a cross-language priming study with Polish fluent speakers of English. It is not made clear, however, why priming was tested between languages. Perhaps this was done to demonstrate complete lexical independence of targets from primes as done in a number of cross-linguistic priming experiments (Desmet & Declercq, 2006; Hartsuiker et.al. 2004; Vasilyeva, Waterfall, Gámez, Gómez, Bowers & Shimpi, 2010). The participants were asked to describe transitive events in English after hearing the following primes produced in Polish: active subject-verb-object (SVO) and OVS constructions, and passives (Polish passives follow the same word order as English passives: *Baletnica jest przygniatanaprzez sportowca*/The ballet dancerACC was squashed the sportsmanINSTR). Additionally, there was also a control condition, where, just like in the study conducted by Bernolet et.al. (2009), the participants heard NP-conjunctions (e.g. *Baletnica i sportowiec*/The ballet dancer and the sportsman) while looking at an image depicting two human entities positioned next to each other. Both the agent and the patient in the primes were human, while the targets had animate patients and inanimate agents.

The results showed no difference in the proportion of passives observed in the active and the NP-coordination baseline conditions, which was significantly lower than the proportion of passives produced in the passive and the OVS conditions. This suggests that the Polish passive and OVS primes were equally likely to trigger the production of English passives (see Table 2.1 for frequencies). Identifying the common information-structural feature of Polish passives and OVS sentences as the *emphasis on the patient,* these findings, Fleischer and colleagues argue, support the Information Structure Priming hypothesis (or, as I term it Patient Prominence Priming hypothesis)[19]. Regrettably, unlike Bernolet et.al. (2009), the authors say nothing about what their understanding of the emphasis may entail. It can only be assumed that this refers to the notion of topic as suggested earlier, but there is no indication in the study's report that this is how it was interpreted.

Table 2.1 Frequency of responses in the four priming conditions: Active SVO, Passive, Active OVS and Baseline/NP conjunction (Fleischer, Pickering and McLean, 2012).

Priming type	Active responses	Passive responses	Other responses
Active SVO	54	100	38
Passive	18	140	4
Active OVS	20	145	27
NP conjunction	40	107	45

Comparable results were obtained by Vasilyeva and Waterfall (2012) (henceforth V&W). The findings of this predominantly developmental priming study were also interpreted as evidence in support of the Patient Prominence Priming account. Monolingual English- and Russian-speaking children aged 5 to 6 (Exp. 1 and 2) and Russian-speaking adults (Exp. 3) were recruited for the study. As per the standard priming procedure employed with young children (see section 1.2), an experimenter and a child took turns to describe images depicting transitive events; the experimenter's set was scripted to follow prime constructions, and the child's descriptions were analysed for structure repetition. Half of the participants were assigned to hear full passive primes and the other half – active primes. No baseline

[19] Fleischer et.al (2012) note, however, that their results are also consistent with the account which considers the linear ordering of thematic-role presentation (i.e. the theme/patient precedes or follows the cause/instrument/agent) as the main contributor to the priming effect (e.g. Chan, et.al., 2003).

condition was included in these experiments. The procedure was identical for the children and the adults.

The results showed that English-speaking children in the passive condition produced significantly more passive description responses (both short and full passives were included) than the children in the active condition, demonstrating a clear syntactic priming effect (Table 2.2).

Table 2.2 Frequency (and proportion) of active and passive responses produced by the English-speaking 5- to 6-year olds in the active and passive conditions (Vasilyeva & Waterfall, 2012: Experiment 1).

Priming condition	Active responses	Passive responses	Other responses
Active	88 (88%)	5 (5%)	7 (7%)
Passive	73 (66%)	26 (24%)	11 (10%)

In contrast, the Russian-speaking children showed no priming effect in the passive condition producing only three passives (both short and full passives were counted) in the passive condition and one in the active (Table 2.3).

Table 2.3 Frequency (and proportion) of active and passive/passive alternative responses produced by the Russian-speaking 5- to 6-year olds in the active and passive conditions (Vasilyeva & Waterfall, 2012: Experiment 2).

condition	Active	PA/passive	Other
active	128 (85%)	4 (3%)	18 (12%)
passive	106 (71)	28 (19%)	16 (10%)

However, V&W analysed the production of constructions they termed *passive alternatives* (PAs) and found a significant difference between the conditions: more PA responses were produced after hearing passives than after hearing active primes. Passive alternatives included OVS (e.g. *Mal'čika ukusila osa*/BoyACC stung waspNOM), impersonal active (e.g. *Mal'čika ukusili*/BoyACC they-stung), and unaccusative constructions (*Okno razbilos'*/WindowNOM broke) (see Table 2.4). Similar pattern of responses was observed in the Russian-speaking adults (see Table 2. 5). The analysis showed that there was significantly more passives and PAs (combined) in the passive condition (M = 31) compared to the active condition (M = 8); but there was no difference in production of passives between the conditions.

Table 2.4 A breakdown for frequency (and proportion) of responses termed passive and passive alternatives (PAs) produced by the Russian-speaking 5- to 6-year olds in the active and passive condition (Vasilyeva & Waterfall, 2012: Experiment 2).

condition	Passive Responses	Imperfective passive	Unaccusative responses	OVS responses	Impersonal active
active	1 (0.7%)	0 (0%)	0 (0%)	2 (1.3%)	1 (0.7%)
passive	4 (2.7%)	0 (0%)	1 (0.7%)	12 (8%)	11 (7.3%)

Table 2. 5 A breakdown for frequency (and proportion) of responses termed passive and passive alternatives (PAs) produced by the Russian-speaking adults in the active and passive condition (Vasilyeva & Waterfall, 2012: Experiment 3).

condition	Passive	Imperfective passive	Unaccusative	OVS	Impersonal active
active	2 (2.2%)	0 (0%)	2 (2.2%)	2 (2.2%)	2 (2.2%)
passive	6 (6%)	1 (1%)	0 (0%)	16 (16%)	1. (8%)

In a close resemblance to the proposal by Fleischer et.al. (2012), V&W suggest that PA structures, being syntactically unrelated to the passive, nevertheless carry a similar discourse function, this being foregrounding or emphasising the patient or thematic object and demoting the thematic subject. In other words, the patient is promoted to the status of topic, although the authors do not explicitly state it. V&W highlight that Russian offers a number of ways to express such a function, see Table 2. 6 (a)-(e), allowing Russian speakers, particularly children who are notoriously struggle with passives, to avoid this complex and infrequent construction. It is noteworthy that there is yet another Russian construction, surprisingly not mentioned by V&W, which fits well with their approach. So-called accusative unaccusative (Lavine & Freidin, 2002), shown in Table 2. 6 (f), is a structure commonly appearing in Slavic languages such as Russian and Ukrainian. Contrary to its name, it is argued to be a monotransitive construction, where the optional external argument (instrument) is assigned an Instrumental Case for interpretive reasons (Titov, 2019).

Table 2. 6 Constructions carrying the discourse function of emphasising the patient as per Vasilyeva and Waterfall (2012).

(a)	Perfective (participial) passive	*Dom byl razrušen (uraganom)*
		HouseNOM bePAST destroyPERF.PART (hurricaneINSTR.)
		The house was destroyed (by a hurricane).

(b)	Imperfective passive	*Dom stroilsja (brigadoj).*
		HouseNOM buildPAST.IMP.REFLEX
		(teamINSTR)
		The house was being built (by the team).

(c)	Object/patient-first	*Mal'čika užalila osa.*
	(OVS)	BoyACC stingPAST.PERF waspNOM
		The boy was stung by the wasp

(d)	Impersonal Active	*Mal'čika nakazali.*
		BoyACC punishPAST.PERF.PL
		They punished the boy.

(e)	Non-agentive reflexive	*Okno razbilos'*
	(unaccusative)	WindowNOM broke-self
		Window broke

(f)	Accusative	*Kryšu sorvalo vetrom*
	unaccusative	RoofACC ripped-off3SGNEUT windINSTR
		Wind ripped off the roof.

V&W hypothesise that an exposure to a passive sentence not only activates the syntax of the passive, but also its discourse function, which then affects speakers' syntactic choices during their own sentence production. The above, the authors argue, explains the patterns of passive alternatives found in the responses of the Russian children and adults: the patient was foregrounded in the passive primes and the participants retained this interpretation in their own target responses utilising the structures which were more frequent in Russian than the passive, namely OVS and impersonal active structures. Note, however, that it is questionable whether the discourse functions of the passive and the OVS are actually similar in Russian, to which I return in section 2.4. The authors argue that since in English this function is fulfilled mainly by the passive, the English-speaking children exhibited clear passive priming effect, which could be driven by both, the syntax and the patient prominence in the passive primes. In sum, it appears that, similarly to Fleischer et.al. (2012), V&W

propose that in addition to the syntactic level, priming may be also operative on the level of information structure[20]. The researchers propose that the IS effects could override the influence of the primes' syntactic form, especially in the case when the primed structure is not as frequent in a given language as its alternatives expressing a similar or identical function.

The data discussed in this section seem to offer compelling evidence for the Patient Prominence Priming hypothesis. However, there is an issue which suggests that further experimental testing is necessary. The account draws mainly on the findings obtained from second-language speakers (Bernolet et.al, 2009; Fleischer et.al., 2012) and children (V&W), thus, lacking systematic and reliable support from monolingual adult data. Crucially, there are a number of theoretical and methodological motivations for questioning the account, to which I turn to next.

2.4. Theoretical Motivations for Questioning Patient Prominence Priming

There are three main theoretically motivated issues which undermine the Patient Prominence Priming account. First is the question of whether the information structure is encoded in syntax and, as such, is susceptible to priming. Second, is to do with the fact that the concept of topic is equated to the notion of "importance" by the proponents of Information Structure Priming (Patient Prominence Priming) view. And finally, there is an issue of doubtful information-structural similarity between Russian or Polish passives and OVS constructions. I will now address these three issues in turn.

In linguistic theory, the information structure (or information packaging) is understood as the formal, grammatical manifestation of speakers' conceptual/pragmatic representations, which can be expressed syntactically (e.g. active structure vs. passive structure), prosodically (e.g. though relative pitch variations and/or changes in loudness and syllable duration), or through the ordering of sentence constituents (e.g. left dislocation) (Cruttenden, 1997; Lambrecht, 1996). The basic and the most prominent notions of information structure are topic, focus

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[20] Note that Vasilyeva and Waterfall (2012) do not themselves call to this phenomenon as Information Structure Priming, instead they refer to it as Discourse Priming.

and contrast. Broadly speaking, there are two approaches in linguistic theory which offer contrasting views on how those aspects of information structure are encoded.

On the cartographic approach the afore mentioned categories of information structure are encoded in syntax proper; specifically, they are predefined as they enter the numeration in a form of discourse-related functional heads with corresponding formal features which drive the syntactic derivation and computation. (Bocci, 2008; Cinque, 1999, Jackendoff, 1972; Rizzi, 2004). At a glance, on this approach any syntactic priming effects and, for that matter, Constituent Structure Priming effects would not be distinct from the Information Structure Priming effects. However, as the information structure features are not the property of lexical items (Szendrői, 2001, 2017), they must be added later in the sentence computation process, and a phase where these features enter the derivation might indeed host priming. Although the exact mechanisms of such priming are difficult to envisage, it is not entirely impossible. If, for instance, a [patient] argument is marked as a topic in a prime, this information could potentially be retained in the memory and reactivated when a target description is constructed.

Following Reinhart's (1981, 1995, 2006) interface-based approach, which I assume in this thesis, information structure is not encoded in syntax: an expression can be defined as a topic or focus only in relation to a given context. On this approach grammar generates all possible well-formed representations, which are then filtered out at the interface with the post grammatical level[21] by the economy rules, selecting the least costly (unmarked) representation; an alternative, more costly representation could only be selected if it achieves the interpretation the unmarked representation fails to convey (Reinhart 1995, 2006; Titov, 2012; 2017). On this account the selection is defined by the context and the economy rules only. Thus, as the context of primes differs from that of targets, Information Structure Priming cannot be expected.

As the proponents of the Patient Prominence Priming often refer to the notion of topic, it is useful to outline what the concept entails within the linguistic theory, although, admittedly, little reference is made to it in the in the literature on the Patient Prominence Priming. Topics are often placed in a subject position, although this is not an obligatory requirement; a heavy stress on a subject NP, for example, would

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[21] Note that here 'the post grammatical level' broadly refers to the staged speech production process outlined in Level's (1989) 'blueprint of the speaker' (see Figure 1. 1).

set it as a non-topic, while other structural positions could be topic-marked (Reinhart, 1981). Topics usually describe old or given information in a sentence. However, Reinhart (1981) stresses that topichood cannot be characterised by givenness only but must be defined by pragmatic aboutness (what the sentence is about), which, importantly, is determined by the context. A given sentence therefore could have different topics depending on a context. For example, in the sentence *Sarah visited John last month*, the topic is *Sarah* only if the utterance was a response to the question *Who did Sarah visit last month?*; but if the question answered was *Who visited John last month?*, the topic is *John*. What should be taken away from this brief discussion is that the notion of topic, as it is perceived within linguistic theory, is greatly detached from the understanding of topic the proponents of Patient Prominence Priming assume, as it has very little to do with the 'prominence' that is defined by linear precedence.

The final issue which undermines the Information Structure Priming (the Patient Prominence Priming) account is a key, but in my view, erroneous assumption adopted by Fleischer et.al. (2012) and Vasilyeva and Waterfall (2012) that the discourse functions of the passive and the OVS in Polish and Russian are similar. There are reasons to doubt this similarity, at least in Russian. Certainly, what the constructions have in common is that in both cases the patient is given/backgrounded and the agent is new/focused. In English this interpretation is also captured by SVO with a stress shift to the subject or by the passive (Titov, 2012). However, while in the Russian passive the patient is promoted to a discourse topic (just as in the English passive – see Levelt (1989: 193-194), OVS does not give rise to such interpretation (Titov, personal communications). Pronoun antecedence could be used as a diagnostic for this claim: the pronoun following a topic should refer to it (Reinhart, 1981). Consider sentences in (7). The intuition is that the antecedent of the pronoun *he* is the thematic object (the grammatical subject) when it follows the passive sentence (7b), but it is the thematic subject (also the grammatical subject) when it follows OVS (7a). The interpretation is mirrored in the English passive. Consider sentences in (8). Like in Russian, the passive is used when the thematic object is a discourse topic (8c).

7.   Petja i Miša xorošie sprintery.

             PetiaNOM and MishaNOM good sprinters

             Peter and Michael are good sprinters

(a)   No včera Mišu obognal Petja$_1$ – on$_1$ govoril ob ètom s ženoj.

        But yesterday MishaACC outrun PetiaNOM – he talked about it with wife

        Yesterday Michael was overtaken by Peter – he was talking about it with his wife.

(b)   No včera Miša$_1$ byl operežën Perej – on$_1$ govoril ob ètom s ženoj.

        But yesterday MishaNOM was outrun PjotrINSTR – he talked about it with wife

        But yesterday Michael was overtaken by Peter – he was talking about it with his wife.

8.   Peter and Michael are both good sprinters.

(a)   But yesterday Peter outrun Michael$_1$. ?He$_1$ blames it on his$_1$ recent injury.

(b)   But yesterday Pater$_1$ outrun Michael. He$_1$ says his$_1$ extra training did the job.

(c)   But yesterday Michael$_1$ was outrun by Peter. He$_1$ blames it on his1 recent injury.

(d)   But yesterday Michael was outrun by Peter$_1$. ?He$_1$ says his$_1$ extra training did the job.

To conclude, it is difficult to reconcile the theoretical approaches to the information structure outlined above (especially the interface-based approach) and the data shown to support Patient Prominence Priming, as they cannot predict the results reported by the studies overviewed above.

I suggest that at least some of the data supporting Patient Prominence Priming can be explained by the methodological flaws most of the experiments reviewed earlier share, to which I turn to in next.

2.5.   Patient Prominence Priming Data and Argument Prominence Hierarchy

In order to explore the potential confounds which may have affected the Patient Prominence Priming data and offer an alternative explanation for the results reported in the previous section, it is first necessary to re-introduce an essential piece of theoretical research, which underpins the present study. As outlined in section 1.3.2, Titov (2012, 2017) proposed that in morphologically rich and syntactically flexible languages such as Russian, neutral scrambling, which defines the linear order of the arguments in a sentence, is regulated by the *Argument Prominence Hierarchy* (APH) introduced in (2) and repeated below in (9) for convenience. What follows from the APH is that 'there is a requirement for interpretively prominent material to precede interpretively non-prominent material' (Titov, 2017: 3). I shall refer to this proposal as *the APH hypothesis*.

9.   *Argument Prominence Hierarchy*

±presupposed > ±referential > ±human> ±animate

'Whenever a higher-ranked feature is operative, it overrides all the lower-ranked features, i.e. the interpretation of the latter becomes immaterial for the ordering of objects. However, whenever a higher-ranked feature is vacuously satisfied (i.e. the arguments carry equal values of this feature) a lower-ranked feature regulates the order of objects.'

(Titov, 2017: 14)

English also abides by the APH to encode argument prominence and to subsequently determine the linear order of arguments, although this encoding is restricted owing to the fact that it is a morphologically poor and syntactically relatively rigid language (Titov, 2012, 2017). Thus, English and Russian would utilise different

syntactic means to satisfy the requirement imposed by the APH. For example, all else being equal, if the thematic subject (agent) is inanimate and the thematic object (patient) is animate, there is a strong tendency to place the [+animate] argument into the subject position of an English passive structure, or into the object position of a Russian active OVS construction.

A number of non-priming studies in sentence production provide support for the AHP hypothesis showing that animacy indeed affects the choice of structure selection (e.g. an animate argument would tent to precede an inanimate) in adults (Altmann & Kemper, 2006; Ferreira, 1994: Prat-Sala, 1998; Rosenbach, 2005), children (Harris, 1978; Drenhaus, & Féry, 2008; Prat-Sala, Shillcock & Sorace, 2000) and speakers with the autism spectrum disorders (Lake, Cardy & Humphreys, 2010); although admittedly, these experiments were not concerned with the other APH features such as givenness and referentiality. The question that arises now is whether similar effects might emerge in priming tasks and whether they interact with the effects of syntactic priming. I propose that they, in fact, do.

Consider the Patient Prominence Priming data in view of the APH hypothesis. Recall that V&W and Fleischer et.al. (2012) argued that the production of Russian PA constructions and English passives were triggered by hearing Russian passives and Polish OVS primes respectively. However, it seems that the animacy context provided favourable conditions for those effects to emerge. Specifically, the transitive target events the participants described had either animate patient and inanimate agent, or human patient and non-human agent; in other words, the distribution of [±animate/human] features in the targets was asymmetrical. If confirmed, this APH-based hypothesis (where animacy is a two-tier characteristic which incorporates both [±animate] and [±human] features) would have important consequences for interpreting the data described in 2.3.

Let us have a closer look at the Fleischer, Pickering and McLean's experiment. Here, all target events had [+human] thematic objects (patients) and [-animate] thematic subjects (agents), e.g. bells waking football player, hat hitting matador, flower splashing sportsman. By the APH hypothesis this animacy mapping favoured the order where the patient precedes the agent, leading to an overall strong bias for the passive, the most frequent structure that achieves this ordering of arguments in English. Driven by this asymmetry, the frequency of the passive responses would have been high due to the APH effect, without an exposure to the passive primes,

and it remained so in the passive and OVS conditions. These structures did not interfere with an inclination to use the English passive for the targets, as they are both equally suitable for describing [+human] patient/[-animate] agent event in Polish.

At the same time, impeded by hearing the active SVO and the NP-conjunction primes (baseline), the number of passives reduced significantly. The NP-conjunction condition could and most likely did impact on the selection of structure for the target sentences, therefore, strictly speaking, it cannot be considered a true baseline. Following this line of logic, it would be the active SVO primes that were responsible for the difference between the conditions, not the passive or the OVS. If this is correct, there should be less actives in the baseline condition compared to the active condition. This indeed was the case numerically (see the frequencies in Table 2.1), although it is unclear whether this difference was significant. The above demonstrates that Fleischer et.al.'s data can be explained without any reference to the information structural level at which priming might be functional, as the animacy features on the arguments in the targets themselves determined the linear order of their presentation.

Examining V&W's data raises the same issue. The full list of target events presented in Table 2. 7 reveals that in four out of ten target images the distribution of animacy was unequal. The authors report that 71% of the passives in the passive condition were produced by the English-speaking children in response to the events (b), (c) and (h). Two of these targets (c), (h) exhibit an asymmetry in animacy and humanness features on the arguments and one (b) – in humanness. Similarly, in the Russian child data, the same three images accounted for 65% of the passives and PA responses combined produced by the children and 59% of passives/PAs produced by the adults. Following the Argument Prominence Hierarchy, the afore mentioned target events (b), (c), (h), and additionally (a), provided a context that, once again, favoured a structure where the patient linearly precedes the agent. Such order could be achieved in Russian either by a canonical passive or by one of the PA constructions, see Table 2. 6. Indeed, those structures (except for accusative unaccusatives) were the structures the target responses followed with a preference given to the PAs over the passive since the latter is an infrequent and possibly marked construction. Note, however, that the APH, as proposed by Titov (2012, 201, 2019) is concerned with the relevant prominence of the arguments in a sentence and says nothing about the agentless constructions such as impersonal actives, short passives, unaccusatives or accusative unaccusatives with the covert thematic

subject. Following V&W, who found an almost equal proportion of OVS and impersonal active structures within those 65% of responses produced by Russian children for the targets with asymmetrical animacy mapping, it is reasonable to suggested that the APH could be taken further to explain the selection of agentless constructions: in a presence of an animate patient, an inanimate agent could either linearly follow the patient as in the passive or OVS, or get omitted altogether as it is the case with unaccusatives or short passives.

Table 2. 7 The full list of target events, Vasilyeva & Waterfall (2012), Exp.1-3.

(a)	**The mailman [+human] is being bitten by the dog [-human].**
(b)	**The boy [+human] is being stung by the bee [-human].**
(c)	**The girl [+human] is being sprinkled by the hose [-animate].**
(d)	The gate [-animate] is being crushed by the car [-animate].
(e)	The shoe [-animate] is being ripped by the dog [+animate].
(f)	The flower [-animate] is being eaten by the rabbit [+animate].
(g)	The horse [-human] is being fed by the boy [+human].
(h)	**The man [+human] is being splashed by the fountain [-animate].**
(i)	The dirt [-animate] is being dumped by the truck [-animate].
(j)	The duck [+animate] is being caught by the tiger [+animate].

In sum, if one accepts the APH hypothesis, the target items with an asymmetric distribution of animacy could be providing a natural licensing for the passive in the group of English-speaking children and for the passive alternatives in the Russian-speaking children and adults, skewing the results. I suggest that the impact of the passive primes might have been exaggerated. Similar to the analysis of the data obtained by Fleischer et.al. I offered above, the difference found between the active and the passive conditions could in fact be due to the syntactic priming effect of the active SVO structure: the natural licensing of the intended arguments in the target sentences was overridden by the active primes resulting in a lower proportion of PA responses in the active condition compared to the passive.

Considering the above, the Patient Prominence Priming account loses its appeal. It seems, there is little need to postulate this kind of esoteric priming. Instead, most of the data reviewed above could be accounted for by the APH effects on one hand, and on the other, by syntactic priming, which, as I will argue throughout this thesis, is driven by the prime's argument structure. It is also evident that in order to explore a possibility of the Patient Prominence Priming, the [±animacy] and [±human] features carried by the intended arguments within the target events must be carefully controlled. A study reviewed next addresses this issue, providing valuable evidence to the above and demonstrating the APH effects in the context of a priming task.

2.6.   Priming and Animacy: Is there an Interaction?

In the recent priming experiment, Gámez and Vasilyeva (2015, Exp. 1) aimed to explore whether the animacy distribution in targets could moderate syntactic priming effects. To my knowledge this is the only study that directly addressed what I earlier called the APH-based hypothesis, although without explicitly appealing to it. In this study English-speaking 5- to 6-year olds (n = 38; mean age = 5;2) were exposed to passive or active primes (see Table 2.8 for the full list of target events).

Table 2.8 Full list of the target events, Gámez & Vasilyeva (2015), Exp. 1.

N	Patient	Agent	Verb
1.	butterfly	frog	grab
2.	boy	bee	sting
3.	postman	dog	bite
4.	man	water	splash
5.	bear	trap	catch
6.	girl	hose	sprinkle
7.	window	ball	break
8.	fence	car	smash
9.	tree	lightning	strike
10.	trunk	beaver	eat
11.	flowers	woman	water
12.	shoe	dog	rip

The primes and the targets were matched in animacy, both having the following animacy mappings: animate patient/animate agent, animate patient/inanimate agent, inanimate patient/animate agent, and inanimate patient/inanimate agent.

The results of the main experiment (Exp. 1) showed a significant animacy*prime interaction effect, while the main effects of animacy and prime were not significant despite a substantial difference between the conditions in the percentage of passives produced. There were more passive responses in the passive condition (24%) compared to the active (7%) (Table 2.9), but this difference was found significant only in those cases where the prime and the target had animate patients and inanimate agents, and not when the arguments' animacy was reversed or equal (Figure 2. 1).

Table 2.9 Proportions of passives produced in the passive and active conditions across all combinations of the arguments' animacy, Gámez & Vasilyeva (2015), Exp. 1.

condition	Active responses	Passive responses	Other responses
active (n=18)	169 (78%)	15 (7%)	32 (15%)
passive (n=20)	134 (56%)	58(24%)	48 (20%)

Following Prat-Sala, Shillcock and Sorace (2000), Gámez and Vasilyeva highlight that in the process of lexical recovery animate entities are conceptually more accessible compared to inanimate and, thus, are easier and faster to retrieve, which allows them to enter the level of syntactic processing before the inanimate entries. Consequently, the authors argue, this ease of retrieval leads to the linear precedence of animate arguments over inanimate. The researchers conclude that the interaction between the syntactic form of the primes and the animacy features of the targets indicates that semantic and syntactic characteristics facilitate the production of specific structures convergently, rather than independently, and that the passive priming effect was modulated by the mapping of the animacy features in the primes and targets.

Figure 2. 1 Production of passives as a function of syntactic priming and animacy (each of the four animacy conditions had 3 trials), Gámez & Vasilyeva (2015: 22), Exp. 1.
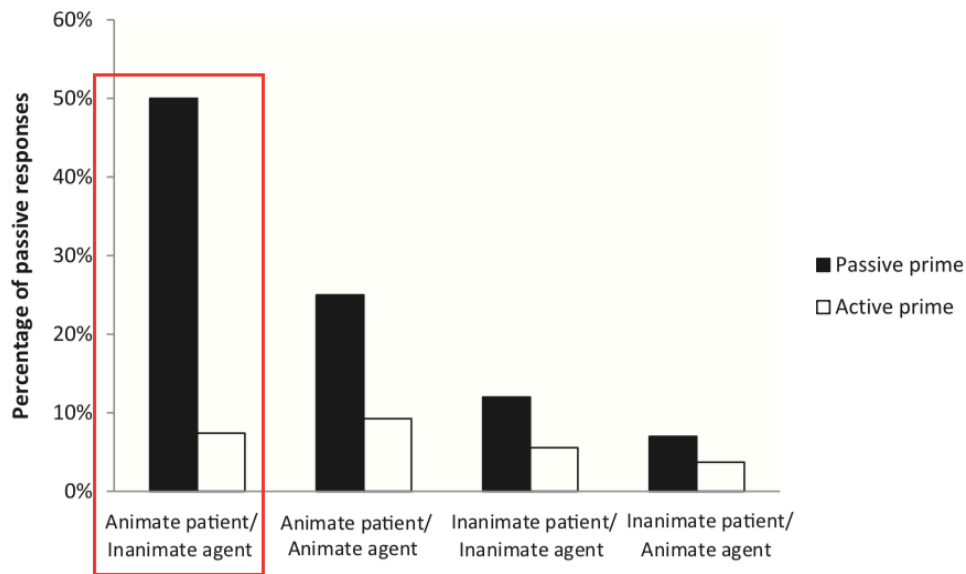
While the results of Gámez and Vasilyeva's experiment offer yet more evidence supporting the APH-based hypothesis, their interpretation of the findings raises some questions. The main issue is that the data show priming effect only when the animacy features on the targets' arguments favour passivisation, namely, when the targets' arguments' animacy was unequal with the [+animate] feature on the patient: passives were produced in 50% of the trials where the prime and the target had an animate patient and an inanimate agent, and only 7% of passives were observed when the arguments' animacy was reversed. It appears that what surfaced as interaction is no more than an effect of the active prime, which was particularly visible in the condition with the animate patient and inanimate agent. The active primes suppressed the natural choice of the structure which otherwise would have been used for this type of animacy distribution (i.e. the passive). This in turn lead to a higher number of actives consequently reducing the number of passives.

Let us consider the responses in the rest of animacy combinations. The second highest proportion of passives (25%) was produced in the passive condition for the events where both, the patient and the agent, were animate (see Figure 2. 1). Why would this be the case? On a closer inspection it became apparent that in two out of the three targets the arguments were equal in their [±animate] feature but differed in their [±human] feature (Table 8 (2), (3)): the patients in these images were human, while the agents were nonhuman. This suggests that the asymmetry in the distribution

of [±human] features, just like the asymmetry in the distribution of animacy, was likely to be responsible for the number of passive responses observed in these targets. Finally, the proportion of passives produced across the conditions in the animate agent/inanimate patient alignment was generally very low with the passive primes having almost no effect. Such pattern could be driven by the animacy distribution which favours the active structure. It appears therefore that only in the targets with inanimate [agent] and [patient] arguments, the actual effect of syntactic priming could have been expected, but still did not occur.

As a side note it is worth mentioning that in a follow-up study Gámez and Vasilyeva (2015, Exp. 2) exposed the participating children to passive primes only, and the primes and targets were either matched or mismatched for their animacy configuration. The highest number of passives was produced when the targets mirrored the animacy features of the primes containing animate thematic objects and inanimate thematic subjects, although this increase was not significant. The authors came to the conclusion that the animacy features of the targets were more influential than those of the primes. For example, in the cases were the targets' animacy distribution mismatched the primes', more passives were produced when the targets had animate patient and inanimate agent after hearing the reversed animacy mappings in the primes compared to when the targets had inanimate patient and animate agent after hearing the reversed animacy mappings in the primes.

In sum, I suggest that in order to study the syntactic priming phenomenon, at the very least two aspects must be taken into consideration when designing a priming task. First, as the animacy and the humanness features have a direct influence on the linear order of arguments in a sentence and consequently affect the choice of syntactic structure selected by participants, the distribution of both features must be controlled. Second, a true no-prime condition needs to be run as a part of any priming experiment. Although I suggested to attribute a difference between the conditions in the studies by Vasilyeva and Waterfall (2012), Fleischer et.al. (2012) and Gámez and Vasilyeva (2015) to the impact of the active prime, this remains only that – a suggestion. Recall that an effect of inverse frequency interaction, whereby a more frequent construction, e.g. an active, would lead to weaker priming compared to a less frequent, e.g. a passive, has been widely reported in syntactic priming experiments (e.g. Hartsuiker & Kolk, 1998; Jaeger & Snider, 2008; Reitter et.al., 2011). Bearing in mind this observation, only when a comparison can be drawn with

a no-prime baseline condition, the true source of priming (e.g. active, passive or both) as well as its strength could be assessed.

Having highlighted some compelling data which support the Patient Prominence Priming proposal as well as the theoretical and methodological issues underpinning such claim, I will now turn to the present study. In the remaining parts of this chapter I report on the three experiments conducted with monolingual Russian adults (Experiment 1), monolingual Russian children aged 4 to 7 (Experiment 2) and native English-speaking 4- to 7-year olds (Experiment 3). The experiments were run to investigate the possibility of the Patient Prominence Priming and to address the issues relating to the APH in the target events.

2.7. The Present Study: Aims, Hypotheses and Predictions

The present study had multiple objectives. First, I aimed to evaluate the proposal put forward by V&W and Fleischer and colleagues (2012), who posited the existence of a syntax-independent information-structural (or discourse function) level of priming (which, for the reason outlined earlier, I refer as the Patient Prominence Priming). Specifically, I tested if hearing passive primes facilitated the subsequent production of the passive alternatives (PAs), the constructions syntactically unrelated to the passive which were claimed to share the discourse function with it, at the very least in Russian and Polish (V&W, Fleischer et.al., 2012). The category of PA responses was not exclusive to Russian speakers in the present study, although in the English data they were limited to unaccusative and copular constructions (recall that in section 2.5 I suggested to extend the APH to explain the selection of agentless constructions). In addition to active and passive primes, the Russian participants were exposed to OVS primes (Experiments 1 and 2), which was done in order to explore a possibility of Patient Prominence Priming from another angle. Coupled with the fact that OVS was one of the most frequent PA produced by the Russian adults and children in V&W's study, the researchers' proposal that passive and OVS carry the same discourse function (i.e. patient prominence) leads to suggest that if priming is susceptible to the information on the patient prominence, then OVS primes should also evoke an increase in production of PAs. In addition to these conditions, a no-prime baseline was introduced to all three groups tested. The baseline was essential in order to draw comparisons between the priming conditions, as judgements based

on the difference between active and passive conditions alone would have not led to an accurate representation of priming effects.

My second objective was to investigate if the relative interpretive prominence of arguments in target events determined by their animacy, the lowest level of the APH, could affect the choice of sentence structure selected by adults and children to describe these events, and whether it can modify syntactic priming effects. The role of animacy in the target structure selection was explored while [±human] feature was controlled for. The targets were of the two types, which was manipulated within subjects: those with an equal prominence of arguments (EP) and those with an unequal prominence of arguments (UP). In the EP targets the intended arguments were both inanimate, and in the UP targets the intended agent was inanimate while the patient was animate. The role of the baseline was to determine the natural (non-primed) selection of structures for EP and UP target evens.

Additionally, I hoped to assess whether active constructions, both SVO and OVS, constitute effective primes. So far there has been little investigation into the strength of the influence of the active form. As shown in the previous chapter there are reasons to believe that the strength of priming may vary depending on the structure being primed. Importantly, an experiment that tests priming of the passive where the active condition, specifically SVO, is treated as a baseline, runs the risk of exaggerating the priming effect of the passive, as the difference between the conditions could in fact be driven by the active primes as well. Furthermore, while Fleischer et.al. (2012) showed priming from Polish active/OVS to English passive, the question of whether such pattern could be observed in a within-language priming task remains. Finding that passives and OVS could prime one other, would provide evidence for supporting the Patient Prominence Priming account.

There were two main reasons for testing children as part of this study. The first is to draw a parallel to the Russian and English child data obtained by V&W (Exp. 1 and 2). The second is a much broader aim. As highlighted in the introduction, in order to understand how the language system works, it is essential to assess the changes the system undergoes at the acquisition stage. One of the ways to achieve it is by comparing the linguistic competence of children to those of adults. While I recognised that performance does not necessarily reflect competence, I have also highlighted earlier that the priming methodology was shown to be well-suited to evaluate children's grammatical knowledge, perhaps more than other methods traditionally

utilised with children (e.g. Truth Value Judgement Task or the Picture Selection Task). The study, therefore, attempted to compare the performance of Russian monolingual adults and children in a priming task. If such a task can pick up memory traces of the thematic object prominence (or the emphasis on the patient in a transitive event) in children, it is likely that they rely on these simpler concepts to derive a sentence until the necessary language components mature or until other essential non-linguistic cognitive functions develop to support their syntactic processing.

The English child data were gathered in order explore the question outlined above cross-linguistically. The status of the Russian passive is substantially different from that of the English passive, i.e. it is lexical in the former and syntactic in the latter. In addition, compared to the English, the Russian passive is a highly infrequent and contextually less flexible construction. Drawing a comparison with the English data allowed to explore whether these differences would be reflected in the strength and the direction of the priming effects, and whether the influence of the argument prominence hierarchy would be apparent not only in a scrambling language like Russian, but also in a non-scrambling language like English.

The following research questions were thus addressed by the present experiments: *1. Is priming susceptible to the information on the patient prominence? 2. What role do the interpretive features on the targets' arguments, specifically animacy, play during a priming procedure? 3. Is children's syntactic behaviour during a priming task distinct from that of adults with respect to the patient prominence and the animacy asymmetry in the target events, and if so, what are the differences? 4. Is there a difference with respect to the degree of relevance of patient prominence or animacy distribution in the arguments between Russian, a flexible word order language, and English, a language with a strict SVO word order?*

Guided by these questions, the study tested two main hypotheses. The first hypothesis (*H1*) is that *the prominence of the patient is subject to syntactic priming (Patient Prominence Priming hypothesis).* The hull hypothesis (*H0*) is that *patient prominence is not subject to syntactic priming*. The mechanisms under which such priming would potentially function are not clear, and if the data discussed in the previous chapter can be accounted for by the APH and priming effects (both passive and active) alone, the assumption of the possibility of Patient Prominence Priming will be eliminated by Ockham's razor. The second main hypothesis (*H2*) is that *the animacy asymmetry in the targets is a strong predictor of the syntactic structure*

produced in a priming task (the APH-based hypothesis)[22]. I therefore propose that the animacy asymmetry and the syntactic priming effects alone are sufficient to account for the data presented in 2.3, and that by the principle of parsimony no additional plane of priming, namely, the Patient Prominence Priming, is required.

The hypotheses make the following predictions for the two languages tested. For Russian *H1* predicts an increase in the production of passive alternatives (PAs) (e.g. OVS, impersonal actives, accusative unaccusatives, unaccusative structures and copular constructions) and perhaps passives themselves in the passive and the OVS conditions irrespective of the animacy distribution in the targets compared to the baseline and the active condition. The predictions for English are similar, although the proportion of PAs is not expected to be high since the choice of such structures in English is limited; a potential increase of canonical passive responses after hearing passives is consistent with *H1*, but it is also consistent with *H0*, and given the syntactic identity of the prime and the target (i.e. both are canonical passives) such an increase would be indistinguishable from the syntactic priming effects in the English data.

If no increase in the production of passive alternative structures in the passive or the OVS conditions compared to the baseline conditions is found in the responses produced by the Russian speakers, it would lead to rejecting *H1* and accepting *H0*. The same applies for English, albeit, given the relative syntactic rigidity of the language and the higher level of syntactic productivity of the canonical passive, the observed effects may be smaller.

H2 predicts a higher proportion of PA and passive responses for the UP targets than for the EP targets across the conditions (EP PA < UP PA) for both languages. For the English-speakers, the natural choice for UP targets is the passive, while for the speakers of a scrambling language such as Russian, it is a passive alternative (PA) construction. These patterns, however, could be mitigated by other factors, which are considered next.

My exploratory predictions are concerned with the relative strength of the APH and the syntactic priming effects. The predictions in this case were more complex, but the key three patterns of responses can be identified. If the APH has more impact on the structure of targets than the priming effect, we can anticipate that the EP PA/passive < UP PA/passive pattern would hold across the conditions and the

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[22] On the APH-based account, such effects would be also expected in spontaneous speech.

proportion of PA/passive responses would be similar in all conditions in both languages. If, however, the reverse is true, the APH effect is expected only in the baseline condition.

The third pattern follows from the proposal put forward by Gámez and Vasilyeva (2015). The researchers hypothesise that priming effect could be moderated by the animacy distribution in the targets: syntax (the participle passive) and semantics (the animacy distribution) convergently promote the production of passives. If the hypothesis is correct, all three, the main effects of the prime and the animacy, as well as the prime*animacy interaction are predicted to be found significant. The Russian speakers are expected to produce more passive alternative or passive responses for the UP targets compared to the EP targets across the conditions, and the highest proportion of passive responses is anticipated in the UP passive condition. The English speakers are expected to produce more passives for the UP target events than for the EP target events across the conditions, but the highest proportion of passives should be observed in the UP passive condition.

Based solely on the findings from the extensive research in the field of priming, an increase of passive responses in the passive condition is expected due to the syntactic priming effect. It is also possible that priming effect is detected for SVO and OVS active structures, although it is less clear how strong such effects may be or whether these constructions could at all prime one another.

Finally, the effects of syntactic priming were likely to be modulated by cross-linguistic differences. As passives are strongly dispreferred even by the adult Russian speakers, passive priming was expected to be weaker in this language compared to English. This effect could be magnified in children to the point that the syntactic priming effect for passives would turn out to be undetectable in Russian. At the same time, if the current experimental design is suited for purpose, passive priming effects are expected to emerge in the English data, as despite general problems surrounding the acquisition of this structure, passive priming effects have been observed in children as young as 2-3 years of age (Bencini & Valian, 2008).

2.8.   Experiment 1: Russian Adults

2.8.1.   Methods

2.8.1.1.   Participants

91 native monolingual Russian speakers (mean age = 33; 36 male), students and staff of a high-school in St-Petersburg, Russia, volunteered to participate in the study and were randomly assigned to either baseline (n=24), active/SVO (n=23), passive (n=24) or OVS (n=20) condition. Consent was obtained from the participants prior to running the procedure.

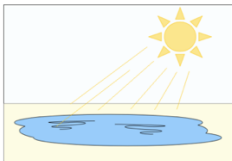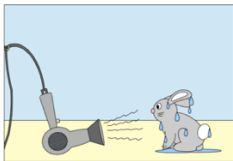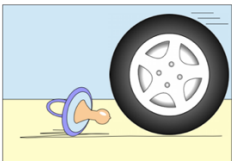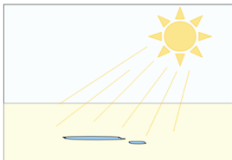#### 2.8.1.2.   Design and Materials
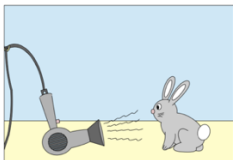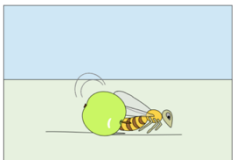
The study adopted a between-subject design to allow for a true baseline where no primes were heard by the participants, to avoid cross-condition contamination and to be able draw a parallel with Vasilyeva and Waterfall's (2012) data. In addition, this design was well-suited to enable a closer comparison with the child data (Experiment 2), where a between subject design was adopted as often done in priming studies which test children. There were four condition: active/SVO, passive, OVS and no-prime baseline condition.
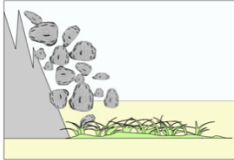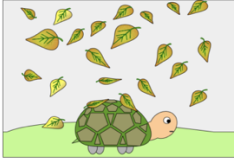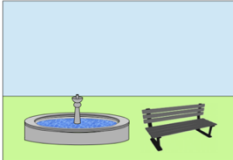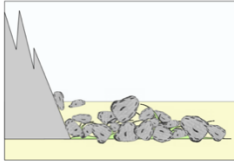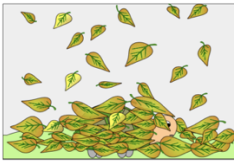
The experimental stimuli consisted of two sets: 16 prime event drawings for the experimenter's set, and 16 target event drawings for the participant's set. The items were presented as A4 colour prints. The colour saturation was moderated to avoid undesired salience of some entities over others. The prime events were accompanied by the prime sentences produced by the experimenter. The sentences followed either active, full passive or OVS constructions depending on the condition. The target events were described by the participants. Each prime was paired with a target in a way specified later in the section.

One of the challenges for depicting transitive events which could be described with the Russian passive was that Russian canonical participle passives are

perfective and can only denote a complete action (imperfective passives follow a different structure and they were not the focus of the study). Therefore, such events could not be depicted in static images as it has often been done in priming experiments with English-speaking participants. Each prime and target item was therefore presented in two drawings, similar to comics: the first drawing in a pair depicted the start of an event (or a state before the action) and the second depicted the end of that event (or completed action) (see Table 2. 10 for examples of the stimuli and Appendix 1 for the full set of stimuli).

Table 2. 10 Examples of experimental stimuli, Experiment 1.

Primes		Target Events	
EP Active prime: *Solnce vysušilo lužu.* SunNOM dried puddleACC	UP Active prime: *Fen vysušil zajčika.* HairdryerNOM dried rabbitACC		
EP Passive prime: *Luža byla vysušena solncem.* PuddleNOM was dried sunINSTR	UP Passive prime: *Zajčik byl vysušen fenom.* RabbitACC was dried hairdryerINSTR		
EP OVS prime: *Lužu vysušilo solnce.* PuddleACC dried sunNOM	UP OVS prime: *Zajčika vysušil fen.* RabbitACC dried hairdryerNOM	EP event: Wheel squashes dummy.	UP event: Apple squashes wasp.

Primes		Target Events	
Active prime: *Kamni zasypali travu.* RocksNOM covered grassACC	Active prime: *List'ja zasypali čerepaxu.* LeavesNOM covered turtleACC		
Passive prime: *Trava byla zasypana kamnjami.* GrassNOM was covered rocksINSTR	Passive prime: *Čerepaxa byla zasypana list'jami.* TurtleNOM was covered leavesINSTR		
OVS prime: *Travu zasypali kamni.* GrassACC covered rocksNOM	OVS prime: *Čerepaxu zasypali list'ja.* TurtleACC covered leavesNOM	EP event: Fountain splashes bench.	UP event: Car splashes pig.

In order to maximise the comprehension of the passive, particularly as the stimuli were designed for testing adults and children, all transitive events that constituted the primes and targets were non-reversible (e.g. an event of the sun drying a puddle), i.e. the reversal the agent-patient roles would yield an impossible event. Non-reversible passives were shown to create less issues for young children than reversible (Bever, 1970; Harris, 1976; Messenger et.al., 2012; Slobin, 1966). This aspect of the experimental design is not unusual – non-reversible passives were widely utilised in priming studies with both adults and children (V&W, 2012; Huttenlocher et.al., 2004; Shimpi, Gámez, Huttenlocher, & Vasilyeva, 2007; Savage et.al., 2003, 2006 amongst others).

There was no lexical overlap between the primes and targets: no event was repeated between primes and targets and the depicted referents (animals and objects) varied from image to image. While lexical overlap was shown to boost

syntactic priming effects (e.g. Bock, 1989; Cleland & Pickering, 2003; Mahowald, James, Futrell & Gibson, 2016 for meta-analysis; Pickering & Branigan, 1998), reliable priming effects were also demonstrated without a lexical overlap even in young children (Foltz, Thiele, Kahsnitz & Stenneken, 2015). Since the ultimate goal of the thesis is to identify the aspect or aspects of a sentence relevant for priming, the prime and the potential target should differ in all but these specific aspects, and the design should reflect this requirement as much as possible. Lexical overlap was therefore avoided.

Four transitive verbs were selected for primes: *pokryvat'*/cover, *vysušivat'*/dry, *carapat'*/scratch *osveščat'*/illuminate, and four transitive actions were selected for the targets: push, lift, squash, splash. Each verb/action was used four times. Verb repetition within the primes generally is not an unusual practice (e.g. Fleischer, Pickering & McLean, 2012); in the present study this was done to accommodate testing children. Considering that the aim was to increase the overall understanding of the events depicted in primes and targets and the ease with which the targets were described, the choice of verbs/actions selected for the task was limited. The issue was complicated by the fact that not every transitive verb in Russian can be passivised. For example, such easy to depict and instantly recognisable events (not only by the adults but also by children) as *push*, *hit* and *chase*, often utilised in passive priming experiments, do not have passive participle equivalent forms in Russian.
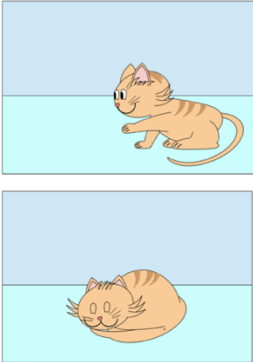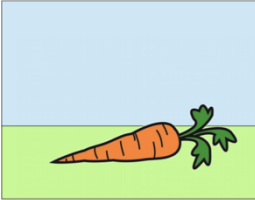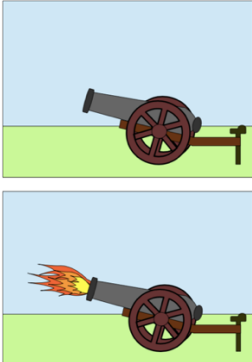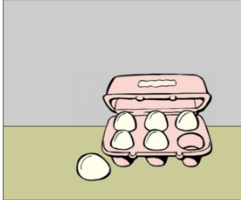
To enable a direct comparison between the structures with equal and unequal prominence of arguments, each verb/action was used four times: twice with equal prominence of arguments (EP): inanimate agent and patient, and twice with an unequal prominence of arguments (UP): an inanimate agent and animate patient. Although, it was demonstrated that the animacy features of the arguments in the primes play little role in syntactic priming (Bock, 1986; Bock, Loebell & Morey, 1992), to control for such possible effect, primes and targets were paired in the following balanced way, each pairing repeating four times: EP prime-EP target, EP prime-UP target, UP prime-EP target, UP prime-UP target. In half of the primes and half of the targets the agent appeared on the left, and in the other half – on the right, which was done to avoid left-right bias.

In addition to the above, 80 filler images were created: 40 filler-primes for the experimenter's set (4 repeated) and 40 filler-targets for the participant's set (4 repeated); those were paired just like the experimental items. The fillers contained

drawings of objects and simple intransitive actions, e.g. a duck swimming or a dog sitting (see examples in Table 2. 11).

Table 2. 11 Examples of filler primes and filler target events, Experiment 1.

Filler Primes		Filler Targets	
Event	Object	Event	Object
Koška zasnula. Cat fell-asleep	*Morkovka.* Carrot	Cannon fires.	Eggs

The full set of items was presented in a pseudo-randomised order: a minimum of two filler prime-target pairs occurred between experimental prime-target pairs, and for each of the four primes containing the same verb there was a target that could be described with one of the four target verbs.

2.8.1.3. Procedure

The procedure was conducted individually in a quiet room. The experimenter and the participants took turns to describe the pictures. The experimenter's descriptions (primes) were scripted to follow the prime construction: full passives in the passive condition, SVO in the active condition and OVS active in the OVS condition. In the baseline the participants viewed the primes in silence.

The subjects were instructed to describe the images as quickly as possible making sure that the descriptions were presented in full sentences. One-word

descriptions of single objects (i.e. some of the fillers) were said to be acceptable.

A short training was included prior to testing: there were three prime-target pairs, one of them depicted objects and the other two presented events.

An additional memory task was introduced as a distractor: the participants were asked to look carefully at all the images and indicate if they notice repeats. Only the filler images were used for such repetitions.

The procedure lasted approximately 10 to 20 minutes. The responses were audio-recorded, transcribed and coded for analysis.

2.8.2.   Coding

The comparability's sake, the coding system utilised by Vasilyeva and Waterfall (2012) was adopted for the present study. Examples of responses for each of the codes used presented in Table 2. 12 below.

A response was coded as *active/SVO* if it was semantically faithful, represented the intended action and followed a subject-verb-object (SVO) order, e.g. Table 2. 12 (a). Utterances following the structures described above containing prepositional verbs *naexal na*/to drive onto*, nažal na*/to press onto and *nadavil na*/to press onto were also coded as actives accordingly. Following Titov (2012, 2019), accusative unaccusative[23] constructions which follow the SVO order were also coded as active*, e.g. Table 2. 12 (b).

In addition, the category of actives/SVO included the responses which contained the agent/cause/instrument in the subject position of a structure where an intransitive clause was coordinated with a transitive clause, e.g. *Grib upal i razdavil červjaka*/ MushroomNOM fell and squashed wormACC (Table 2. 12 (c)). I analysed

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[23] As noted earlier in the chapter, this is a fairly frequent structure in Russian, which contains the patient in the object position followed by a verb in neuter gender. The construction was coined accusative unaccusative by Lavine and Freidin (2002). Although for simplicity I accept this term, following Titov (2012: 170), here it is analysed as 'a monotransitive construction that makes use of the Instrumental Case to indicate the [-referential] status of the cause/instrument subject NP'. The subject can be either expressed in the Instrumental Case or omitted altogether (*Ëžika pridavilo/Hedgehog*ACC *squashed*Neu).

these items as a coordination on the clausal level, because the subject had the same discourse referent, but two distinct thematic interpretations. In such items, for the purposes of the coding, the first part of this coordination was omitted; the second part of the coordination was coded as active/SVO. The question of the position from which the subject was elided was crucial for selecting the correct code. SOV, OVS and OSV orders could not be contenders as the object in the cases like the one presented above was in a post-verbal position. VSO was also dismissed as this order is only available if the verb is topicalised, which would have been apparent from the marked accentuation. The analysis of the raw audio data confirmed that these verbs were not accentuated. Lastly, VOS is only available in VP-fronting, which incidentally is derived from SVO. It was therefore reasoned that the second clause structure should be coded as active/SVO.

A response was coded as *passive* if all of the following conditions held: (1) the utterance was semantically faithful and represented the intended action; (2) the utterance contained the patient of the action in the subject position, optionally followed by an auxiliary *byl/byla (be)* (in the present tense the auxiliary is covert in Russian), a verb in past participle form, and the agent/instrument/cause of the action in the Instrumental Case, e.g. Table 2. 12 (d).

A response was coded as *passive alternative (PA)* if the utterance was semantically faithful and represented the intended action and if any of the following held true: (1) the patient was in the subject position in an unaccusative sentence, e.g. Table 2. 12 (e); (2) the patient was in the object position of an impersonal active, e.g. Table 2. 12 (f); (3) the object linearly preceded the subject in a simple active structure, which included OVS, OSV and VOS structures, e.g. Table 2. 12 (g). OVS constructions were additionally assigned their own separate coding class (see below); (4) a response was a copular construction, e.g. Table 2. 12 (h); (5) a response was an *accusative unaccusative* structure were the subject was omitted, e.g. Table 2. 12 (i). Those accusative unaccusatives which contained the optional subject and followed OVS order were coded accordingly as OVS; (6) a response was a short (truncated passive), i.e. it followed the description for *Passive* category, but lacked the agent/instrument/cause, e.g. Table 2. 12 (j).

Table 2. 12 Examples of responses for each of the codes used, Experiment 1.

| (a) | Active: | *Grib pridavil červjaka.* |
| | SVO | MushroomNOM squashed wormACC |

(b)	Active:	*Gribom pridavilo červjaka.*
	accusative	MushroomINST squashedNEU wormACC
	unaccusative	

| (c) | Active: | *Grib upal i razdavil červjaka.* |
| | coordination | MushroomNOM fell and squashed wormACC |

| (d) | Full Passive | *Červjak byl pridavlen gribom.* |
| | | WormNOM was squashed mashroomINSTR. |

| (e) | Passive Alternative: | *Červjak raspljuščilsja.* |
| | unaccusative | WormNOM squashed-self |

| (f) | Passive Alternative: | *Červjaka razdavili.* |
| | impersonal active | WormACC squashedPL |

| (g) | Passive Alternative: | *Červjaka razdavil grib.* |
| | OVS | WormACC squashed mushroomNOM |

| (h) | Passive Alternative: | *Červjak byl razdavlennyj.* |
| | copular construction | WormNOM was squashed |

(i)	Passive Alternative:	*Červjaka pridavilo (gribom).*
	accusative	WormACC squashedNEU (mushroomINSTR)
	unaccusative	

| (j) | Passive Alternative: | *Červjak byl pridavlen.* |
| | short passive | WarmNOM was squashed |

The OVS constructions were additionally coded separately from the PA category in order to investigate a possibility of OVS priming effects and whether the

priming of this kind incorporates the information on the patient prominence. This category also included the accusative unaccusative responses where the subject was overtly realised (e.g. *Svin'ju oblilo mašinoj*/Pig splashed3NEUT carINSTR) since, following Titov's (2019) analysis on these constructions, they were treated as simple monotransitive sentences.

All other responses were coded as *other*, those included incomplete sentences such as those missing a subject or an object, containing NPs only (e.g. *Pridavlivanie červjaka*/Squashing wormINSTR/The squashing of the worm) or following the active SOV and VSO constructions. Non-responses, one-word responses, semantically unfaithful utterances and the utterances that do not relate to the intended action (e.g. *Grib upal*/Mushroom fell) were included in this category, although those responses were not frequent.

2.8.3.   Results

Before presenting the results of the experiment, a brief discussion on the choice of statistical analysis applied to these data and the data reported in the rest of the dissertation is necessary. All the experiments include proportions of different response types as its dependent measure. There are between subject factors with three or four levels (i.e. the conditions) in Experiments 1 to 6, and a within-subject factor with two levels (i.e. target type) in all but the last experiment. It was deemed most appropriate to run a mixed ANOVA on the present data. Although there are well-known limitations of applying ANOVAs to proportions of categorical data (Jaeger, 2008), it was not feasible to use a test better suited for categorical data such as the Chi square test. This is because in production studies such as those reported in the thesis, there are several different possible response types, not just two. It was also considered unnecessary to apply logit mixed models, because, due to the categorical nature of the data, the dependent measure in any case is based on the average proportion of responses by the participants.

I further note that the following also holds. Due to the variety of possible response types and the different theoretical predictions referring to these, one must look at each response type separately and thus several ANOVAs would be routinely performed on the same data set. It is understood that, given that the dependent

measures are proportions of certain response categories, these ANOVAs are not completely independent of each other. At the same time, considering that in any priming experiment there are several (usually around four or five) different categories of responses that participants may produce, the ANOVAs are also not fully dependent on each other in a deterministic fashion. So, in order to be able to explore the predictions of the different theoretical hypothesis, several ANOVA's were performed, noting that their results are not fully independent from each other, but also not fully dependent on each other.

Statistical analysis of the data investigating the effects of the primes were run on full passive, passive alternative, active/SVO and OVS responses. A summary of the results for Experiment 1 is presented in Table 2. 13 below. Note that the OVS category (shaded) forms part of the PA category in the original coding set, but it is also displayed in the table separately since these responses play an important role in addressing the Patient Prominence Priming claim.

Table 2. 13 Proportions (and frequencies) of full passives, passive alternatives (PA) (incl. OVS and short passives), active/SVO, OVS and 'other' responses produced by the Russian-speaking adults across the conditions, Experiment 1.

condition	Full passives	PAs incl. OVS & short passives	Active/SVO	OVS only	Other
Base (n=24)	0 (0)	18.1 (70)	59.1 (227)	2.6 (10)	22.8 (87)
SVO (n=23)	0.8 (3)	7.6 (28)	65.5 (241)	1.6 (6)	26.1 (96)
Passive (n=24)	6.5 (25)	22.9 (88)	46.1 (177)	8.6 (33)	24.5 (94)
OVS (n=20)	0 (0)	14.7 (47)	65.6 (210)	10.6 (34)	19.7 (63)

A mixed 4 x 2 ANOVA was first performed on the average proportion of full passives with a between-subject factor of condition (4 levels: baseline, active, passive and OVS) and a within-subject factor of target type (2 levels: EP and UP targets). The analysis demonstrated a main effect of condition (F (3, 87) = 3.702, p = .015, ηp 2

= .113, Observed Power = .788)[24]. Bonferroni's multiple comparisons revealed that the effect was due to a higher proportion of passives produced in the passive condition (M = 6.5) compared to the baseline (M = 0) (p = .033). The difference between the passive and the active/SVO conditions (M = 0.8) was approaching significance (p = .094); and there were also significantly more passives in the passive conditions than in the OVS condition (M = 0) (p = .048). No effect of target type (p = .550) or condition*target type interaction (p = .948) was found. See Figure 2. 2.

Figure 2. 2 Average proportion of full passive (FP) responses produced across the conditions by Russian-speaking adults, Experiment 1.
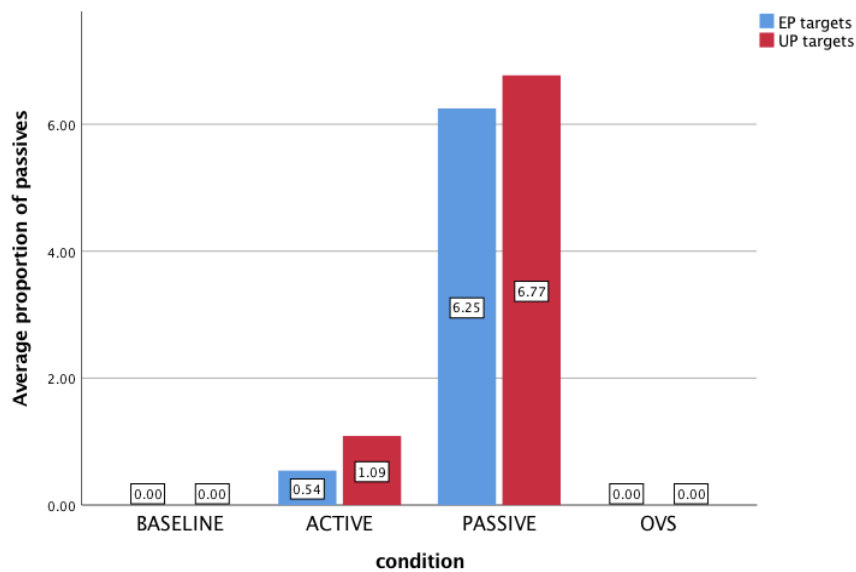
A possibility of the Patient Prominence Priming effect was examined by running an ANOVA with the same factors on the proportion of passive alternative (PA) constructions and it returned a highly significant main effect of condition (F (3, 87) = 5.865, *p* = .001, ηp 2 = .168, Observed Power = .946)[25], a highly significant main effect of target type (F (1, 87) = 94.514, *p* < .001, ηp 2 = .521, Observed Power = 1.000), and a significant condition*target type interaction (F (3, 87) = 6.908, *p* < .001,

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[24] Homogeneity of variances assumption (Lavene's test) was violated due to the unequal sample size. However, following Howell (1997), since the variance in the largest sample was not more than four times of that in the smallest sample, the violation was deemed acceptable.
[25] Homogeneity of variances assumption was violated for the UP conditions due to the unequal sample size. Since the variance in the largest sample was not more than four times of that in the smallest sample, the violation was considered acceptable (Howell, 1997) (footnote 24).

ηp 2 = .192, Observed Power = .974). Bonferroni's multiple comparisons showed that the effect of condition was due to more PAs produced in the baseline (M = 18.1) and passive (M = 22.9) conditions compared to the active SVO condition (M = 7.6) (*p* = .041; *p* = .001, respectively). There was no difference between the passive and the OVS (M = 14.7) condition, or between the active SVO and the OVS conditions. Importantly, there was no difference in the proportion of PAs either between the baseline and the passive condition (*p* = 1.000) or between the baseline and the OVS condition (*p* = 1.000), see the results in Figure 2. 3. The effect of target type was due to more PA responses produced for the UP targets (M = 24.3) compared to the EP targets (M = 7.6). The post-hoc test with Bonferroni correction showed that the interaction effect was due to this difference being found in the baseline, passive and OVS condition, but not in the active condition.

Figure 2. 3 Average proportion of passive alternative (PA) responses produced across the conditions by Russian-speaking adults, Experiment 1.
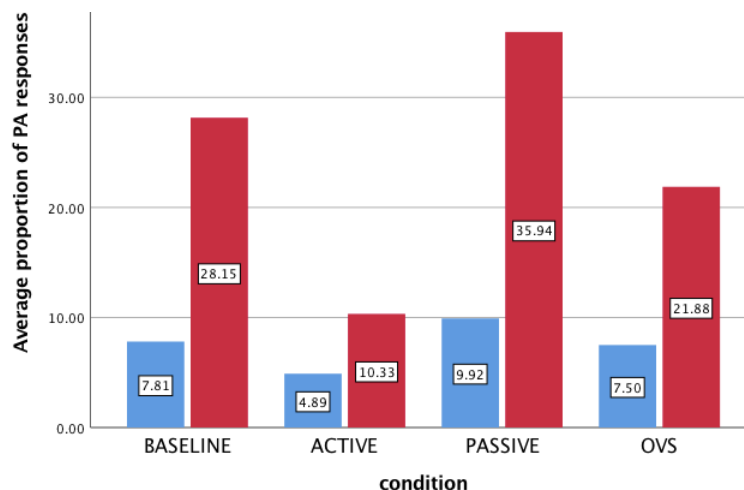

To explore the effects of the active SVO prime, the SVO responses were analysed using ANOVA with the same factors. The analysis showed a significant main effect of condition (F (3, 87) = 6.153, p = .001, ηp 2 = .175, Observed Power = .955), a highly significant main effect of target type (F (1, 87) = 96.231, *p* < .001, ηp 2 = .525, Observed Power = 1.000), and a significant condition*target type interaction (F 3, 87) = 3.164, *p* = .028, ηp 2 = .098, Observed Power = .715). Bonferroni's multiple comparisons revealed that the effect of condition was due to more SVO responses elicited in the active SVO (M = 65.49) and the active OVS (M = 65.63) conditions (which did not themselves differ in the proportion of the SVO responses produced)

compared to the passive condition (M = 46.1) (p = .002; p = .003, respectively). Despite the numerical difference, there was no significant difference between the active condition and the baseline (66% vs 59%, respectively). The effect of target type was due to a higher proportion of SVO responses in the EP targets (M = 69.5) compared to the UP targets (M = 47.9). The post-hoc test with Bonferroni corrections showed that the interaction was due to this difference being smaller in the active SVO condition than in the baseline, passive and OVS conditions. See Figure 2. 4.

Figure 2. 4 Average proportion of SVO responses produced across the conditions by Russian-speaking adults, Experiment 1.
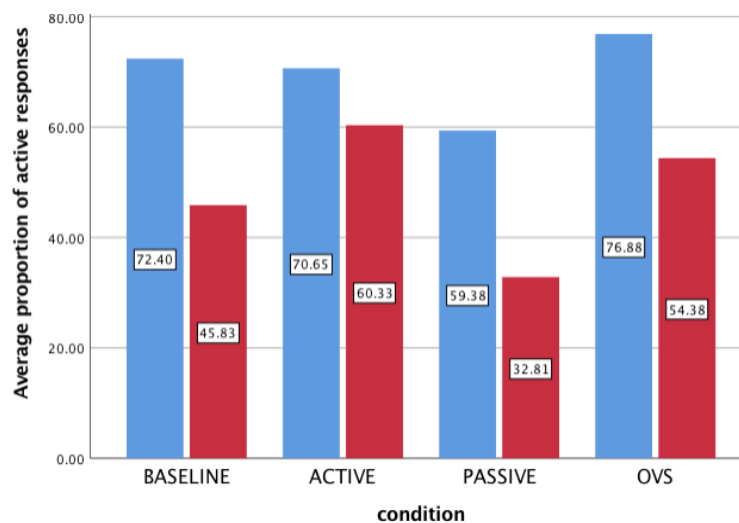

To establish whether OVS can be primed and whether such priming takes into consideration the patient prominence, another ANOVA, again with the same independent variables was run on the average proportion of OVS responses. The results returned a highly significant main effect of condition ($F_{(3, 87)} = 9.250$, $p < .001$, $\eta p 2 = .242$, Observed Power = .996)[26], a highly significant main effect of target type ($F_{(1, 87)} = 50.176$, $p < .001$, $\eta p 2 = .366$, Observed Power = 1.000), and a significant condition*target type interaction ($F_{(3, 87)} = 6.084$, $p = .001$, $\eta p 2 = .173$, Observed Power = .953). Bonferroni's multiple comparisons revealed that the effect of condition was due to more OVS responses produced in the OVS condition (M = 10.63) compared to the baseline (M = 2.60) (p = .001) and the active SVO condition (M = 1.63) (p < .001); there was also more OVS responses in the passive condition

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[26] Homogeneity of variance assumption was violated due to an unequal sample size. The violation was accepted for the reason outlined in footnote 24.

(M = 8.59) compared to the baseline (p = .019) and the active condition (p = .005). The main effect of target type was due to more OVS responses produced for the UP targets (M = 9.62) than for the EP targets (M = 1.79). As per the results of the post-hoc tests with Bonferroni correction, the interaction reflected the fact that the above differences were significant only in the passive and OVS conditions, but not in the active/SVO and OVS conditions, where there was no statistical difference between the responses to the EP and the UP targets. The results presented in Figure 2. 5.

Figure 2. 5 Average proportion of OVS responses produced across the conditions by Russian-speaking adults, Experiment 1.
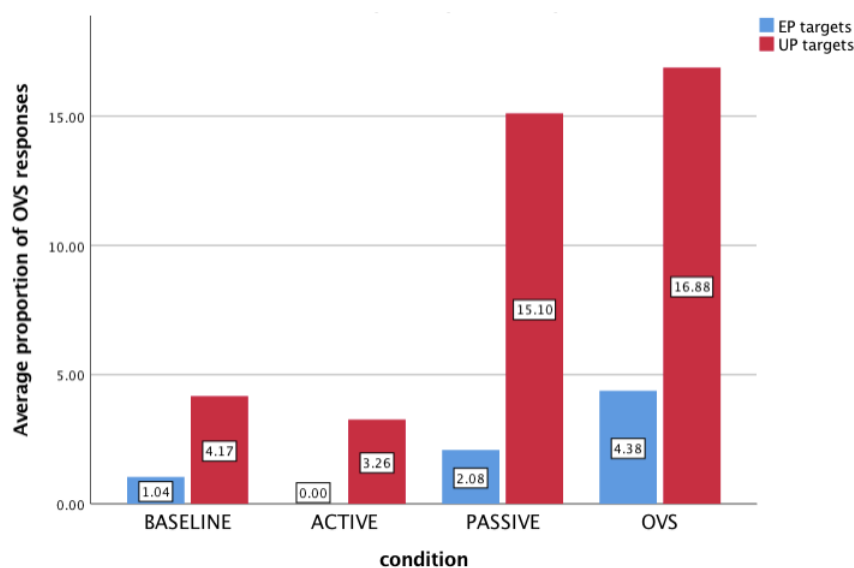

2.8.4. Discussion

As predicted, in line with a large body of research demonstrating passive priming effects, the results of this experiment showed a clear passive priming effect. Although the frequency of passive responses was generally low, there were significantly more full passives produced in the passive condition than in the baseline, active and OVS conditions. The difference was equally evident in both the EP and the UP targets, suggesting that the animacy distribution in the events described did not modify the priming effect. Unlike V&W study, which showed no passive priming effect either in the child's or the adult's responses, these data are compatible with the two syntactic priming hypotheses highlighted in Chapter 1 – the Constituent Structure Priming hypothesis (Bock, 1986; Bock & Loebell, 1990), and the Argument Structure

Priming hypothesis I argue for. Importantly, the findings suggest that the experimental paradigm developed for this study is suited for the purpose.

One of the main aims of the experiment was to evaluate the hypothesis (*H1*), put forward by Vasilyeva and Waterfall (2012), that *the discourse function of patient prominence is primable*. Passives and OVS as well as the rest of the passive alternative constructions (PAs) were claimed to have a similar information structure (i.e. *emphasis* on the patient of an action). The Patient Prominence Priming hypothesis therefore predicted that, irrespective of the animacy distribution in the targets, the proportion of PA responses would increase after hearing passive and OVS primes compared to the proportion of PAs produced in the active SVO condition, but, more importantly, compared to the proportion of the PAs produced in the baseline, where no primes were heard. Only a part of the prediction, however, was borne out. There were more PAs in the passive condition than in the active SVO condition, but the proportion of PAs did not vary between the active SVO and OVS condition as would have been expected on the Patient Priming Prominence hypothesis. And crucially, no difference was observed in the production of PAs either between the baseline condition and the passive condition, or between the baseline and the OVS condition, which directly contradicts *H1*.

However, a closer look at one of the PA structures, OVS, considering the main effect of condition, seems to paint a different picture. There were statistically more OVS responses in the passive and the OVS conditions compared to the baseline and the active conditions. Such patterns could be argued to support the Patient Prominence Priming account: if the OVS and the passive share the discourse function of patient prominence and the OVS is preferred to the passive in Russian, then an OVS would be the response expected after hearing a passive. These results are also consistent with the constituent priming approach as per Bock and colleagues (Bock, 1986; Bock & Loebell, 1990, Exp. 2) (see section 1.5.2). Indeed, the Russian passive and OVS constructions follow the same NP-V-NP constituent order (recall that unlike in an English passive where the agent is realised in a PP *by*-phrase, in a Russian passive the agent NP just carries the Instrumental Case). Furthermore, the findings could be interpreted using the thematic role order priming approach (see section 1.5.3) as the passive and the OVS adhere to the same patient-agent theta-role order. The three accounts make indistinguishable predictions for the OVS response pattern in the passive and the OVS.

Let us now examine the interaction effect in relation to the participants' performance on the OVS responses. While the OVS priming was indeed observed in the passive and the OVS conditions, this effect was actually driven by the responses for the UP targets. This peculiar OVS priming effect emerged only in the targets where the animacy distribution was asymmetrical (passive: EP 2% vs UP 15%; OVS: EP 4% vs UP 17%). It seems that for the OVS to be primed by the passive and the OVS, the following condition must be met: the OVS target must be licenced by the APH, namely the object argument must be more prominent, [+animate], than the subject argument, [-animate]. Recall, however, that the Patient Prominence Priming hypothesis says nothing about the interpretive prominence of arguments in the targets, and neither do the constituent priming or thematic role priming accounts for that matter. Therefore, under these hypotheses the effect would have been expected for both types of targets, EP and UP. In sum, despite the initial suggestion, the patterns of the OVS responses described above does not lend support to *H1*.

Establishing that the OVS pattern emerged only in the UP targets and therefore cannot be explained by the Patient Prominence Priming, does not in itself explain what drove the production of OVS in the passive condition in the context of unequal prominence of arguments (animate patient-inanimate agent). The question essentially is what unites the OVS and the full passive. First, the two constructions are both licenced by the APH. Second, aside having a thematic object, they both contain a thematic subject. Let us consider the latter focussing on the unique status of the *by*-phrase in the passive. As discussed earlier in the thesis, the external argument of the passive is suppressed (thus, not projected syntactically) but still interpreted semantically (Chierchia, 1998; Reinhart, 2002; Reinhart, 2016). The thematic role of the suppressed argument is transferred to the NP within the optional *by*-phrase licenced by the suppressed argument position (Grimshaw, 1990). The by-phrase has a special intermediate status, Grimshaw (1990) argues, resembling both, an argument and an adjunct, and could thus be termed an 'a(rgument) adjunct' (109). In the passive condition the participants received full passive primes where the thematic subject was overtly realised. Unlike OVS, the Russian passive is a highly infrequent structure, therefore unless a specific interpretation that goes beyond the

APH is required (i.e. the thematic object is the topic in a sentence[27]), OVS is what a speaker would naturally resort to. This is what seems to have occurred during the experiment. When the participants encountered target events with [+animate] patient and [-animate] agent after hearing the full passive primes, the structure they selected for their own descriptions matched the full passive with respect to its capacity to reflect the animacy asymmetry and in terms of the overt presence of the thematic subject, albeit the verb's external argument was suppressed.

The unique status of the by-phrase also allows us to explain the pattern of agentless passive alternative responses emerged in the data (see Figure 2. 6 below). Those responses included short passives, impersonal actives, accusative unaccusatives (where the subject bearing an Instrumental Case was omitted), unaccusatives and copular constructions.

Figure 2. 6 Average proportion of agentless passive alternative responses across the conditions, Experiment 1.
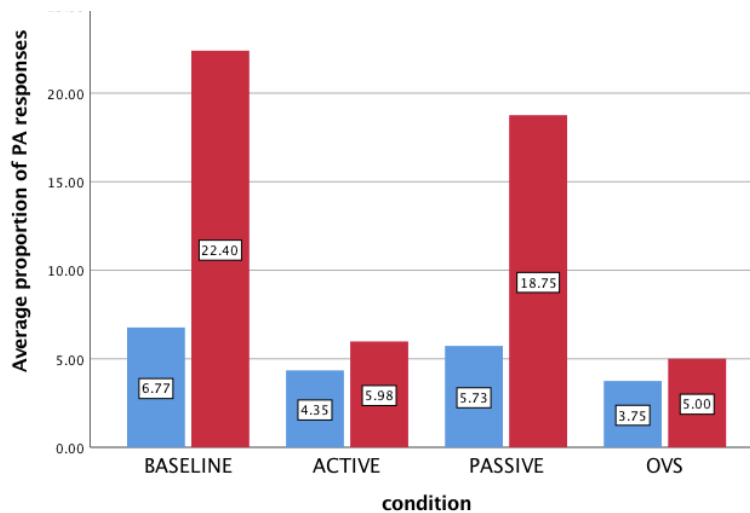
Agentless constructions are ideal to describe the animate patent/inanimate agent targets (see Harris, 1978; Drenhaus, & Féry, 2008; Prat-Sala, Shillcock & Sorace, 2000 for animacy effects on structural choice in spontaneous speech and non-priming experiments). Indeed over 22% of the responses in the UP baseline condition fell into this category. What might these structures have in common with the

[27] Ironically, this is what distinguishes the passive and OVS in terms of the information structure, not unites them as the proponents of the Patient Prominence Priming suggested (see discussion in section 2.4).

passive? It can be argued that although in full passives an external argument is semantically interpreted, since it is an a-adjunct, its realization in the by-phrase is optional, while in SVO and OVS constructions it is obligatory. Thus, when an external argument is obligatorily present in the prime, as in the SVO and OVS conditions, an agentless PA response seems suboptimal in the UP targets. This is under the assumption that priming is sensitive to the number of arguments projected in prime and target, an aspect which forms part of the hypothesis pursued in this thesis.

Indeed, as the post hoc data chart in Figure 2. 6 above shows, the proportion of agentless constructions produced for the UP targets in the passive condition remained the same as in the baseline, and both were significantly larger than in the OVS and SVO conditions. Given the idea that the status of an external argument and its realization is relevant for priming, this is not surprising. There was of course no external argument present in the prime in the baseline and thus agentless PAs were produced in a high proportion in the UP condition. The passive primes did not mitigate this tendency – after all the thematic subject is optional in the passive. It seems that the a-adjunct status of the by-phrase in the passive on one hand promotes the production of OVS, the structure with an obligatory thematic subject, and on the other, does not block agentless constructions. In contrast, the OVS and the SVO primes, containing obligatory subject, inhibit the production of agentless PAs. The above provides further evidence in support of the proposal that the status of the *by*-phrase might indeed be a factor moderating syntactic priming effects.

Let us now address the additional questions pursued in this study: Does an active construction get primed? There were more SVO responses observed in the SVO and the OVS conditions compared to the passive, but there was no difference between the SVO condition and the baseline, despite the numerical difference. This suggests only a weak priming effect, which is in line with the inverse frequency effect whereby a more frequent construction would evoke weaker priming than a less frequent (Hartsuiker & Kolk, 1998; Jaeger & Snider, 2008; Reitter et.al., 2011). At the same time the OVS sentences primed OVS only when OVS was licenced by the APH (i.e. in the asymmetrical animacy mapping context). In short, SVO and OVS do not appear to be effective primes for SVO and OVS respectively.

However, a post hoc analysis also demonstrated that hearing the OVS primes increased the production of the active SVO and OVS constructions combined: a significant increase of such responses was observed in the OVS condition (73%) not

only compared to the passive (p = .002; 53%), but also compared to the baseline (p = .019; 57%) even in the symmetrical animacy context (baseline - 65%; passive – 61%, OVS - 77%). This not only indicates that the argument structure of the verbs was indeed the crucial factor for priming, but, in conjunction with the numerical increase of the SVO in the SVO condition compared to the baseline (66% vs 59% respectively), it highlights that neither SVO nor OVS could be treated as a true baseline in a priming experiment, as even if their one-to-one structural influences (i.e. SVO-to-SVO and OVS-to-OVS priming) might be weak, they might evoke a general active priming effect.

Taken together, the findings lead to the following conclusions: First, while the results detected syntactic priming effects of the Russian passive, they failed to find evidence for the Patient Prominence Priming hypothesis: whichever discourse function (e.g. thematic object prominence) the passive or the OVS may have carried, it did not get primed. No increase of the OVS or the agentless PA responses was detected for the targets with equal animacy distribution in the passive or the OVS conditions compared to the baseline. Second, it was established that relative prominence of arguments, as defined by their animacy, governs speakers' syntactic choices, providing strong evidence in support of *H2*, the APH-based hypothesis (Titov, 2012; 2017). Third, I argued that when animacy distribution in targets of a priming task is asymmetrical, specifically, when the thematic object is animate and the thematic subject is inanimate, the status of the external argument in the primes affects the selection of the syntactic structure produced in response to these targets, highlighting the relevance of the argument-structural variations for syntactic priming. Finally, it was proposed that as a consequence of argument-structural similarity between SVO and OVS constructions, OVS can prime both OVS and SVO, the results which indicate that caution should be taken when using an active structure as a baseline against which the rest of the conditions are measured.

What remains to be seen is whether these effects could be replicated with young children, the issue the next two experiments aimed to address.

2.9.   Experiment 2: Russian Children

The second experiment was run to draw a direct parallel with the Russian data obtained by V&W (Exp. 1) and to evaluate potential differences between the performance of Russian-speaking adults and children. No evidence in support for the Patient Prominence (or discourse function/information structure) Priming was found in the first experiment conducted with adults. One could, however, hypothesise that children may rely on such concepts as patient salience (as defined by its linear precedence) to derive a sentence until the necessary language components mature or until other essential non-linguistic cognitive functions develop to support their syntactic processing. Alternatively, if the young children behave like the adults did, it could be considered as another piece of evidence for the continuity approach to language acquisition.

The other aim of the experiment was to establish whether Russian-speaking children are as sensitive to the impact of the APH on sentence production during a priming procedure as Russian adults were found to be. The effect of animacy features on sentence production are thought to be as pronounced in children as they are in adults (Aslan & John, 2016; Harris, 1978). Children, thus, are expected to behave similarly if not identical to adults in terms of the APH-driven effects in priming.

Testing children on passive priming, however, meant that the data could have been affected by the difficulties related to the acquisition of the passive. Before moving to the experiment itself, a brief review of the issue is necessary.

2.9.1.   Acquisition of Passives

The development of comprehension and production of passives has been extensively investigated. Undertaken cross-linguistically, this research led to conflicting findings and an array of theories explaining variation in results (Babyonyshev & Brun, 2004; Borer & Wexler, 1987; De Villiers & De Villiers, 1973; Djurkovic, 2007; Fox & Grodzinsky 1998; Fraser, Bellugi & Brown, 1963; Gavarró and Heshmati, 2014; Hirsch, & Wexler, 2006a; Hyams, Ntelitheos, & Manorohanta, 2006; Kirby, 2012; Messenger, 2009; Perovic, Vuksanovic, Petrovic, & Avramovic-Ilic, 2014; Vasilyeva & Waterfall, 2012; Wexler, 2004). Passive acquisition studies show that

children obtain full competence in comprehending passives only between the ages of 5 and 7 depending on whether passives are full or truncated (Hirsch & Wexler, 2006b; Fox & Grodzinsky, 1998), and whether the verbs used are action or psychological (Maratsos, Fox, Becker & Chalkley, 1985; Perovic et.al., 2014). Some suggested that full English passive is acquired as late as 10 (Horgan, 1978). It has been widely accepted that the delay holds across languages (Crawford, 2009; Guasti, 2012 for overview; Terzi & Wexler, 2002), but a small number of studies showed that the delay might not after all be universal (Allen, 2009; Allen & Crago, 1996; Demuth, 1989).

There are several suggestions as to why there is a delay in the acquisition of the passive. Frequency based theories explain the delay in acquisition of passives by claiming that these structures are infrequent or virtually absent in child directed speech (Allen & Crago, 1996; Brooks & Tomasello, 1999; Demuth, 1989). The accounts are greatly undermined by the findings that children often display knowledge of other complex constructions that are rare in child directed speech (Guasti, 2012). Another explanation for the delay, the A-chain deficit hypothesis (ACDH), is based on a claim that young children's ability to form A-chains is immature and, thus, interferes with the assignment of theta-role to the DP displaced by case- and EPP-motivated A-movement from object to subject position (Babyonyshev, Ganger, Pesetsky & Wexler, 2001; Borer & Wexler, 1987). The main argument put forward against ACHD is that young children have been found to comprehend other structures requiring A-movement such as raising and subject movement out of VP (VP-internal subject hypothesis) (Orfitelli, 2012). Another maturation approach, the Canonical Alignment Hypothesis (CAH), essentially postulates that children obey canonical theta-role ordering hierarchy whereby the role of agent/experiencer is mapped onto the subject, linearly higher than the theme/goal role, which is assigned to the object. CAH suggests that only the A-chains that violate this typical theta-mapping (i.e. most notably passives) are problematic for the child's grammar (Hyams et.al., 2006).

The most puzzling, considering young children's poor comprehension of passives in experiments, is the evidence of their ability to produce grammatical passives in priming tasks (Bencini & Valian, 2008; Huttenlocher, et.al., 2004; Messenger, Branigan & McLean, 2011, 2012; Shimpi, Gámez, Huttenlocher & Vasilyeva, 2007 amongst others), which suggests that children possess abstract syntactic representation of the structure. To explain the phenomenon, Messenger et.al. (2012) propose that acquisition of passives is a staged process. Similarly to

CAH, this approach is based on children's inability to process non-canonical theta-role mappings. In view of the passive priming data, the advantage of this hypothesis over CAH is that, unlike Hyams et.al. (2006), Messenger and colleagues do not appeal to a deficit in formation of those A-chains that result in non-canonical theta-role assignments. Rather, they believe there might be a processing restriction defined by children's general cognitive development (including working memory capacity), which prevents them from parsing non-canonically aligned structures until after the age of 6. The constituent structure of the passive itself, the authors argue, might be in place as early as at the age of 3, which is manifested in young children's ability to produce grammatical passives in priming experiments. The account predicts that younger participants would produce more passives after hearing passive primes than after hearing active primes, and that these elicited passives would follow a reversed theta-role order (i.e. the picture depicting a dog chasing a girl would be described as *The dog was chased by the girl*). The results of Messenger et.al.'s experiment demonstrated exactly this pattern in English-speaking 6-year-olds, but not 9-year-olds. The latter demonstrated a significant priming effect producing passives with the correct thematic-role-to-grammatical function mappings. The researchers, thus, suggest that while the syntactic structure of the full passive might be already in place in younger children, their ability to attend to non-canonical theta-role order is still undergoing development.

2.9.2. Methods

2.9.2.1. Participants

85 native monolingual Russian-speaking children aged 4 to 7 (mean age = 5;9; 37 boys) were recruited from three kindergartens in St-Petersburg, Russia. Written consent was obtained from the setting and the participants parents, and verbal consent was sought from the children themselves. In the absence of standardised perceptive grammar assessment, a brief summary of participants' grammatical proficiency in Russian was collected from the teachers closely working with the children. Subsequently, one child was excluded due to significant delay in his language development according to the teachers' feedback. The participants were

randomly assigned to one of the 4 conditions: baseline (n=23), active (n=20), passive (n=21) and active OVS (n=21).

2.9.2.2. Design and Materials

The 16 prime and 16 target colour prints created for Experiment 1 were utilised for this priming task. The "comics" design used with adults in the Experiment 1, where each prime and target was depicted in two images (first – "start-event", the second – "end-event"), was replicated in Experiment 2. Only two major changes were introduced to the original design: no fillers were included in the experimental sets to reduce the length of the procedure and, thus, minimise the fatigue; and a lexical warm-up task, explained below, was added. The rest of the amendments to the procedure were not substantial (see section 2.9.2.3). As with the adults, the study had four conditions: active/SVO, passive, OVS and no-prime baseline condition.

Lexical Warm-up

Following Bencini and Valian (2008), in order to ensure that the children understood the events depicted in the paired drawings and to encourage the use of the intended verbs for their target descriptions, a lexical warm-up element was introduced in the experiment.

Another eight pictures were created for this purpose. Each lexical warm-up item contained four images: two depicting prime events and two depicting target events in a single drawing, both in half of their original size, see an example in Figure 2. 7 below. These 4-piece warm-up images were presented as A4 colour prints. Prior to every two prime/target parings one of such warm-up images was shown to the child; the experimenter then encouraged the child to point at the picture which showed the event she described in the following way: *Pokaži mne vysušivanie*/Show me drying; or *Pokaži mne obryzgivanie*/Show me splashing. Although such occasions were rare, if a child displayed hesitation, the experimenter helped to identify the correct picture by asking further guiding questions.

Figure 2. 7 Example of a lexical warm-up item, Experiment 2.
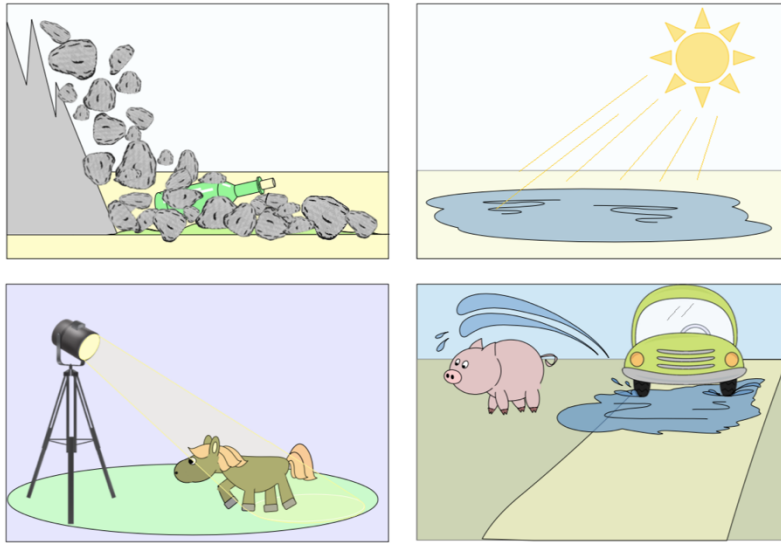
Reversibility of Passives

As discussed in section 2.8.1, choosing non-reversible passives in this study was deemed more appropriate for a number of reasons. The issue is particularly important when testing young children. The present experiment did not aim to test children's comprehension of passives, on the contrary, it was necessary to increase the likelihood that the participants fully understood that they were presented with passive constructions. Reversible passives, Messenger et.al. (2012) argue, are more likely to be understood by young children as actives: the argument, linearly appearing first, would be perceived as the agent and the following argument as the patient. If such a construal of a passive sentence was available, it could potentially affect the comprehension of the OVS primes as well.

While the [±human] feature was controlled by the choice of the entities depicted, an important element added to the procedure with children (but absent in the experiment with the adults) helped to control for the other two APH features, [±presupposed], [±referential]. The former was controlled for by introducing the arguments as given (background/presupposition is [+presupposed] and focus is [-presupposed]); the latter was controlled by the experimenter's pointing at the entities depicted when introducing them to the children. The order in which the agent and the patient were presented in primes and targets was pseudo-randomised to ensure that both [agent] and [patient] entities were introduced first an equal number of times.

2.9.2.3. Procedure

The testing was administered individually in a quiet room. The children were told they were going to look at pictures with the experimenter and tell each other what happened in each of them. The child and the experimenter then took turns describing the depicted events from their sets. The children were offered to choose stickers once the task was completed.

Prior to every two prime-target pairings a lexical warm-up image was shown, and the child was encouraged to point at each of the events the experimenter described with a verbal noun as discussed above. The procedure for each prime-target pair adhered to the following scheme. Initially, only the first, "start-event", picture of the prime was shown to the child and the depicted objects were introduced as the experimenter was pointing at the entities while describing them, e.g. *Èto solnce, a èto luža*/This is sunNOM, and this is puddleNOM. The second, "end-event", picture was then revealed, and the child heard the prime, e.g. *Luža byla vysušena solncem*/PuddleNOM was dried sunINSTR. A target event was then introduced in the same way and the child was encouraged to describe it, e.g. *Èto svin'ja, a èto mašina. Čto tut proizošlo?*/This is pigNOM, and this is carNOM, what here happenedNEUT? This was done not only to establish the arguments as given and referential as mentioned earlier, but also to ensure a better understanding of who or what the drawings depicted.

In the active SVO, passive and the OVS condition the child heard the relevant primes produced with a neutral intonation. In the baseline condition – no primes were produced by the experimenter, but the rest of the procedure was identical to those with the primes.

The memory task used in the procedure with the adults was deemed unnecessary for the experiment here. This is in line with the majority of priming tasks conducted with young participants, where additional cognitively taxing elements are generally avoided (e.g. Vasilyeva, Waterfall & Gómez, 2012).

The procedure lasted approximately between 15 and 20 minutes. The children's responses were audio-recorded, transcribed and coded for analysis.

2.9.3.   Coding

Two coding systems utilised in this experiment, and those fundamentally were very similar to the one used with the adults. Several adjustments were however required due to the child data being much noisier than the adults' data. Uniformly, the first three utterances produced by the child in response to a target image was coded, each of which received a separate code. For example, if the child's response to a target event where a sheep was moved by a tractor was *Ovečka. Traktor edet. Traktor tolknul ovečku*/Sheep. TractorNOM moving. TractorNOM pushed sheepACC, it received three codes, one for each of the utterances. Any utterances produced beyond the first three were excluded from the analysis.

2.9.3.1.   V&W Coding

The first coding system adopted for the analysis mirrored Vasilyeva and Waterfall's (2012, Exp. 2) and, thus, termed V&W approach. This system was used in order to make a direct comparison with their data. A response was coded as *active* if the following held true: (1) the response was semantically faithful, i.e. represented the intended action, (2) the response had the agent/instrument/cause in the subject position, followed by a transitive verb, and the patient in the object position (e.g. Mašina oblila svinʹju/CarNOM splashed pigACC). The SVO sentences containing prepositional verbs like *naexal na*/to drive onto*, nažal na*/to press onto and *nadavil na*/to press onto were also coded as SVO accordingly, but such responses were rare.

A response was coded as *passive* if it represented the intended action and contained the patient in the position of the grammatical subject, followed by an auxiliary, a verb in past participle form and, optionally, by the [agent/instrument /cause] in the Instrumental Case.

A response was coded as *passive alternative (PA)* if the utterance was semantically faithful and represented the intended action, and contained either (1) the object that linearly preceded the subject in a simple active structure, which include

OVS, OSV and VOS structures[28] (e.g. *Svin'ju oblila mašina*/PigACC splashed carNOM); (2) the patient in the subject position in an unaccusative sentence (e.g. *Svin'ja namokla*/PigNOM wetted-self); (3) the patient in the object position of an impersonal active construction (e.g. Svin'ju oblili/PigACC splashed3PL).

All other structures were coded as *other (O)*. Those included semantically unfaithful utterances and sentences unrelated to the depicted action, responses in which the children treated target items as a spot-the-difference game (i.e. attempted to find differences in the two images rather than describing a given event no-responses), one-word responses, copular constructions (e.g. *Svin'ja byla mokraja*/Pig was wet), control sentences (e.g. *Mašina xotela obryzgat' svin'ju*/Car wanted to splash pig), coordinated structures, intransitive, and incomplete sentences (e.g. sentences where either the object or the subject was dropped). The utterances containing the intended agent/cause/instrument in the subject position of an unaccusative construction (e.g. *Mašina namokla*/CarNOM wetted-self) were considered semantically unfaithful and coded as *other*.

2.9.3.2. Comprehensive coding

This coding approach was utilised to account for the structural variety observed in the present data, thus, the categories outlined in the V&W coding system were expanded to include other syntactic constructions.

As with the V&W coding, a response was coded as *active* if: (1) the response was semantically faithful, i.e. represented the intended action, (2) the response had the agent/instrument/cause in the subject position, followed by a transitive verb, and the patient in the object position. Those included the SVO sentences containing prepositional verbs like *naexal na*/to drive onto, *nažal na*/to press onto and *nadavil na*/to press onto. In addition to the codes outlined in the V&W system, as with the coding approach applied to the adult's data, the category of *active/SVO* included the

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[28] Note, that while the active category in V&W's Experiment 2 included strictly SVO structures, their passive alternative category allowed any linear word order regardless of the verb's position as long as there is an object precedence. In the V&W coding system, I follow this inconsistency for the purposes of a direct comparison between the results obtained by V&W and the present data.

responses where the agent/cause/instrument was in the subject position of a structure where an unaccusative (or intransitive) clause was coordinated with a transitive and where the object was expressed (e.g. *Mašina exala i obryzgala svin'ju*/CarNOM moved and splashed pigACC), see section 2.8.2 for the motivation of such coding.

A response was coded as *passive* if it represented the intended action and contained the patient in the subject position, followed by an auxiliary, a verb in past participle form and by the agent/instrument/cause in the Instrumental Case (only one such responses was detected in the data).

As per V&W coding, a response was coded as *passive alternative (PA)* if the utterance was semantically faithful and represented the intended action, and contained either (1) the object that linearly preceded the subject in a simple active structure, which include OVS, OSV and VOS structures (e.g. *Svin'ju oblila mašina*/PigACC splashed carNOM); (2) the patient in the subject position in an unaccusative sentence (e.g. *Svin'ja namokla*/PigNOM wetted-self); (3) the patient in the object position of an impersonal active construction (e.g. Svin'ju oblili/PigACC splashed3PL). In addition to those constructions coded as *passive alternatives (PAs)* in the V&W approach, in the comprehensive coding system the category of PAs also included unaccusatives (*Myška namokla*/MouseNOM splashed-self), accusative unaccusative (e.g. *Svin'ju oblilo (mašinoj)*/Pig splashed3NEUT (carINSTR)) and copular constructions. Following V&W focus-on-the-patient approach to coding, those constructions were well-suited to be coded as passive alternatives.

The OVS constructions were also analysed separately in order to explore possible OVS priming effects and whether such priming is sensitive to the information on the patient prominence in a prime. As with the Russian adult data coding, following Titov's analysis of accusative unaccusative constructions as simple monotransitive structures, if an accusative unaccusative target contained the optional subject and followed OVS order (e.g. *Svin'ju oblilo mašinoj*/Pig splashed3NEUT carINSTR), it was included in the OVS category.

Finally, all semantically unfaithful utterances (e.g. those containing intended agent/cause/instrument in the subject position of an unaccusative construction), sentences unrelated to the depicted action, "spot-the-difference" answers, no-responses, and one-word answers were removed from the analysis. The rest of the responses were coded as other. If the total number of the targets qualified for coding

did not reach 10, the participant's responses were removed from the analysis. Following this exercise, the total number of participants reduced to 81 (baseline = 21, active/SVO = 19, passive = 20, OVS = 21).

### 2.9.4. Results

2.9.4.1. V&W Coding

The V&W coding was used only to address the Patient Prominence Priming hypothesis (*H1*), drawing a direct parallel with the V&W's data. Out of over fourteen hundred utterances produced by the children in the current experiment only one was coded as a passive. Therefore, the analysis was run on the passive alternative structures only. A summary of the children's performance across the condition is presented in Table 2. 14.

Table 2. 14 Proportions (and frequencies) of passives alternatives (PA), active/SVO and 'other' responses produced by Russian-speaking children aged 4 to 7, V&W coding, Experiment 2.

condition	PA	Active/SVO	Other
baseline (n=23)	8.7 (34)	34.8 (135)	56.5 (218)
SVO (n=20)	13.4 (43)	44.6 (143)	41.9 (134)
passive (n=21)	7.9 (27)	48.2 (162)	43.9 (147)
OVS (n=21)	12.9 (43)	52.9 (178)	34.2 (115)

One-way ANOVA was performed on the average proportion of passive alternative (PA) responses with one between-subject factor of condition (4 levels: baseline, active/SVO, passive and OVS). The results for the passive alternatives showed no main effect of the condition (p = .535): the amount of PAs responses did not significantly change according to the type of prime heard. The proportion of PAs in the passive condition was numerically lower than that of PAs in the active, baseline or OVS conditions (Table 2. 14 and Figure 2. 8).

Figure 2. 8 Russian children's performance on SVO and passive alternative (PA) constructions across the conditions by Russian-speaking children aged 4 to 7, V&W coding, Experiment 2.
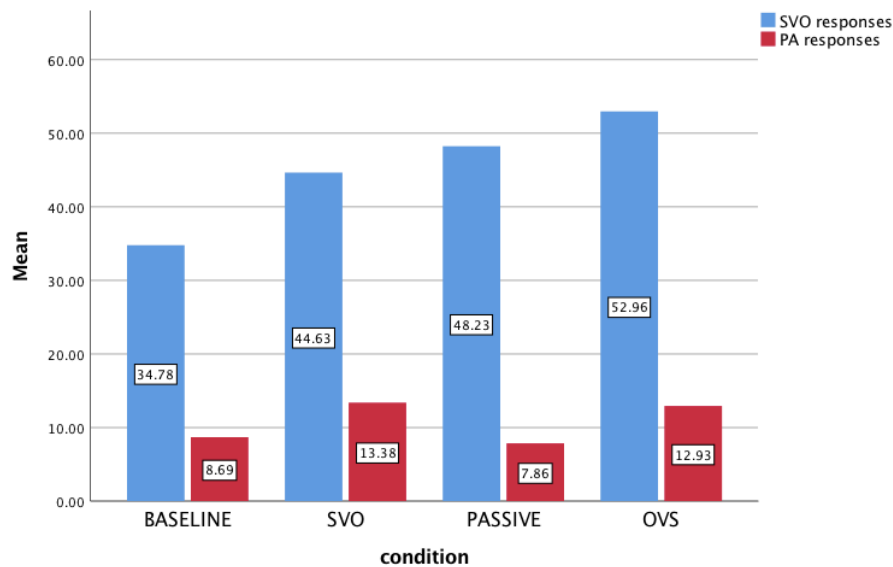
The priming effect of the active/SVO was then assessed using a one-way ANOVA with the average proportion of the SVO structures and the same within-subject factor of condition. The analysis returned insignificant results despite the numerical difference: there was no difference in the production of active/SVO target responses between the conditions (p = .220) (see Table 2. 14 and Figure 2. 8).

2.9.4.2.   Comprehensive Coding

The results of the analyses run using the V&W and the comprehensive coding systems did not differ fundamentally. However, the comprehensive coding allowed for a much more refined analysis of the responses, not only by taking into account the animacy distribution in the targets, but also by accounting for a greater structural variety of the responses observed in the present child data compared to the data reported by V&W. A summary of the results across the conditions is presented in Table 2. 15 below[29]. Note that the OVS category (shaded) forms part of the PA

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[29] Note that the proportions of responses coded as *other* in the children's data are lower than that in the adult's data. This is because the semantically unfaithful descriptions and 'stop-the-

category in the original coding set but is also displayed in the table separately since these responses are relevant for addressing the Patient Prominence Priming claim.

Table 2. 15 Proportions (and frequencies) of passives alternatives, active/SVO and 'other' responses produced by Russian-speaking children aged 4 to 7, comprehensive coding, Experiment 2.

condition	PAs	SVO	OVS only	Other
baseline (n=21)	22.9 (67)	69.2 (201)	0.3 (1)	7.9 (23)
SVO (n=19)	22.7 (64)	70.2 (197)	1.5 (4)	7.1(20)
passive (n=20)	15.2 (35)	76.6 (175)	1.9 (4)	8.2 (19)
OVS (n=21)	21.8 (66)	71.0 (215)	5.7 (17)	7.2 (22)

To explore the Patient Prominence Priming effects and to investigate a potential influence of the relative interpretive prominence of the arguments in the targets on the sentence structure selection and a potential interaction between the two in a context of a syntactic priming task, a mixed 2 x 4 ANOVA was conducted on the average proportion of passive alternative responses (PA) with a between-subject factor of condition (4 levels: baseline, active, passive and OVS), and a within-subject factor of target type (2 levels: EP targets and UP targets). No main effect of condition was detected (p = .667), as the proportion of PAs did not vary between the conditions. The analysis demonstrated a highly significant main effect of target type (F (1, 77) = 18.60, p < .001, $\eta p 2$ = .195, Observed Power = .989). The descriptive statistics revealed that the effect of the target type was due to a higher proportion of passive alternatives produced for the UP targets (M = 25.4) compared to the EP targets (M = 15.9). The difference held across the conditions, as no condition*target type interaction (p = 217) was observed in the data. See the results in Figure 2. 9.

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difference' responses were deleted from the analysis of the child data, but not from the analysis of the adult data since their number was not very high in the latter.

Figure 2. 9 Average proportion of passive alternative (PA) responses produced across the conditions by Russian-speaking children aged 4 to 7, comprehensive coding, Experiment 2.
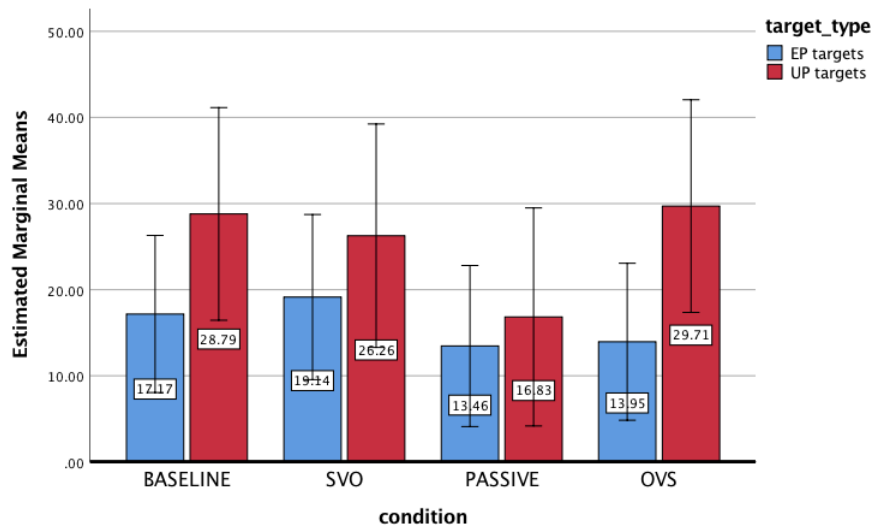

A mixed ANOVA with the same between- and within-subject fixed factors was run on the proportion of SVO constructions to explore active priming effects. No effect of condition was detected in the data (p = .818). The analysis showed a main effect of target type (F (1, 77) = .015, ηp 2 = .074, Observed Power = .691), which, the descriptive statistics revealed, was due to a higher proportion of the SVO responses produced for the EP targets (M = 74.8) compared to the UP targets (M = 68.7). No condition*target type interaction (p = .381) was observed in the data (Figure 2. 10).

Figure 2. 10 Average proportion of SVO responses by Russian-speaking children aged 4 to 7 across the conditions, comprehensive coding, Experiment 2.
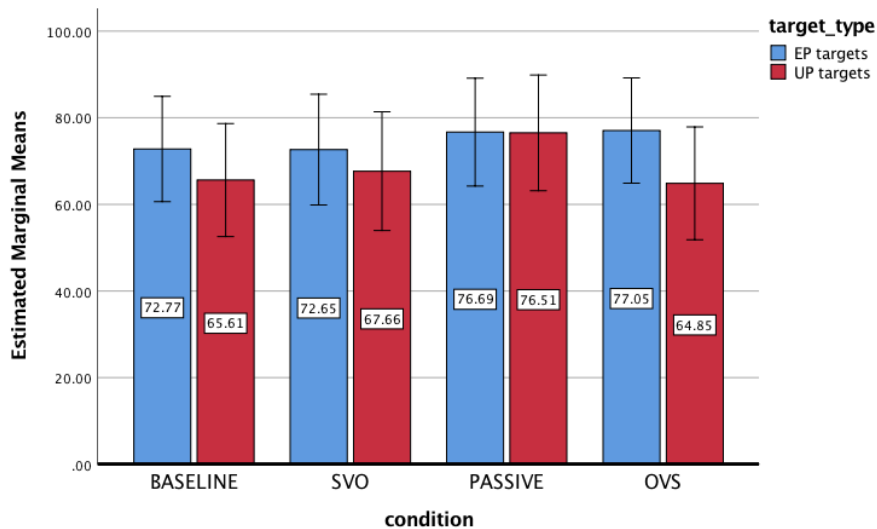
A mixed ANOVA conducted on the proportion of OVS constructions only, was run to establish a possible Patient Prominence Priming effect of the OVS structure, demonstrated a significant main effect of condition ($F_{(1, 77)} = 3.623$, $p = .017$, $\eta p 2 = .124$, Observed Power = .776), which, Bonferroni's multiple comparisons revealed, was due to a higher proportion of the OVS responses produced in the OVS condition (M = 5.7) compared to the baseline (M = 0.3, $p = .016$) [30]. All other comparisons yielded insignificant results. The analysis showed no effect of target type ($p = .165$), but a highly significant condition*target type interaction ($F_{(3, 77)} = 6.828$, $p < .001$, $\eta p 2 = .210$, Observed Power = .971): more OVS targets were produced for the UP (M = 9.2) than for the EP targets (M = 2.2) in the OVS condition only (Figure 2. 11).

Figure 2. 11 Average proportion of OVS responses across the conditions by Russian-speaking children aged 4 to 7, comprehensive coding, Experiment 2.
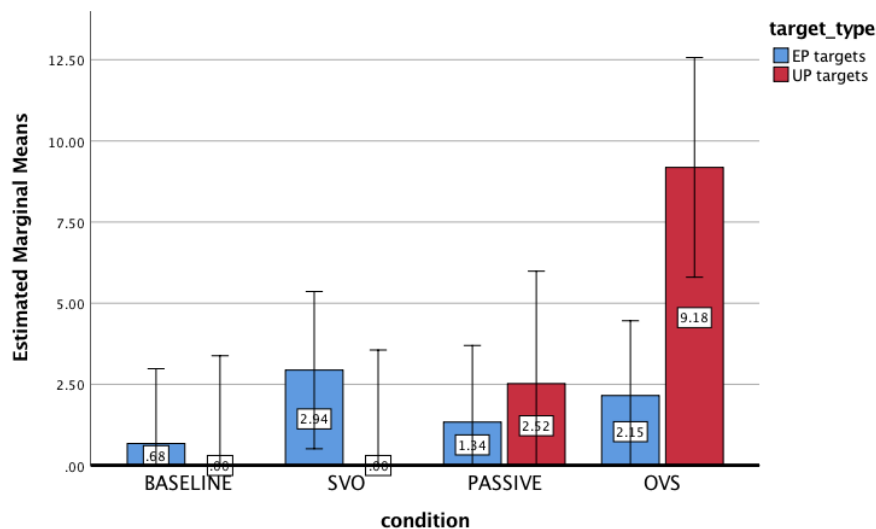
2.9.5.   Discussion

2.9.5.1.   V&W Coding: The Patient Prominence Hypothesis

The experiment tested the Patient Prominence Priming hypothesis (*H1*) in Russian-speaking children (V&W). On this hypothesis, priming can function on the

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[30] Homogeneity of variances assumption (Lavene's test) was violated in the UP target responses, but the violation was accepted for the same reasons as outlined in footnote 24.

level of information structure due to a discourse function or communicative goal similarity between the passive and passive alternative constructions (PAs), namely, the emphasis on the [patient] argument (Fleisher et.al., 2012). *H1* predicted that Russian-speaking children would increase the production of PA construction in the passive and, additionally, in the OVS conditions since it is one of the most frequent PA structures. Although the passive is an infrequent construction in Russian, some increase in production of canonical passives could also be expected after hearing passive primes due to syntactic priming effects. The Russian adult data in Experiment 1 provided no evidence to *H1*, but as hypothesised earlier in the chapter, children may behave differently. To validate the Patient Prominence Priming hypothesis, drawing a direct comparison with the data obtained by Vasilyeva and Waterfall (2012), the analysis was first run using the V&W coding system.

Before evaluating the evidence for *H1*, let us first examine syntactic priming effects of the Russian passive in children. Only one canonical passive across all the utterances produced by the children was detected at the coding stage. This passive actually appeared in the passive condition, but obviously this can be accidental. Such results are in line with Vasilyeva and Waterfall's (2012) findings, where children were also very reluctant to produce canonical passive responses (1 in SVO and 4 in the passive condition). This suggests that with or without a prime, passive constructions are highly problematic for Russian-speaking children even at the age of 7. The finding supports the proposal that frequency of a given construction in a language, in this case – the passive, affects the age of its acquisition (Demuth, 1989).

Turning to *H1*, the analysis showed that the proportion of passive alternatives remained almost unchanged across the conditions, in fact, PAs were at its lowest in the passive condition. Such results is at odds with V&W's and, thus, provides no support to the Patient Prominence Priming hypothesis.

The analysis of SVO responses showed no effect of condition despite the numerical difference between the proportion of SVO produced in the active condition (M = 13.4) and in the baseline (M = 8.7). Recall that I considered that the difference between the active and passive condition in V&W's Russian child data (Exp. 2) could be attributed to the effect of the active prime. The present results suggest that such interpretation might be problematic. The general direction of the SVO responses, namely, a gradual numerical increase in the production of these active constructions from the baseline to the SVO, through the passive and the OVS conditions, see Figure

2. 8, is difficult to explain. However, while the children in V&W's experiment were 5-
to 6-year olds, the present study also included young 4-year olds, in fact the youngest
participant was 3 years 11 month. In order to verify whether the age could have been
a factor which skewed the results, the same analysis was run on the younger
participants (4- to 5-year olds) and older group (6- to 7-year olds).

Although the results did not elicit significant results, the SVO response patterns
differed between the younger and the older groups: compare (a) and (b) in Figure 2.
12 below. While the responses of the younger group display an unexpected increase
of the SVO in the passive and the OVS condition, the responses of the older group
resemble those of the Russian-speaking adults in Experiment 1 (see Figure 2. 4) with
the highest proportion of SVO responses produced in the SVO condition (M = 61.3)
compared to the baseline (M = 42.4), passive (M = 47.6) and OVS (M = 53.6)
conditions. It appears that the older children, were indeed susceptible to weak SVO
priming effects at least, which does provide some support to the suggestion that the
difference between an active and a passive condition in a priming study could be
driven not only by passive primes, but also by active primes, and highlights the
importance of including a true non-prime baseline.

Figure 2. 12 Average proportion of active/SVO responses produced across the conditions by
Russian-speaking children, presented by age group, V&W coding, Experiment 2.

(a) SVO responses across the conditions, Russian 4- to 5-year olds.
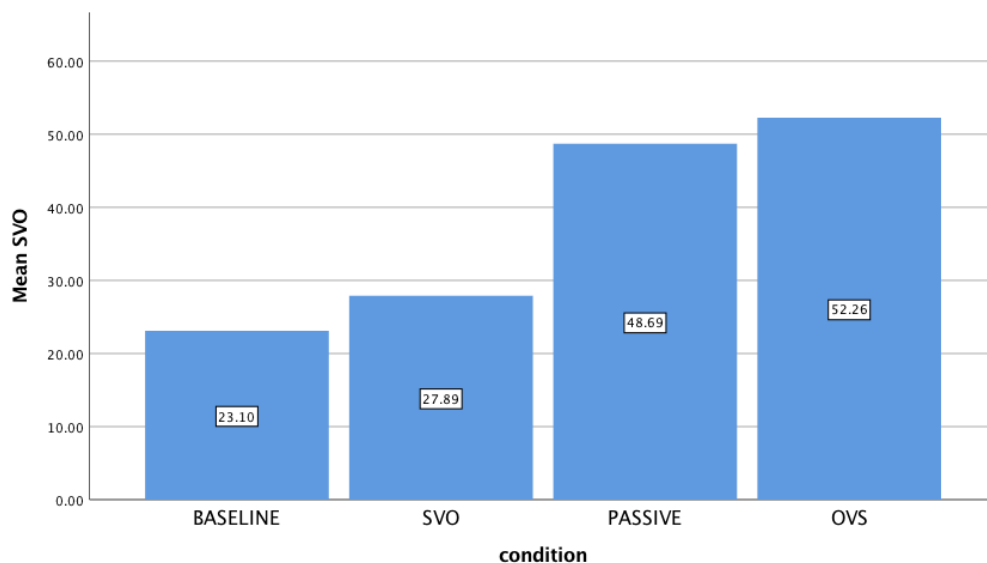
(b) SVO responses across the conditions, Russian 6- to 7-year olds.
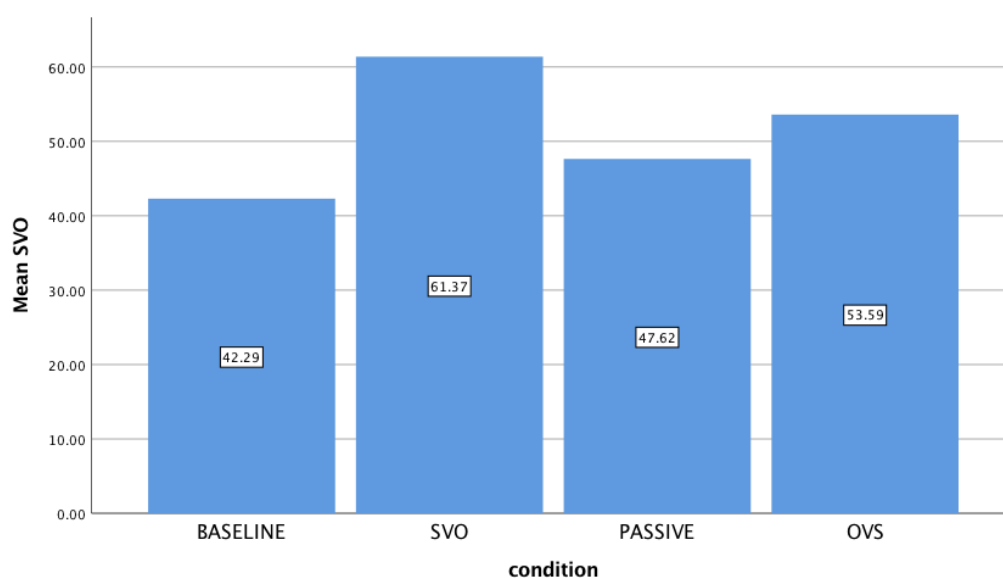
Furthermore, looking at the older group's performance on PAs, setting the responses elicited in the passive condition aside, it is again comparable to that of the Russian adults with the lowest number of PAs produced in the SVO condition, see Figure 2. 13 (b). The responses obtained from the younger participants are challenging to interpret Figure 2. 13 (a).
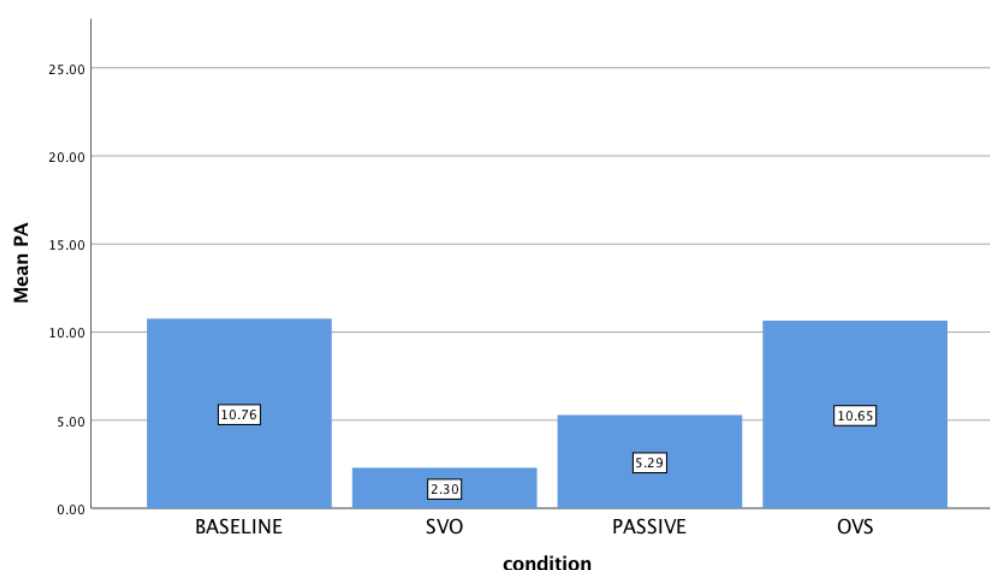
Figure 2. 13 Average proportion of PA responses produced across the conditions by Russian-speaking children, presented by age group, V&W coding, Experiment 2.

(a) PA responses across the conditions, Russian 4- to 5-year olds.
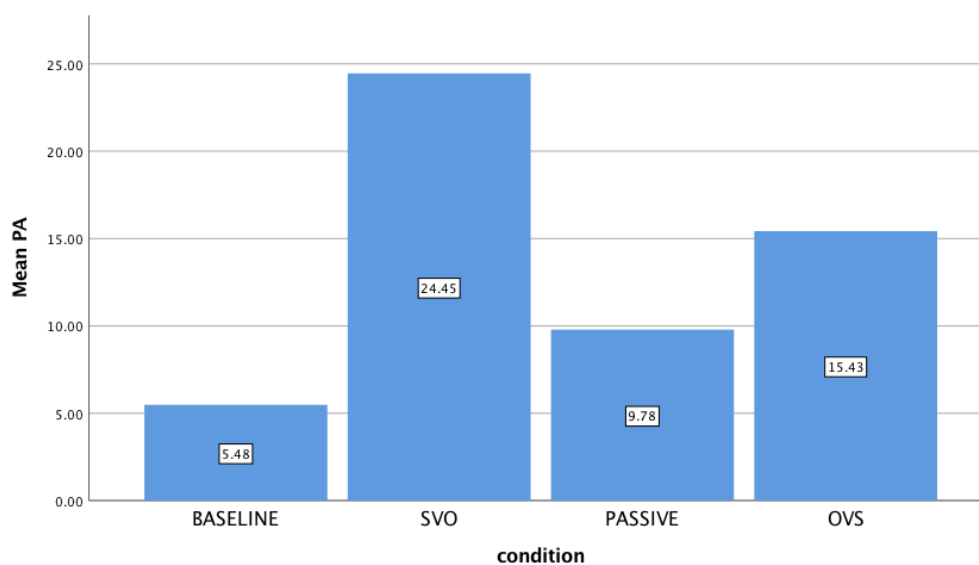
(b) PA responses across the conditions, Russian 6- to 7-year olds.

Further testing is perhaps necessary to explore the patterns of both SVO and PA responses produced by the 4- to 5-year olds, as these children showed no trend towards syntactic priming effect of the SVO as well as displaying an increase in PAs in the SVO condition.

2.9.5.2.   Comprehensive Coding: The APH Hypothesis

The hypothesis that an asymmetry in animacy in the targets is a strong predictor of the sentence structure during a priming task (*H2*), was also tested in the experiment. I proposed that the animacy asymmetry and perhaps some active/SVO priming effects alone were sufficient to account for V&W's data, because patient-first constructions (i.e. PAs) were naturally selected by Russian-speaking children to describe events with animate patients and inanimate agents, and no aid of a prime (i.e. a passive prime) was required to elicit the PA constructions. Therefore, by the principle of parsimony no additional plane of priming, such as the information structure, discourse function or, simply, patient prominence, was necessary to postulate. The Russian adult data provided strong evidence in support of to *H2*. Considering that children exhibit sensitivity to the animate-inanimate distinction from a very young age (Rakison & Poulin-Dubois, D., 2001; Vihman & Nelson, 2019), the results were expected to mirror those obtained in Experiment 1. In order to access

the evidence from the Russian-speaking 4- to 7-year olds, the comprehensive coding approach was utilised.

The crucial adjustment made to the design of V&W's priming experiment was that the relative interpretive prominence of the arguments in the targets was controlled for and manipulated. The results revealed a clear preference for PA structures in the targets with animate patient and inanimate agent (unequal prominence of arguments, UP) compared to the targets with inanimate patient and inanimate agent (equal prominence of arguments, EP). The opposite was also true: the children used more active/SVO constructions to describe the targets where both objects were inanimate compared to when the targets' animacy was asymmetrical. The difference was clearly evident in the baseline and held across the conditions. These findings provide strong support for the APH-based hypothesis (*H2*) and subsequently to the argument prominence hierarchy account, proposed by Titov (2012, 2017, 2019). The above leads to suggest that the outcome of V&W's study was indeed underpinned by the animacy distribution in the targets, and not driven by the Patient Prominence Priming effects as interpreted by the researchers.

The results sit well with the findings of Gámez and Vasilyeva (2015), which showed similar effects of animacy distribution on the choice of structure selected by English-speaking children, although the current data could not establish with certainty that priming effects may be modified by the animacy asymmetry as Gámez and Vasilyeva proposed. This is because the syntax of the passive or OVS primes did not significantly affect the syntax of the utterances the children produced. However, examining the children's performance on the OVS, the most frequent PA, indicates at least some impact of animacy asymmetry in the targets on the OVS priming effects: there were more OVS responses in the OVS condition than in the rest of the conditions, and this difference emerged only in the responses for the UP targets, but not for the EP targets where the proportion of the OVS responses remained unchanged. The child data mirror the adult's data in this respect, except for the children's performance in the passive condition, which could be due to the issues with the acquisition of the Russian passive.

An additional analysis run on the responses of the younger and the older participants showed no difference between the age groups in terms of their preferences for PAs in the UP targets and SVO in the EP targets. This suggests that just like Russian adult speakers, Russian children as young as 4 years of age are

aware of the relative prominence of arguments in a sentence, at least as far as the animacy is concerned.

2.10. Experiment 3: English Children

There were three main reasons for running the experiment. First, it was essential to establish that the absence of passive priming in the Russian child data was indeed a consequence of the late acquisition of the Russian passive rather than because the experimental design was not well-suited to elicit these effects in young children. Another issue related to the priming design which needed to be assessed was a possibility of active priming. I have argued that the difference between the active and passive condition in V&W study (Exp. 2) could be attributed to the active priming effects, and that a no-prime baseline is imperative in any priming study. The results from the previous two experiments with Russian speakers highlighted some effects of the active prime, albeit very weak. This could however be explained by the fact that both SVO and OVS, being syntactically identical, could be triggered by a Russian SVO prime. It is expected that since English has only a single active form, it might be easier to detect the priming effects it might evoke.

Second, the Patient Prominence Priming hypothesis is allegedly not limited to the languages it was tested in such as Polish (Fleischer et.al., 2012) and Russian (Vasilyeva & Waterfall, 2012). It is reasonable to suggest that if such phenomenon does indeed exist, it should be detectable in English as well. Admittedly, there is much less structural variety in English compared to Polish and Russian, nevertheless English contains some constructions which could be construed as "patient-focused" (e.g. unaccusatives, copular constructions, clefts and pseudo-clefts), which also allows to test the Patient Prominence Priming hypothesis (*H1*).

Third, while strong evidence in support of the APH-based hypothesis (*H2*) was found in the Russian adult and child data, it was necessary to verify *H2* with English-speaking participants. The Russian adult and child data were highly comparable in this respect – in both cases the participants showed strong tendency in producing patient-first constructions when describing targets with an animate patient and an inanimate agent. It was, thus, reasoned that if English children displayed the same tendency, it could hypothetically be generalised to mature English speakers as well.

127

Only if no animacy asymmetry (APH-based) effects were found in children, further testing would need to be sought with English-speaking adults.

2.10.1. Methods

2.10.1.1. Participants

63 native English speakers aged 4 to 7 (mean age = 6;0, 29 boys) were recruited from two primary schools in South London. Written consent was obtained from the setting and the participants parents, and verbal consent was sought from the children themselves. According to the information provided by the parents, thirty children spoke an additional language in varying levels of proficiency. The Test for Receptive Grammar (TROG II) (Bishop, 2003) was administered to assess participants' perceptive grammar. The children's performance on TROG II was generally within the expected age range as indicated by the standardised score, which ranged from 75 to 139. The participants were randomly assigned to either baseline (n=21), active (n=21) or passive condition (n=21).

2.10.1.2. Design, Materials and Procedure

A between-subject design was maintained for this experiment. The materials and procedure were identical to those used with the Russian children in Experiment 2 except that there were only three conditions (active, passive and no-prime baseline condition) and that the experiment was run in English, which allowed to introduce all depicted objects with the definite article. The procedure itself lasted between 15 and 20 minutes, which was preceded by TROG II assessment, lasting also approximately 15-20 minutes. The children's responses were audio-recorded, transcribed and coded for analysis.

The coding system used to prepare these data for analyses was similar to the comprehensive coding adopted in Experiment 2, which allowed to explore the priming effects of both passive and active structures as well as to assess the potential influence of the APH in targets on priming. As per the comprehensive coding in the Experiment 2, all semantically unfaithful utterances, sentences unrelated to the depicted action, "spot-the-difference" answers, no-responses, and one-word answers were removed from the analysis rather than being coded as *other*.

The category of *active* included the responses where the agent/instrument/cause was in the subject position, followed by a transitive verb, and the patient in the object position, e.g. *The mushroom squashed the worm*. The utterance was also coded as *active* when the agent/cause/instrument was in the subject position of a structure where an unaccusative or intransitive clause was coordinated with a transitive and where the object was expressed, e.g. *The mushroom fell and squashed the worm.*

A response was coded as *full passive (FP)* if it contained the patient in the subject position, followed by an auxiliary, a verb in past participle form and the agent/instrument/cause in a *by*-phrase, e.g. *The worm was squashed by the mushroom*. A response was coded as *short passive (SP)* if it followed the structure the full prime, but did not contain a *by*-phrase.

Copular constructions (e.g. *The mouse is wet*) and rare cases of unaccusative structures (e.g. *The hippo is lifting up* as a description of an event where a hippo is being lifted by the crane) were coded as passive alternatives (PAs). All other responses were coded as *other*.

2.10.3.   Results

A summary of the results of the responses across the conditions is presented in Table 2. 16 below.

Table 2. 16 Proportions (and frequencies) of full passive (FP), short passive (SP), active, passive alternative (PA) and 'other' responses produced across the conditions by the English-speaking children aged 4- to 7, Experiment 3.

condition	Full passives	Short passives	PAs	Active	Other
baseline (n=21)	5.3 (16)	19.0 (56)	12.6 (37)	57.0 (168)	6.1 (18)
active (n=21)	0.7 (2)	3.1 (9)	5.2 (16)	84.2 (243)	6.1 (18)
passive (n=21)	18.4 (56)	18.7 (57)	12.6 (38)	44.6 (136)	5.7 (17)

In order to investigate the priming effect of the full passive and the effects of the APH, a 2 x 3 ANOVA with a between-subject factor of condition (three levels: baseline, active, passive) and a within-subject factor of target type (EP targets, UP targets) was performed on the average proportion of full passive (FP) responses. The tests revealed a significant main effect of condition ($F_{(2, 60)} = 6.580$, $p = .003$, $\eta p 2 = .180$, Observed Power = .897), and a main effect of target type ($F_{(1, 60)} = 5.011$, $p = .029$, $\eta p 2 = .077$, Observed Power = 596) (see Figure 2. 14). Bonferroni's multiple comparisons showed that the effect of condition was due to more FP being produced in the passive condition (M = 18.41) compared to the baseline (M = 5.29) ($p = .036$) or the active condition (M = 1.4) ($p = .003$) (Table 2. 16)[31]. The effect of target type was due to a higher proportion of FPs produced for the UP targets (M = 9.8) compared to the EP targets (M = 6.4). There was no condition*target type interaction ($p = .348$).

Additionally, an ANOVA was run on all passive responses, incorporating full and short passives since the majority of passive priming experiments run with children followed the coding which include both. The main effect of condition was significant ($F_{(2, 60)} = 10.848$, $p < .001$, $p = .003$, $\eta p 2 = .266$, Observed Power = 988), which was only due, Bonferroni's multiple comparisons revealed, to more passives produced in the passive condition (M = 37.4) compared to the active condition (3.8) ($p < .001$), while the difference between the passive condition and the baseline (M = 24.7) was not significant. The main effect of target type was also significant ($F_{(1, 60)} = 5.490$, $p = .022$, $\eta p 2 = .084$, Observed Power = .635), due to the higher proportion

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[31] Lavene's test for equality of variances was significant for all passive (i.e. full passives, short passives and full and short combined) and active responses. This violation of homogeneity assumption was accepted, see footnote 24 for justification.

of passive produced for the UP targets (M = 24.7) compared to the EP targets (M = 19.3) see Figure 2. 15 below. There was no condition*target type interaction detected in the data (p = .114), although the difference between EP and UP in the passive condition was still found significant (p = .009).

To investigate the pattern of short passive responses further, another ANOVA was run just on the proportion of short passives (SP). The analysis returned the main effect of condition (F (2, 60) = 3.891, p = .026, ηp 2 = .115, Observed Power = .681). Bonferroni's multiple comparisons indicated that this effect was due to marginally more SP responses produced in the passive (M = 18.7) and baseline (M = 19) conditions compared to the active (p = .059, p = .053, respectively). The main effect of target type did not reach significance (p = .329), but there was a marginal condition*target type interaction (p = .075), which was due to a higher proportion of SP responses produced for the UP targets compared to the EP targets in the baseline condition only, see Figure 2. 16 below.

Figure 2. 14 Average proportion of full passive (FP) responses across the conditions produced by the English-speaking children aged 4 to 7, Experiment 3.

131
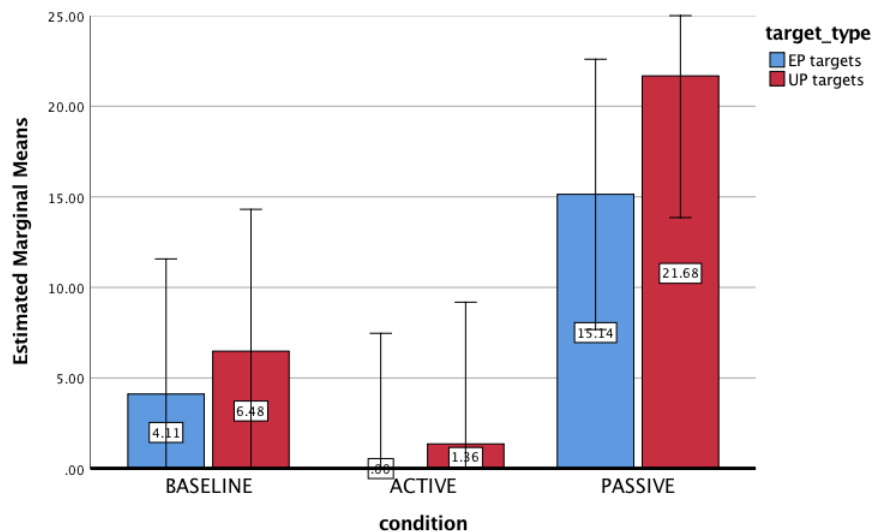
Figure 2. 15 Average proportion of all passive responses (short passive + full passives) across the conditions produced by the English-speaking children aged 4 to 7, Experiment 3.
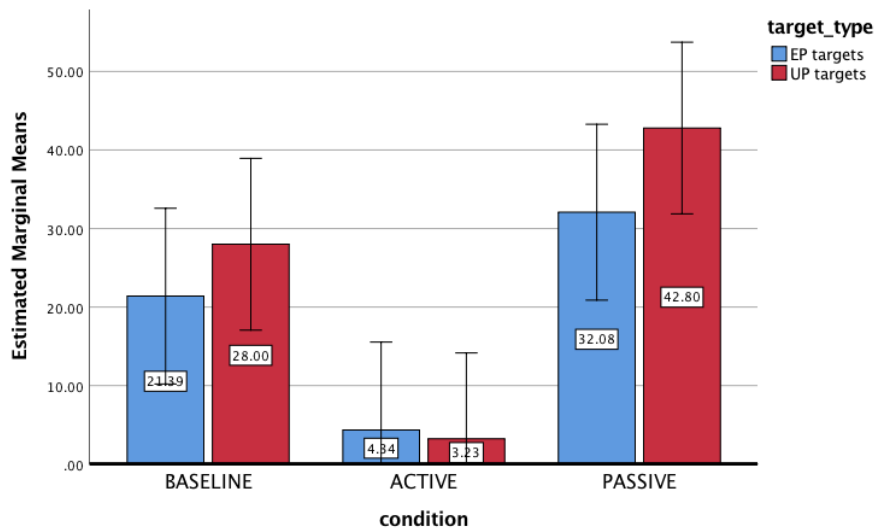
Figure 2. 16 Average proportion of short passive (SP) responses across the conditions produced by the English-speaking children aged 4 to 7, Experiment 3.
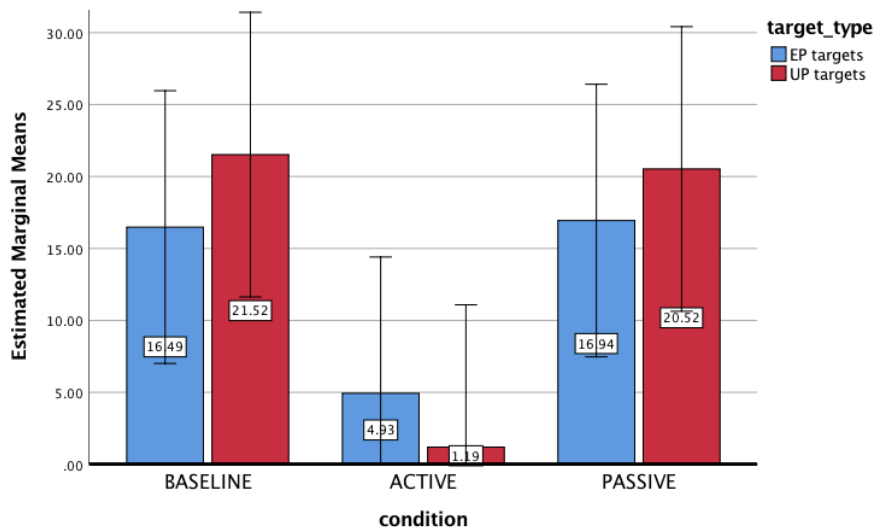
Active priming was assessed by running another 2 x 3 ANOVA on the average proportion of active responses, which was followed by pairwise comparisons with Bonferroni adjustment. The tests returned highly significant main effect of condition ($F_{(2, 60)}$ = 9.534, $p < .001$, ηp^2 = .241, Observed Power = .975). Bonferroni's multiple comparisons revealed that it was due to more active constructions produced in the active condition (M = 84.2) than in the baseline (M = 56.9, p = .014) or in the passive condition (M = 44.6, $p < .001$) (Table 2. 16). The main effect of target type was also significant ($F_{(1, 60)}$ = 4.474, p = .039, ηp^2 = .069, Observed Power = .548)

due to a higher proportion of active responses produced for the EP targets (M = 64.8) compared to the UP targets (M = 59.1), see Figure 2. 17. There was no condition*target type interaction in the data (p = .231), although the EP-UP difference was statistically significant in the passive condition.

Figure 2. 17 Average proportion of active responses across the conditions produced by the English-speaking children aged 4 to 7, Experiment 3.
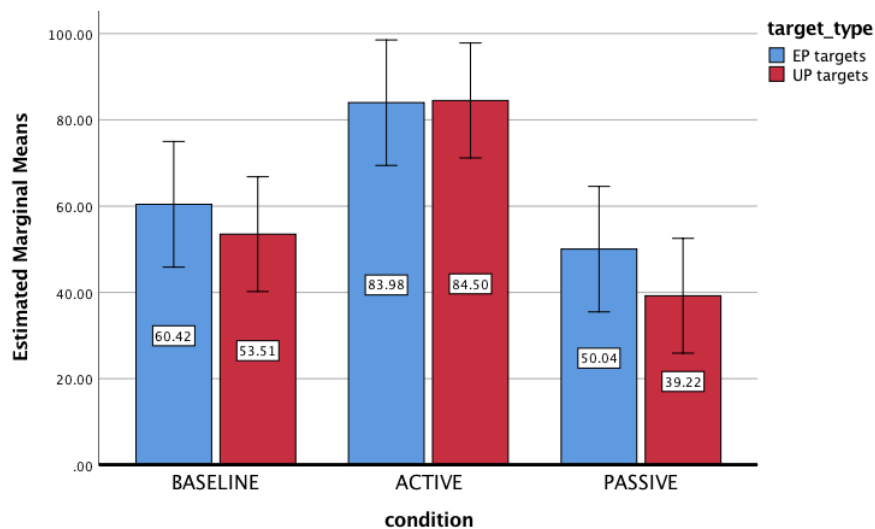
To draw a parallel with the Russian data, and in order to investigate the claim that the passive can prime listeners to produce syntactically unrelated structures that share its discourse function of the patient prominence (Vasilyeva & Waterfall, 2012), a mixed ANOVA with the same independent variables was performed on the average proportion of passive alternative (PA) responses, which included unaccusatives and copular constructions. The analysis returned a significant main effect of target type (F (1, 60) = 13.200, p = .001, $\eta p\ 2$ = .180, Observed Power = .947). Descriptive statistics highlighted that this effect was due more PAs produced for the UP targets (M = 12.4) than for the EP targets, see Figure 2. 18. The effect of condition was not significant (p = .134): no difference in production of PAs emerged between the passive and baseline or active condition (Table 2. 16 and Figure 2. 18). The target type*condition interaction was also insignificant (p = .706).

Figure 2. 18 Average proportion of passive alternative (PA) responses across the conditions, English-speaking children aged 4 to 7, Experiment 3.
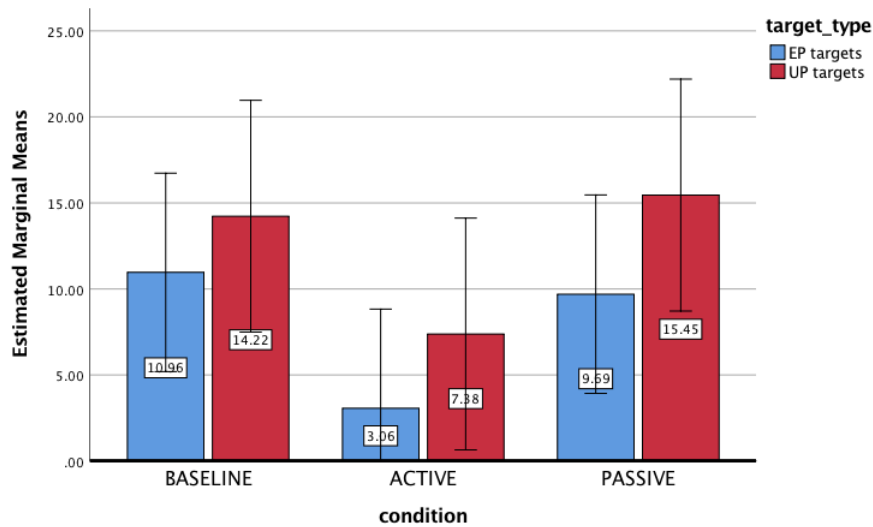
2.10.4. Discussion

2.10.4.1. Syntactic Priming

The analysis of the responses elicited from the native English 4- to 7-year olds yielded a clear syntactic priming effect: the children produced significantly more full passives after hearing full passive primes not only compared to the active condition, but also compared to the no-prime baseline. Such findings are in line with the results obtained from a number of priming studies involving English-speaking children of the same age-range (Bencini & Valian, 2008; Huttenlocher et.al., 2004; Savage et.al., 2006; Shimpi & Gamez, 2007; Vasilyeva & Waterfall, 2012, Exp. 1).

Interestingly, the analysis run on all passives and short passives only suggest that the full passive construction primes only itself, but not the short passive: the difference in the production of short passives was found only between the active and the passive conditions, while in the baseline and the passive conditions the proportion of SPs the remained the same. What can be concluded from the above is that interpreting an analysis on the responses where the passive code value combines full and short passives, the coding many priming studies with children adopt, should be done with caution as the results might be misleading.

A number of previous passive priming experiments compared the responses to

priming conditions each of which followed a specific syntactic structure, e.g. a passive and an active (Bernolet, Collina & Hartsuiker, 2016; Bock & Loebell, 1990; Bock, Loebell & Morey, 1992; Gámez & Vasilyeva, 2015; Huttenlocher et.al., 2004; Messenger et.al., 2012; Savage et.al., 2003; Vasilyeva & Waterfall, 2012; Vasilyeva et.al., 2010) or a passive and a noun conjunction (Bernolet et.al., 2009; Fleischer et.al., 2012). In such cases the proportion of passives produced in the passive condition was compared to the other prime condition, which served as a baseline. I have argued earlier that a true priming effect can only be assessed against a no-prime baseline and that active primes themselves may affect structural choices participants make and, thus, cannot be used as a baseline. This is indeed supported by the current data. The analysis demonstrated active priming effects: there were more active responses in the active condition not only compared to the passive condition, but also compared to the baseline. It is an important piece of evidence, especially considering that active priming observed in the Russian data was statistically insignificant. I have suggested that the lack of significance in this case could be due to the fact that Russian has two active constructions which are syntactically identical and therefore it was possible that they would prime each other, masking the effect of active/SVO itself. Conversely, the English child data show that even in the view of the inverse frequency effects whereby a more frequent structure elicits weaker priming than a less frequent, active priming is still detectable.

Aside assessing a true priming effect, there was another reason for including a baseline into the design of the current experiment. Recall that while the difference between the conditions in the V&W's experiment with Russian children was attributed to the Patient Prominence Priming, I have suggested that it was in fact due to the priming effect of the active construction: the participants' natural inclination to describe animate patient/inanimate agent targets with PAs was overridden by hearing an active prime. Indeed, the analysis on the proportion of actives in the current English data showed that the active was very effective as a prime: significantly more active responses were produced by the children who heard active primes compared to the children who heard no primes. The above is a piece of evidence to the claim that the difference found in V&W's data could be due to the influence of the active, not the passive primes.

2.10.4.2.   Patient Prominence Priming

The category of PAs in the English data was created to assess a possibility of the Patient Prominence Priming, as the increase of passives in the passive condition can be attributed equally to either syntactic or Patient Prominence Priming effects. As the PA category was limited to copular constructions and unaccusatives and no cleft or pseudo-cleft construction were found in the data, the proportion of passive alternative structures was much lower in the English data compared to the Russian. Yet it was enough to attempt to distinguish syntactic priming from Patient Prominence Priming. An increase in the proportion of the PA responses in the passive condition could provide evidence for the V&W's discourse function/patient emphasis priming hypothesis. However, no such increase was found. The analysis revealed that the proportion of PAs remained the same across the conditions. In fact, the proportion of PAs produced in the baseline and the passive condition was identical at 13%; the figure dropped (numerically, but not statistically) to 5% in the active condition, which was likely to be due to the effect of the active primes. Thus, the English data, just as the Russian, failed to find support for Vasilyeva and Waterfall's Patient Prominence Priming hypothesis.

2.10.4.3.   APH-based Hypothesis

The present data provide strong evidence in support of the APH-based hypothesis (*H2*) in addition to that found in the Russian adult and child data. The proportion of full passive, active and passive alternative responses produced by the children varied depending on whether they were describing target events with animate patient and inanimate agent (UP targets) or the ones where both entities were inanimate (EP targets). The animacy distribution in the targets affected the linear order in which the arguments were presented in a sentence and determined its syntactic structure. The children produced more full passives and PAs, where the agent followed the patient (or was altogether omitted) for the UP targets than they did for the EP targets. The opposite was also true: there were more active responses produced for the EP targets than for the UP targets. These results are in line with the predictions the APH-based hypothesis makes.

In addition, the EP-UP difference held across the conditions as there was no interaction found between the priming condition and the target type on most analyses except for the one run on the short passive responses. Such findings do not support the idea that (at least in English) priming effects could be modified by the distribution of animacy in the targets proposed by Gámez and Vasilyeva (2015). The results are also in contrast with the OVS pattern observed in the Russian adult data, where the effect of OVS was detected only in the UP targets, but not in the EP targets. Further cross-linguistic testing is required to explore whether animacy distribution in the targets could interact with priming effects and if so, how.

2.11. General Discussion

2.11.1. Patient Prominence Priming

The present study, which included priming data gathered from native Russian adults and children and native English-speaking children, had three main aims. The first aim was to establish whether priming is sensitive to the information on the patient prominence in a sentence independently of syntax. *H1* predicted that there should be an increase in the production of passive alternatives (i.e. the structures claimed to share the discourse function of patient prominence with the passive) in the passive condition compared to the rest of the conditions in Russian and English. *H0*, predicted no such increase. The data disconfirmed the prediction *H1* made: neither Russian nor English passives promoted the production of PAs. Hearing Russian OVS, the construction which was claimed to be one of the most frequent PAs, also failed to increase the number of passive alternatives produced by the adults and the children: the proportion of PAs elicited in this condition was almost equal to the active condition.

Nonetheless, an increase of the OVS responses produced by the Russian adults was observed in the passive condition, which is in agreement with the Patient Prominence Priming account. However, the effect was detected exclusively in the targets with asymmetrical animacy mapping (animate patient-inanimate agent), and therefore cannot be used as evidence for the Patient Prominence Priming. The pattern was instead explained by the thematic subject status effects. It was hypothesised that the full passive prime which had its optional thematic subject

137

overtly realised, on one hand did not inhibit the production of a construction where the thematic subject was obligatory, namely OVS, and on the other, did not block the agentless structures (e.g. unaccusatives or impersonal actives). The latter were subsequently impeded by the OVS and SVO primes since the thematic subject in this these constructions was obligatory. Taken together, the results lead us to accept the null hypothesis.

The proponents of the Patient Prominence Priming, who adopt a psychological view of information structure, make reference to the notion of *emphasis*, *prominence*, *salience* or *importance* of the [patient] argument. This salience amounts to linear precedence in a sentence and guides the selection of a syntactic structure during the priming. In short, if the patient was emphasised in the prime by appearing before the agent, it would be expected to be emphasised in the target either by preceding the agent or by being selected as the only argument in a target sentence. The syntax of the target would follow the syntax of the prime. If the language of testing, e.g. English, is limited in the ways such emphasis could be expressed, the syntactic priming effects would be indistinguishable from the Patient Prominence Priming effects – a full passive would prime another full passive. For other languages with less rigid word order such as Polish or Russian, the emphasis on the patient could be realised by other syntactic means – a full passive would prime a Russian OVS. Despite the cross-linguistic differences, the data obtained in the three experiments suggest that such notions as patient emphasis or prominence are obsolete and calls for a more refined syntax-orientated approach to priming.

That much is clear, but what are the potential implications of the current findings for the linguistic theory? Recall that for the researchers who argue for the Patient Prominence Priming account *prominence* equals *topic*. Even if we adopt this understanding of the term, on Reinhart's (1981, 1995, 2006) interface-based approach, assumed in this thesis, an expression can be defined as a topic (or focus) only in relation to a given context, the information-structural aspects do not form part of a numeration. Following Reinhart, all possible well-formed representations, generated by the grammar are filtered out at the interface with the post grammatical level[32] by the economy rules, selecting the least costly representation; an alternative, more costly representation is selected only if it achieves the interpretation required

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[32] As mentioned in footnotes 19, the post-grammatical level broadly corresponds to the staged production process described in Levelt's (1989) 'blueprint for the speaker' (Figure 1. 1).

by a given context, which the unmarked representation fails to express (Reinhart 1995, 2006). If the selection made at the interface is conditioned by the context, and the context of a target event is presumed to be different from that of a prime, then there is no such mechanism under which the topic (prominence) priming would emerge. It could be argued that by failing to demonstrate information priming effects, the results obtained in the present study provide some support to the interface-based account of information structure[33].

2.11.2.   Argument Prominence Hierarchy and Priming

The second aim was to explore whether the relative interpretive prominence of arguments in target events, determined by their animacy, the lowest level of the APH, could guide the choice of sentence structure selected by Russian and English children during a priming task, and if so, whether it could modify the syntactic priming effect. *H2* predicted that following the APH, a higher proportion of PA and passive responses would be produced for the UP targets than for the EP targets, the difference that was expected to hold across the conditions. This prediction was borne out. Both Russian and English data demonstrated a strong impact of animacy distribution on structure selection: with the exception of the Russian children who did not use participle passives, there were more Russian and English PAs and full passives produced when the participants described the events with animate patient and inanimate agent compared to when they responded to the event with inanimate entities only. The EP PA/passive < UP PA/passive pattern held across the conditions, which highlights that the argument prominence hierarchy (defined by animacy in the present experiment) has a strong impact on the structure selected by the participants during the priming task.

The present findings do not provide conclusive evidence to suggest that animacy asymmetry could modify priming effects. While the Russian adult data supported this proposal (OVS priming was observed only in the target with unequal prominence of arguments (UP)), the English data did not provide any evidence to

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[33] Note, however, that the findings are also compatible with cartographic accounts, which hold that information structure is encoded in syntax, as there is yet no evidence in support of the claim that all elements encoded in syntax are susceptible to priming.

support the claim (passive and active priming effects were detected across the EP and the UP primes. Further cross-linguistic testing is necessary to settle the issue.

2.11.3. Syntactic Priming

In line with a large body of priming research, passive priming effects were found in Russian adult and English child data. However, as anticipated, due to the Russian passive being strongly dispreferred even by adults (Vasilyeva & Waterfall, 2012) combined with the general problems surrounding its acquisition across the languages (see section 2.9.1), there was no influence of the passive prime found in the Russian child data.

The difference between the passive and active conditions found by Vasilyeva and Waterfall (2012) and Fleisher, Pickering and McLean (2012) was earlier explained by possible active priming effects. Overall, the present data provide sufficient evidence that this could indeed be the case. The effects of the active prime were strong in the English data. There was also a numerical increase in production of SVO actives in the active condition compared to the baseline in the Russian data. In addition to establishing the active priming effects, the current findings underline the importance of including a no-prime baseline condition in any priming task. Considering the results of the present study, I suggest that any priming experiment that makes assumptions on the strength of priming without making reference to a true no-prime baseline runs a risk of overestimating the priming effects.

2.12. Conclusion

This chapter addressed the Patient Prominence Priming hypothesis based on the results of three passive priming experiments. The cross-linguistic data obtained from the native Russian and English speakers showed no evidence for the Patient Prominence Priming hypothesis. I argued for the alternative interpretation of the data used by the proponents of the Patient Prominence Priming to support the claim, attributing the findings to the asymmetrical animacy distribution in the targets and the active priming effects.

The main contribution of the research reported so far, however, is not the rejection of the Patient Prominence Priming hypothesis, but rather highlighting the effects of animacy asymmetry and, more generally, the role of animacy distribution in syntactic structure selection under the priming task conditions. The data strongly support the account under which the relevant prominence of arguments, which amongst other features is defined by their animacy, regulates the surface word order in a sentence (Titov, 2012, 2017). The present data demonstrate that this principle works not only for scrambling languages such as Russian, but also for English. The above suggests that not to control for the effects of animacy when designing a priming experiment may lead to spurious results.

Running the experiment with young children allowed me to draw a direct comparison with the results obtained by Vasilyeva and Waterfall (2012) and Gámez and Vasilyeva (2015) not only in terms of the Patient Prominence Priming, but also in relation to the animacy distribution effects. The results reveal startling similarities in the performance of the adult and the children, highlighting the children's syntactic competence. As hypothesised in Chapter 1, if priming tasks can pick up memory traces of a patient-emphasis effect in children, but not in adults, it is likely that, when constructing a sentence, children rely on these simpler concepts until the necessary language components mature and/or until other essential non-linguistic cognitive functions develop to support structure-building. The results do not lend support to the above, showing that children, unless impeded by a low occurrence frequency of a given construction in their native language, just like adults are sensitive to the syntactic form of a prime and the animacy distribution in the events they describe.

3.   Argument Structure Priming: Evidence from English

> 'There is now no doubt that Bock's contention that the priming effect can be independent of variations in meaning is true.'
>
> (Dell & Ferreira, 2016: 1)

3.1.   Introduction

In this chapter I address the Argument Structure Priming hypothesis and return to the influential priming work undertaken by Bock and colleagues which is widely considered to be the foundation of the modern priming research (Bock, 1986; Bock & Loebell, 1990; Bock, Loebell & Morey, 1992). These seminal priming experiments suggest that priming functions at the level of linear surface constituents order. I will revisit these findings with particular attention paid to the study by Bock (1986) and Bock & Loebell (1990), and attempt to reinterpret the patterns of responses observed in these experiments, taking into account the results of the three current experiments reported in the previous chapter. These experiments (Exp. 1-3) demonstrated that the impact of an asymmetrical animacy distribution in targets of a priming task goes above and beyond the effects evoked by primes, thus calling for reassessing the data obtained by Bock and colleagues. I will then present the next study, which contained two experiments with native English speakers – one with adults and one with children. The study aimed to replicate Bock and Loebell's experiment whose results appear particularly problematic in the view of the syntactic theory assumed in this dissertation (see section 1.3). Considering the present data, I will argue against the claim that linear constituent order similarity is sufficient for priming and propose that a more refined approach to syntactic priming which takes into account argument structure of the prime is necessary.

Probably the most influential experimental work which pioneered the syntactic priming paradigm, and therefore deserves a special attention, is the study conducted by Bock (1986). In the first of the three experiments Bock tested the hypothesis that sentence repetition under the priming conditions is generated on the syntactic level rather than being type- or token-based. In this within-subject study the participants were required to describe a number of depicted events after hearing an experimenter

producing sentences of three prime types (no images were shown for those sentences): an active (e.g. *A gang of teenagers mugged the building manager.*), a full passive (e.g. *The building manager was mugged by a gang of teenagers.*), a prepositional object dative (POD) (e.g. *The governess made a pot of tea for the princess.*), and a double-object dative construction (DOD) (e.g. *The governess made the princess a pot of tea.*). Such argument prominence hierarchy (the APH) features as [±referentiality], [±animacy] and [±human] (see section 1.3.2) varied and were not controlled for in the primes. Half of the depicted transitive target events had human agents and the other half had non-human agents. The [±animacy] and [±human] features on the intended arguments in the target events in either the transitive or the dative primes were not reported. Eight of the prepositional dative primes contained the preposition *to* and four – the preposition *for*. The subjects were asked to repeat the prime sentences and then to describe the drawings presented to them, which were unrelated to the prime sentences (i.e. the lexical overlap between the primes and the targets was minimised). The responses were scored as a*ctive, passive, prepositional dative, double-object dative*, all other responses were excluded from the analysis. The analysis showed that 23% more POD targets were produced following the POD primes compared to when the targets followed the DOD primes. In the DOD condition 22% more DOD targets were produced compared to the POD condition. The proportion of active and passive targets each was 8% higher following the exposure to the respective primes. All of these differences were found significant.

Notwithstanding some methodological issues, e.g. the absence of a true baseline and the lack of systematic control for the APH features in the primes and targets, these ground-breaking findings for the first time demonstrated that abstract syntactic structure independent from lexical, type- or token-based features can be retained by the speaker and subsequently reproduced. Statistically reliable difference between the conditions attest to that. Note, however, that it is probable that each type of prime structure, be it transitive (active or passive) or dative (POD or DOD) would have itself facilitated the priming effect, therefore none of them made a true baseline against which priming could have been measured. A control condition, where the participants heard intransitive primes (e.g. *The rhododendrons are blooming*) was only included for the dative set of primes in order to compare the speakers' preferences in their choice of POD and DOD constructions; and no preference was detected in these data.

Another important outcome of the experiment reported by Bock (1986) was that half of the transitive targets, specifically, the ones containing human agents were not susceptible for priming at all – there was only one passive description produced for the human agent event in the passive condition. Following Bates and MacWhinney (1982) and MacWhinney, Bates and Kliegl (1984), Bock hypothesised that if such conceptual features as human agency directly affected message-to-structure mapping (e.g. events with non-human agents were more likely to be mapped onto a passive then on an active construction), the exposure to the prime structure where a given conceptual feature (e.g. non-human agency) was mapped accordingly (e.g. onto a passive) would lead to a greater syntactic priming effect than hearing the prime whose structure failed to be mapped in this way. To address the above, in the next experiment which followed the same design and procedure as in Experiment 1, half of the 24 primes contained human agents and the other half had non-human agents; 12 out of the 24 target events had human agents and patients, 8 had non-human agent and patient, and 4 had non-human agent and human patient. The message-to-structure hypothesis predicted that, there would be more passive responses for non-human agent target events after hearing the passive primes with non-human agents than after the passive primes with human agents. No such effect was found. It was also reported that the primes made little or no effect on the descriptions of the targets with human agents (see Table 3. 1).

Table 3. 1 Proportions of active and passive utterances used to describe pictures of events with human versus non-human agents in the active and passive conditions: Experiments 1-3 (Bock, 1986).

N	Condition	Non-human agent targets		Human agent targets	
		Active responses	Passive responses	Active responses	Passive Responses
Exp. 1	active	51	24	93	1
	passive	36	39	94	1
Exp. 2	active	56	25	91	3
	passive	54	32	89	2
Exp. 3	active	48	31	85	2
	passive	43	37	83	4

The results nevertheless revealed syntactic priming effects: there were more passives produced in the passive condition (31.8%) compared to the active (25%). Overall Bock concluded that the process of syntactic structure selection could be dissociated from the conceptual features of the events described at least in part.

What is significant in Bock's interpretation of the findings is that on the one hand, the focus is on the [±human] features of the agent, but not the patient, and on the other, the attention is centred on the conceptual features of the primes, but not those of the targets. For Bock the value of [±human] feature on agents and patients in the target events are only of interest insofar as there is an effect of match/mismatch of this feature between the targets and primes. Importantly, the relative prominence of arguments in terms of their animacy and humanness either in the primes or the targets was ignored.

Recall that according to the Argument Prominence Hierarchy (APH) hypothesis proposed by Titov (2012, 2017) and outlined in section 1.3.2, all else being equal, a human argument is more interpretively prominent than a non-human/inanimate argument, and an animate argument is more prominent that inanimate, the consequence of which is a linear precedence of a more prominent human and animate argument in each of these cases, respectively. Although the exact value of [±human] and [±animacy] features on the patient in the target events in Bock's Experiment 1 is unknown, if they were [-human] or [-animate], following the relative interpretive prominence account as per the APH (see **Error! Reference source not f ound.**), the passive priming effect would have been expected to be blocked and the speakers would have favoured the active descriptions instead. This indeed what appeared to have occurred. In the second experiment, 4 out of the 12 target events where the passive priming was detected (recall that the other 12 primes contained animate agents were immune to the passive primes) had [+human] patient and [-human] agent. Once more, following the Titov's relative interpretive prominence account, it comes as no surprise that the passives were observed there. The other 8 targets where both intended arguments were non-human could have contributed to the priming effect triggering more passives in the passive condition and more actives in the active. That is if, of course, both arguments were of the same animacy, on which no information was provided. In sum, the results were perhaps affected not by the human agency in the targets per se as Bock suggested, but instead were due to the lack of consistent control for the animacy distribution in the target events.

In another influential study Bock and Loebell (1990) (B&L henceforth) aimed to investigate whether the conceptual features of a primed event facilitated syntactic priming or whether such effects were purely structural and independent from the theta- or event-role mappings of the prime. The study is underpinned by the two

competing approaches to the process of sentence representation and construction, the debate between the proponents of which has not been resolved since the publishing of the B&L's work. The first suggests that grammar is defined by communicative intentions in the sense that particular semantic, pragmatic and conceptual elements of an utterance are associated with specific grammatical structures (e.g. Clark & Clark, 1977; McNeill, 1987, Osgood & Bock, 1977). For example, subjecthood might be seen as syntactic realization of conceptual prominence of an entity (Bates & MacWhinney, 1982, 1989). B&L termed this approach *meaning-mapping*, which is what Pickering and Ferreira (2008) later referred to as *functionalist* account (see section 2.1). Following the second, *form-mapping approach* (or *autonomous* account (Pickering & Ferreira, 2008)), which B&L argue for, syntactic representations are independent from semantic and pragmatic information, in other words, they are completely autonomous from the meaning of words and ideas expressed (Branigan, & Pickering, 2017; Chomsky, 1957; Gertner, Fisher & Eisengart, 2006; Lashley, 1951; Valian, Solt & Stewart, 2009).

On the former approach, B&L suggest, the conceptual similarity between prime and target events drives the priming. Following the meaning mapping account, syntactic repetition occurs as a function of communicative function activation: hearing a grammatical structure which is associated with a particular communicative intention would prime another grammatical structure or structures, which reflect the same intention. Thus, according to B&L, the meaning mapping approach predicts that a prepositional dative with an indirect object (IO) beneficiary such as *The wealthy widow gave an old Mercedes to the church* should be a better prime for a dative structure with an IO beneficiary such as *The girl is handing a paintbrush to the boy*, compared to a locative structure such as *The wealthy widow drove an old Mercedes to the church*, which contains a locative goal. On the form-mapping hypothesis, on the other hand, despite the differences in their conceptual features, both constructions would be equally strong primes for prepositional datives as only abstract syntactic information, understood by Bock (1986) as constituent order, would be primable.

Utilising a priming procedure identical to the one in Bock (1986), B&L's Experiment 1 was designed to test these predictions. The participants were required to describe dative target events after hearing and repeating the primes which adhered to either a POD with beneficiary IO structure (e.g. *The wealthy widow gave an old*

Mercedes to the church) or a locative goal construction (e.g. *The wealthy widow drove an old Mercedes to the church*). DOD datives (e.g. *The wealthy widow sold the church an old Mercedes*) were also included as a control condition. The events had [+human] IO (beneficiary) and [-animate] direct object (e.g. a boy giving an apple to a teacher). The results showed that both, the prepositional locative and the POD primes were equally effective in evoking prepositional datives targets: 32% of POD was produced in the POD condition and 35% in the locative condition against only 25% of POD responses produced in the DOD condition. These findings, B&L argue, highlight that there was no effect of conceptual differences between the POD and the locative primes on the production of datives targets, providing little support to the meaning-mapping hypothesis and suggesting that the abstract surface structure priming was at play. However, there could be an alternative explanation for these results.

As the responses that did not follow prepositional dative or double-object dative structures were excluded from the analysis, and considering the proportion of POD responses produced, the proportion of the double-object dative can be conversely calculated. There were 68% of DOD targets produced in the POD condition, 65% in the locative condition and 75% in the DOD condition, overall demonstrating an overwhelming preference to the DOD construction over the POD construction irrespective of the priming structure (see Table 3. 2).

Table 3. 2 The proportion of double-object and prepositional object dative responses as a function of double-object, prepositional locative and prepositional object primes (Bock & Loebell, 1990: Experiment 1).

Prime type	Double-object dative responses	Prepositional object responses
prepositional object prime	68	32
prepositional locative prime	65	35
double-object prime	75	25

In addition, the POD targets were produced with less fluency compared to the DO datives, which manifested through delays in speaking, pause fillers (e.g. *mmm* and *ahh*) and repetitions. Such results are at odds with the findings obtained by Bock (1986)[34]. Recall that no preference was found in the production of POD and DOD datives after hearing intransitive primes. In fact, Bock detected 41% of POD

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[34] Interestingly, B&L refer to Bock's (1986) findings in their work to argue against a possibility that that DOD primes affected the responses while POD primes might have not (pp.16-17).

responses and 37% DOD responses in the intransitive condition. How can these results be reconciled?

I suggest that such apparent preference is none other than the effect of asymmetric distribution of the animacy the targets. The agent was [+animate], the beneficiary was [+animate/+human] and the theme was [-inanimate]. It comes as no surprise that the participants produced a high number of DOD responses across the condition and that the lack of fluency was observed in the production of POD responses – the given distribution of animacy in the target evets required agent-beneficiary-theme order, which the majority of the responses followed. Furthermore, it could be proposed that the difference found between the DOD control and the other two conditions was due to the priming effects triggered by the DOD structure. Rather than saying that the POD and the locative primes were equally suitable as primes for POD targets and therefore yielded similar proportion of such responses, as B&L hypothesised, I suggest that they were in fact equally ineffective at overriding the liner order defined by the APH. The important point to be made here is that without a true baseline it is impossible to resolve this issue.

Despite the fact that these results offer support to the form-mapping account of sentence representation B&L argue for, the researchers highlight that these data do not provide enough evidence to reject the meaning-mapping approach as the conceptual features of the locative and the POD primes may have varied insufficiently. The issue was addressed by conducting the second experiment where B&L tested full passive primes (e.g. *The construction worker was hit by the bulldozer*; *The 747 was alerted by the airport's control tower*), intransitive primes with a locative *by-*phrase (e.g. *The construction worker was digging by the bulldozer*; *The 747 was landing by the airport's control tower*) and active control primes (e.g. *The construction worker drove the bulldozer*; *The 747 radioed the airport's control tower*). The participants were required to repeat each prime after hearing it (no images were shown for the primes) and then proceed with describing a target image. All targets depicted transitive events. B&L argue that while the passive and the locative primes follow the same phrase structure, meaning that both have identical linear constituent order of [noun phase]-[verb phrase]-[prepositional phrase] (NP-V-PP), there is no doubt that they differ conceptually.

The aim of this experiment was to establish whether the target responses were affected by the primes' constituent structure only, or whether they were influenced by

the primes' conceptual aspects, i.e. their thematic structure. In the case of the former, both types of prime, full passive and locative, would elicit more full passive targets than the active primes. In the case of the latter, the proportion of full passive responses would only increase in the passive, but not in the locative condition.

The results showed that there were significantly more passives produced after hearing passive (79%) and locative primes (80%) than after hearing active primes (74%) (the analysis was run only on the passive and active responses; all other constructions were excluded). The researchers interpret the results as evidence for the form-mapping account, treating the data as verification of purely structural nature of priming, the effect of which are devoid from conceptual, thematic or pragmatic features of an utterance. Specifically, the researchers argue that constituent structure is primed whether the thematic roles of the prime matches that of the target or not.

This interpretation of the results raises an important point. It supports the idea that priming does not "see" beyond the linear surface representation of phrases, suggesting that it is "blind" to the argument structure of the verbs in primes, since the argument-structural distinctions between the passive and the locative structure were not picked up by priming. For several decades since their publishing, these findings have been cited in the subsequent priming literature to argue for the independence of abstract syntax from metrical and thematic aspects of a sentence in language processing as a whole (e.g. Huang, Pickering, Yang, Wang, Branigan, 2016; Dell & Ferreira, 2016 and Pickering & Ferreira, 2008 for overview), although, admittedly, there are some studies which suggest otherwise (Chang et.al, 2003; Pappert & Pechmann, 2014).

It is crucial to highlight, however, that *abstract syntax* in this context has been taken to mean *linear constituent structure*, and, consequently, Constituent Structure Priming has been elevated to the status of syntactic priming. The question is therefore, whether truly syntactic priming exists. Judging by the B&L finings, the answer is – no. Before going ahead to explore the issue experimentally, let us first outline the syntactic aspects of a sentence which, following B&L's findings, seem irrelevant for priming. As discussed in Chapter 1, while the constituent structures of the passive and locative primes were indeed identical (i.e. NP-V-PP), their syntactic structures were not the same. One of the most important differences between them is the foot-of-the-chain position of the subject argument (see Figure 3. 1 below).

Figure 3. 1 Intransitive and full passive constructions: syntactic representation.

(a) Full passive:
The construction worker was hit by the bulldozer.
Surface constituent structure:
NP-aux-V-PP

(b) Intransitive:
The construction worker was digging by the bulldozer.
Surface constituent structure:
NP-aux-V-PP
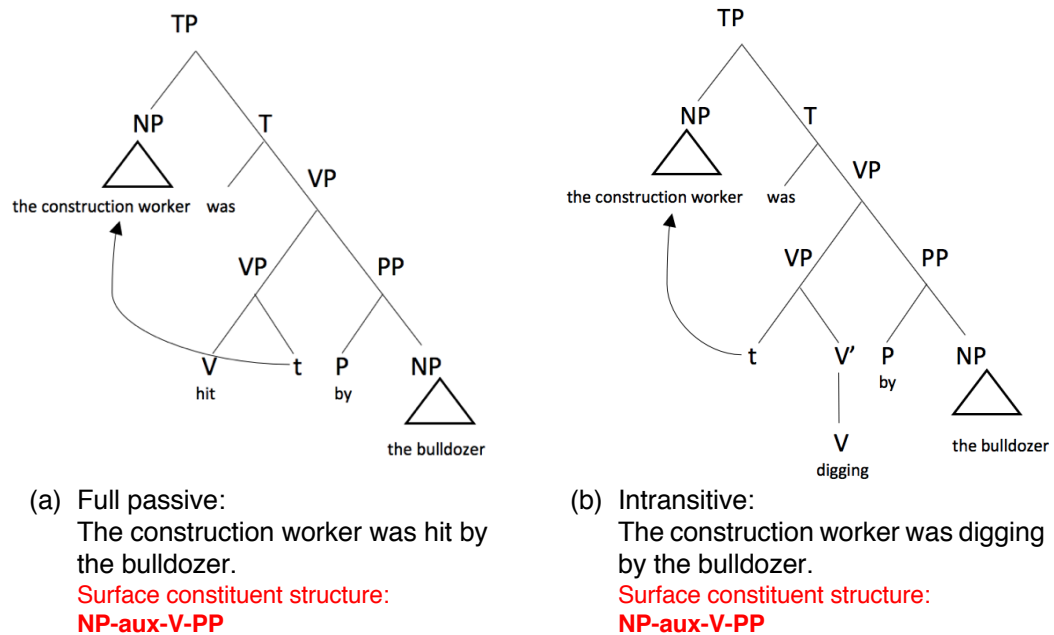
As established in Chapter 1, the syntactic behaviour of a verb and its argument(s), namely their hierarchical positions in a sentence structure and the movement they undergo, is by large defined by the verb's argument structure, its lexical property which is available at the lemma stratum. While the passive verb (e.g. *hit* as in *The construction worker was hit by the bulldozer*) and the unergative verbs (e.g. *dig* as in *The construction worker was digging by the bulldozer*) both have a single argument, in the case of the former it is an internal argument, and in the case of the latter it is an external argument. Consequently, in the passive the copy/trace of the subject constituent prior to movement is the complement of the verb *hit*, while in the locative structure it is in the Spec(ifier)VP position.

If we consider the locative prime that contained an unaccusative verb (e.g. *land* as in *The 747 was landing by the airport's control tower*), its argument structure is also distinct from the one found is a passive (e.g. *The 747 was alerted by the airport's control tower*), but in a more subtle way. Despite both having a single open internal argument and thus being identical in terms of the architecture of the movement chains within them, in the passive the external θ-role is suppressed (or saturated), but semantically interpreted, while in the locative unaccusative sentence it is eliminated altogether by expletivization, a lexical operation of reduction (Reinhart, 2002). Both operations are encoded in the argument structure of these verbs.

Another distinction stemming from the argument-structural differences between the two construction is to do with the status of the PP *by*-phase in the passive and the unaccusative sentence. While the PP in the unaccusative prime is a clear adjunct, as we have established earlier in sections 1.3.1 and 2.8.4, the PP in the passive has an exclusive intermediate status of an a-adjunct, partly combining the properties of arguments and adjuncts (Grimshaw, 1990). These distinctions could be represented as in Figure 1. 7, repeated in Figure 3. 2 below. What is important here is that while the two sentences follow the same surface constituent order as well as having identical syntactic structures as far as the foot- and head-of-the-chain positions are concerned (e.g. the subject's base position in both sentences is in the complement of V position), they are distinct from the argument-structural point of view.

Figure 3. 2 Syntactic representations of a passive and an unaccusative locative prime from Bock and Loebell (1990, Exp. 2); $\exists\underline{\theta}$ = existentially closed (saturated) external $\underline{\theta}$-role; $R\underline{\theta}$ = reduced (expletivized) external $\underline{\theta}$-role.

(a) The 747 was alerted by the airport's conrol tower.
Surface constituent structure:
NP-aux-V-PP

(b) The 747 was landing by the airport's control tower.
Surface constituent structure:
NP-aux-V-PP
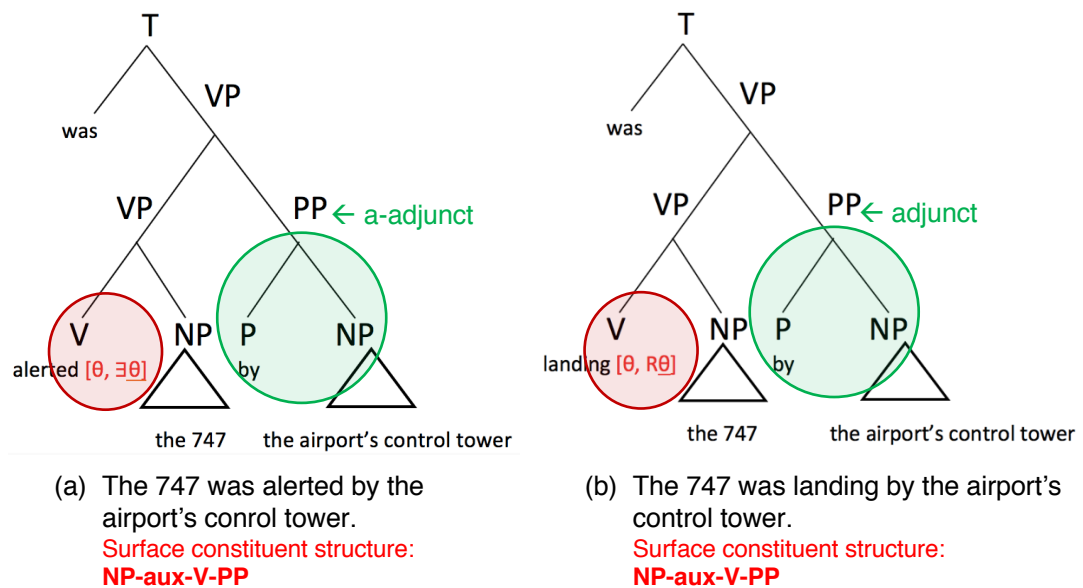
The results of B&L's second experiment suggest that the distinctions outlined above are ignored by speakers during a priming task. This, however, is at odds with a number of studies which showed the impact of semantic aspects on priming (Cai, Pickering & Branigan, 2012; Köhne, Pickering & Branigan, 2014; Pappert & Pechmann, 2014; Ziegler & Snedeker, 2018). For example, Ziegler and Snedeker (2018) found more prepositional dative target responses in the prepositional dative

condition (e.g. *The boy gave the lamp to the rooster*) than in the locative condition (e.g. *The boy lugged the lamp past the rooster*) despite the similarity in constituent structure the primes. In addition, the problem with B&L's original constituent-only priming claim is that it denies the effect of the passive prime over the influence of the locative prime, which is difficult to reconcile with the large body of subsequent experimental evidence supporting passive priming. So, how could these issues be settled? A closer look at the design of the B&L's experiment reveals potential confounds, which could be accountable for the observed effects.

The first issue is that the passive and the locative primes contained an auxiliary and a *by*-phrase, while the active controls did not (e.g. *The construction worker drove the bulldozer*). This makes the first two metrically more similar to each other than either is to the active primes, which, one could argue, can explain at least some of the priming effect found. Second, and the most important issue is that all target images depicted transitive events in which the intended [patient/theme] argument was human while the [cause/instrument/agent] argument was inanimate. As established, such a set up leads to an unequal prominence of arguments in a target sentence, thus promoting the production of passives. Indeed, the high proportion of passive produced across the three conditions (passive – 79%, locative – 80%) including the active (74%) attest to that. Note especially the proportion of passives in the active condition: almost three quarters of the responses were passive, despite an active prime structure. Recall that this passive bias also emerged in the same asymmetrical animacy context in the study conducted by Fleischer et.al. (2012) with Polish-English bilingual adults and in the experiment by Gámez and Vasilyeva (2015) with native English-speaking 4- to 6-year old children. The results could therefore be viewed as a reduction in otherwise naturally occurring passive responses in the active condition compared to the other two rather than as an increase of the passive targets in the passive and locative conditions compared to the active. As with the results of B&L's Experiment 1, the absence of a true baseline does not allow us to resolve this issue.

As noted earlier, the studies reviewed above have been used as the key piece of evidence to support the idea of syntactic autonomy (Pickering & Ferreira, 2008). Subsequent work in priming and sentence production heavily relied on these findings to defend the existence of the syntactic level of representation that is independent of conceptual, semantic or lexical features. However, the notion of syntactic autonomy referred to in this context is superficial as it is determined by mere surface constituent

ordering and does not take into consideration either the predicate's argument structure or any syntactic processes and mechanisms governing the derivation of sentences. The problems with the B&L's design discussed in this section do not allow to assess the true nature of syntactic priming. Thus, the inconclusiveness of B&L's results, particularly in relation to Experiment 2, highlights the necessity for an experiment which would control for animacy and humanness in targets and include a baseline against which the strength and the direction of priming effects could be measured. The studies reported in this chapter intended to address these issues.

3.2. The Present Study: Aims, Hypotheses and Predictions

The study contained of two priming experiments which were run with native English-speaking adults (Experiment 4) and 4- to 7-year old children (Experiment 5). Adopting Bock and Loebell's (1990, Exp. 2) design, full passives and intransitive constructions with a locative adjunct, were used as primes. Both constructions followed the identical NP-V-PP constituent order. The first critical change made to the original design was to replace the active condition with a no-prime baseline. The second key change was to manipulate and control for the animacy distribution in the targets. As in the three experiments discussed earlier in the thesis, the targets were of the two types: those with an equal prominence of arguments (EP) where both, the intended thematic subject and object, were inanimate, and those with an unequal prominence of arguments (UP) were the intended agent was inanimate while the patient was animate.

In this study I aimed to assess the claim that syntactic priming constitutes repetition of linear surface constituent order of a sentence. Another objective was to verify the proposal which stemmed from the argument prominence hierarchy hypothesis (Titov, 2012). The proposal was to attribute the results B&L obtained in Experiment 2 to the unequal distribution of animacy in the target events. The results of Experiments 1-3 reported in Chapter 2 have already provided a strong support to the claim that the animacy distribution in the targets of a priming task affects speakers' responses even when they are not exposed to primes (i.e. in the baseline). If the effects are observed not only in the passive condition, but, once again in the baseline and in the intransitive condition, it would allow us to maintain the proposed alternative explanation for the B&L's results.

An additional goal of the present enquiry was to explore any potential differences between the priming effect observed in mature speakers and young children. One could hypothesise that even if adults are indeed primed by syntactic aspects of a sentence which go beyond surface phrase order, children might behave differently. If a priming procedure conducted with children detects memory traces of the linear constituents presentation and nothing else, it is likely that in order to derive a sentence, children rely on this superficial aspect of syntax until their language system and/or non-linguistic cognitive functions, e.g. short-term memory, sufficiently mature to support sentence processing. An additional effect underpinned by the observation that less frequent constructions lead to stronger priming (Reitter et.al., 2011) might reveal magnified passive priming in the children compared to that found in the adults, since the passive is very infrequent in the child directed speech (Demuth, 1989). On the other hand, the passive priming effect might also be expected to diminish in children due to the general issues with its acquisition.

The following research questions were thus addressed in the study: *1. Is priming driven by constituent structure similarities between the prime and the target or is it the verb's argument structure that is retained and subsequently reproduced by speakers as part of a priming task? 2. Are the effects of animacy distribution in target events of a priming task comparable between intransitive and non-prime conditions?* In other words, *can the emergence of full passive responses in the locative condition of B&L's experiment be explained by the natural, APH-driven licencing of the passive rather than by constituent order priming? 3. Does children's syntactic behaviour differ from that of adults with respect to the above?*

Recall that the overarching hypothesis guiding the experimental work reported in the thesis is that *syntactic priming is sensitive to the argument-structural information which includes the number of arguments a verb can take, their prominence ranking as per the thematic and event structure hierarchy, and the type of valence-changing operations the verb may be subject to.* In the two experiments presented in this chapter I address one aspect of the main hypothesis, namely, that *speakers are sensitive to the type of the valence-changing operation a predicate undergoes, while the constituent order repetition observed in a priming task is a collateral effect of this sensitivity (H1).* At least two argument-structural properties could thus be identified as relevant for priming: (1) the type of lexical operation applied to the external argument (expletivization in unaccusatives vs. suppression in

passives) as the verb's valence changes; (2) the status of the PP *by*-phrase, where (2) is directly linked to (1) since the suppressed external argument of the passive licences the *by*-phrase that has an exclusive a-argument status (Grimshaw, 1990).

The null hypothesis (*H0*) is that *priming functions only on the level of surface constituent order and is blind to the predicate-argument structure of a sentence (Constituent Structure Priming hypothesis)*. The last hypothesis (*H2*) remained the same as that tested in Experiments 1-3, and it is that *the animacy distribution in the targets is a strong predictor of the sentence structure produced in a priming task (the APH-based hypothesis)*. Here, however, the emphasis was on a possibility of the APH effects in the targets produced after hearing intransitive primes.

These hypotheses make the following predictions. *H0* predicts an increase of full passive responses in the locative and passive conditions compared to the baseline irrespective of the animacy distribution in the targets. Following *H1*, the increase in the production of full passives is only expected in the passive condition, but not the locative condition. *H2* predicts a higher proportion of full passive responses produced for the UP targets compared to the proportion of full passives produced for the EP targets. In addition, following the results of Experiment 1, 2 and 3, more agentless structures such as unaccusatives, short passives and copular constructions are expected in response to the UP targets compared to the EP targets.

3.3. Experiment 4: English-speaking adults

3.3.1. Methods

3.3.1.1. Participants

The experiment was first piloted online using Opinio survey platform (Exp. 4a). 56 native English speakers (mean age = 32, 7 male) were recruited for the pilot study through the University College London Psychology Pool and a number of social media platforms. Written consent was sought from the participants before they completed the online task. The participants were randomly assigned to one of the three conditions, baseline (n = 24), locative (n = 18) or passive (n = 14).

Further 68 native speakers of English (mean age = 20; 8 male) were recruited for the lab-based experiment (Exp. 4b) from the University College London and the University of Roehampton. Verbal and written consent was obtained from the participants. The varieties of English spoken by the participants included both American and British English. The participants received credits for participation. One participant was excluded because English was not his first language, and one because it transpired that he vaguely understood the goal of the experiment. The participants were randomly assigned to one of the three conditions: baseline (n = 22), passive (n = 22) or locative (n = 22).

Based on the participants' comments at the end of the testing, the aim of the study was not evident to them. The vast majority of the participants reported that they thought the task examined memory during language production. Some suggested that the study explored the use of particular articles, adjectives or a tense. One participant from the passive condition reported that often he involuntary described the images in an unnatural or even ungrammatical way because he "couldn't help himself" or because the descriptions did not come easy to him; while another participant, also from the passive condition, noted that they were affected by hearing the experimenter's descriptions because it indicated to them that they had to be "more elaborate" in their own descriptions. Incidentally, these two participants produced a high proportion of full passives, so it could be suggested that they reflected on their own performance, considering their behaviour somewhat unusual. Importantly, it is evident that such behaviour was not conscious.

3.3.1.2.   Design

The design of the present study adopted B&L's experiment in a sense that it utilised the same two key structures, full passives and intransitives with a locative adjunct (henceforth locative), as well as using a picture-description priming procedure, but the original design otherwise undergone several substantial adjustments which are outlined below.

Despite the general trend in priming work with adults to present all priming conditions to every participant, there was a number of reasons for choosing a between-subject design for the current experiment. First, such design was pursued

in attempt to prevent cross-prime contamination; and although the use of fillers generally takes care of this matter, it could not guarantee that such possibility would be eliminated altogether when each participant was exposed to all conditions (see Bock, 1989). It is also worth noting that while those priming experiments that explore duration and strength of priming might aim to avoid cumulative priming effect and thus adopt a within-subject design, this was not a concern in the current study. Second, it provided an opportunity to run a true baseline condition where targets were described with no prior exposure to primes. This no-prime baseline replaced B&L's active control condition. A potential cumulative priming effect as well as self-priming, which was of course possible and more likely when a participant is exposed to the same priming structure within a set, were deemed of less importance compared to the issue of not having a baseline. Third, this design permitted to compare the responses to lexically identical target items after hearing different primes. Finally, a between-subject design was a necessary amendment because it allowed a direct comparison between the adult and the child data. The majority of priming experiments involving children used a between subject approach as it minimises problems related to fatigue and attention span in young participants.

Another change to the B&L design was to include prime images with the prime sentences. Recall that in B&L study no pictures of the events described by the primes were shown. Not having pictures to accompany the primes could have potentially led to construing the full passive primes like *The construction worker was hit by the bulldozer* as short passives with a locative *by*-phrase adjunct. To avoid such possibility as well as to accommodate the collection of child data, the experiment included the depiction of the prime events.

The most significant change to the B&L's methodology was the way animacy was manipulated in the targets. Recall that in the original design all target images had animate or human patient/theme and inanimate cause/instrument/agent. Such inequality in arguments' prominence was likely to affect the choice of construction selected for a target response and to promote the production of passives regardless of the priming condition. Thus, the animacy of potential arguments in the targets was controlled and manipulated (see below for details).

The study had four condition: passive, locative and no-prime baseline condition.

3.3.1.3. Materials
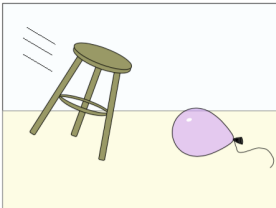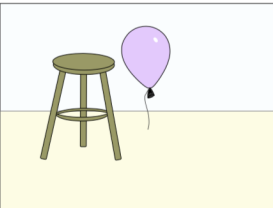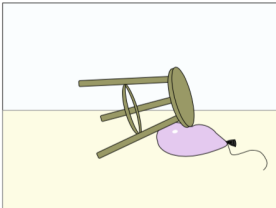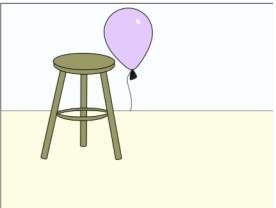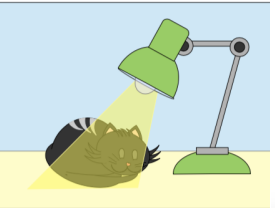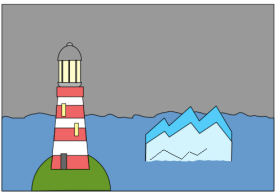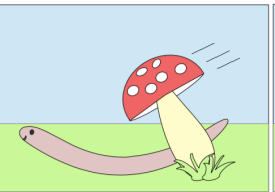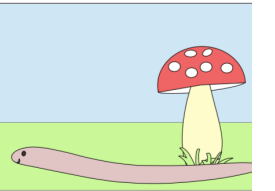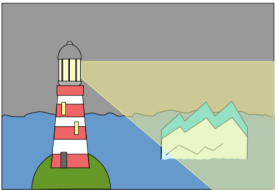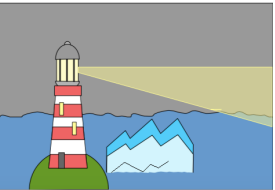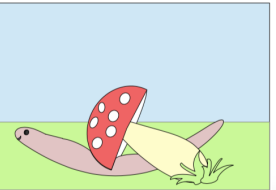
For the online pilot (Exp. 4a) the prime and target evens were presented in two pictures, first displaying the beginning of an event and second its end/result as was the case in Experiments 1, 2 and 3. For the lab-based experiment (Exp. 4b) the stimuli were displayed on a 13" laptop screen; the start and the end of each prime and target event was shown one after another in succession, creating a simple schematic two-frame animated sequence.

Two sets of experimental items were created – one prime set for the experimenter and one target set for the participants. The prime set had three variants, one for each condition. The examples are provided in Table 3. 3 (see Appendix 2 for the full set of stimuli). 16 prime images depicted transitive events used in the first three experiments were amended for this priming task. Half of the transitive primes contained the arguments of an equal interpretive prominence (EP), having an inanimate thematic subject (agent) and an inanimate thematic object (patient/theme); and in the other half the arguments were of an unequal prominence (UP), i.e. an agent was inanimate, and a patient was animate

Further 16 prime images were created for the locative condition. Those displayed the same entities as in the transitive primes but depicted intransitive events and their locations (see Table 3. 3). Of those 16 intransitive prime events, 8 were depicted in a single image (laying and standing events) and 8 were presented as animated two-frame sequences (hovering and floating events). The manner of presentation (animation vs. still image) did not appear to affect the participants' comprehension of the depicted events. As in the transitive primes, in half of the locative primes both the subject and the [location] NP were inanimate, and in the rest, the subject was animate, and the [location] NP remained inanimate.

Each prime image was accompanied either by a passive sentence (e.g. *The balloon was squashed by the stool*) in the passive condition, or by an intransitive construction that contained a locative adjunct in the locative condition (e.g. *The balloon was hovering by the stool*) (see examples in Table 3. 3). In the no-prime baseline, the primes were viewed in silence (an equal number of intransitive and locative events were used for the primes in the baseline). All nouns in the primes were preceded by the definite article to establish them as given and referential.

Table 3. 3 Examples of primes, Experiment 4.

Transitive prime event	Intransitive (locative) prime event	Transitive prime event	Intransitive (locative) prime event
EP primes		UP primes	
The balloon was squashed by the stool.	*The balloon was hovering by the stool.*	*The kitten was illuminated by the lamp.*	*The kitten was laying by the lamp.*

The iceberg was illuminated by the lighthouse.	*The iceberg was floating by the lighthouse.*	*The worm was squashed by the mushroom.*	*The worm was laying by the mushroom.*

The transitive prime sentences contained two-place argument verbs *squash*, *scratch*, *cover* and *illuminate*, each of which were repeated four times with different agent and theme referents.

The intransitive prime sentences contained the verbs *lay*, *stand*, *float* and *hover*, also repeated four times with different referents. The verb selection in this case was

159

a little more complicated. While the primes in B&L's study contained both unaccusative verbs and unergative verbs, only unaccusative verbs were chosen for the present experiment. This was done to allow for a more refined comparison between the primes, since unaccusatives and passives are the closest verb classes in terms of their argument structure, having a single internal theta-role, while the argument of an unergative verb is external. The choice of verbs selected for the intransitive primes was greatly limited by the fact that the intransitive events selected had to contain the same referents used for the transitive event primes. In addition, they had to be easily recognised in a basic animation suitable not only for adults, but also for young children.

To establish the exact argument-structural status of the four prime verbs, the standard diagnostic tests for unaccusivity were necessary to administer. Dabrowska (2016) outlined six diagnostics widely accepted in the literature (Alexiadou, Anagnostopoulou, Everaert, 2004; Burzio, 1986; Levin & Rappaport Hovav, 1995): (i) unaccusatives can undergo causative-inchoative alteration, while unergative cannot, see (10) below; (ii) unaccusatives are compatible with resultative phrases, while unergatives are not as in (11), the exceptions, however, are the stative verbs, e.g. *remain*, and inherently directed motion verbs, e.g. *arrive*, *come*, *escape*; (iii) unaccusatives, unlike unergatives, can appear in *there*-insertion constructions, see (12); (iv) prenominal participle adjectives can be formed from unaccusative verbs, but not from unergative verbs, see (13), although such adjectives can only be formed from telic verbs; (v) unaccusative, but not unergatives can appear in the locative inversion constructions, see (14), but for some verbs, particularly those which denote a change of state, such as *melt*, this test does not apply; (vi) in languages such as German, Dutch, French and Italian, unaccusative verbs select auxiliary *be*, and unergative verbs select *have*, see (15) for examples Dabrowska (2016: 65) provides from German. The last test has two exceptions. First, the choice of the auxiliary depends on the telicity of a given verb, i.e. *be* is used only with telic verbs and have with atelic (Everaert, 2004). Second, as noted by Dabrowska (2016), some researchers argue against the two-way split, proposing the auxiliary selection hierarchy which specifies the probability of a verb accepting either *be* or *have* (Sorace, 2000).

10. (a) The door opened.   unaccusative

        Peter opened the door.

    (b) The girl laughed.   unergative

        *The mother laughed the girl.

11. (a) The base broke into smitheries.   unaccusative

    (b) *The singer performed tired.   unergative

12. (a) The helicopter landed in the field.   unaccusative

        There landed a helicopter in the field.

    (c) A choir sang in the garden.   unergative

        *There sang a choir in the garden.

13. (a) a frozen lake   unaccusative

    (b) *a jumped boy   unergative

14. (a) In the village came hunger.   unaccusative

    (b) In the playground laughed the children.   unergative

15. (a) Ich bin angekommen.   unaccusative

        I   am arrived

        I have arrived.

                    Dabrowska (2016: 65)

    (b) Er hat geschlafen.   unergative

        He has slept

                    Dabrowska (2016: 65)

    The five diagnostics available in English were run with the verbs selected for
the primes *lay, stand, float* and *hover*. As seen from 16-20, the verbs appear to pass

161

the causative alternation (16), *there*-insertion (18) and locative inversion tests (20), although their ability to form participle adjectives seems problematic (19) and they are incompatible with resultative phrases (17). An attempt to run the auxiliary selection diagnostic with German equivalents of these verbs do not provide illuminating results, see (21): while *lay* is clearly takes only *haben* (have), stand and *float* might accept both *sein* (be) and *haben*, depending on the exact meaning of the verb and the dialect adopted; *hover* present a challenge for German as it is rarely used in Perfekt Präteritum, which means that the auxiliary would be inapplicable.

16. *Causative alternation*

   (a) The book laid on the table
       The teacher laid the book on the table.

   (b) The bucket stood by the door.
       Granma stood the bucket by the door.

   (c) The boat floated in the water.
       The boy floated the boat on the water.

   (d) The balloon hovered in the air.
       The girl hovered the balloon above her head.

17. *Compatibility with resultative phrases*

   (a) *The princess laid bored.

   (c) *The schoolboy stood sick.

   (d) *A piece of wood floated in the water mouldy.

   (e) *A climber hovered on a rope tired.

18. *'There'-insertion*

   (a) There laid a letter on the stool.

   (b) There stood a glorious ship in the harbour.

   (a) There floated a bottle in the pond.

   (b) There hovered a rain cloud above the mountain.
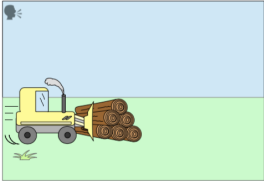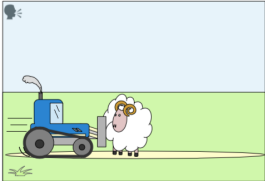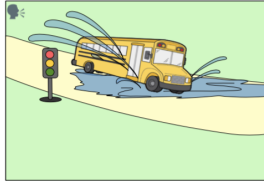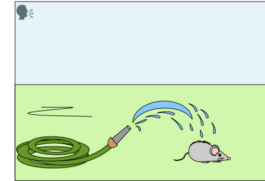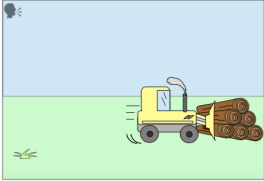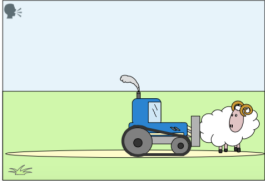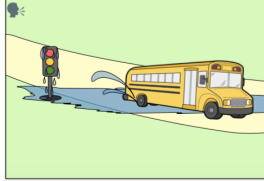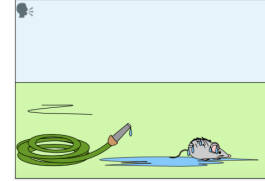
19. *Formation of prenominal participle adjectives*

(a) ?This was done to prevent detachment of the laid tablecloth.

(b) ?In the open filed he saw a stood tree.

(c) ?The boy and the girl are on a floated boat, rowing.

(d) ?The hovered object will appear over the image.

20. *Locative inversion*

(a) On the floor laid several torn pages.

(b) On the hill stood a lonely house.

(c) Into the river floated some polluted waste.

(d) In the sky hovered a kite.

21. (a) Sein eigener Schatten hat sich vor   ihn gelegt.
His own   shadow has self before him laid
His own shadow laid before him.

(b) Das Glass ist/hat im Regal gestanded.
The jar   is/has on shelf stood
The jar stood on the shelf.

(c) Die Flasche ist/hat im Wasser getrieben.
The bottle   is/has in water floated
The bottle floated in the water.

However, note that all the diagnostics apart from the causative alternation and *there*-insertion tests have exceptions. Interestingly, Levin & Rappaport Hovav (1995: 151) argue that in English 'the strongest evidence for an unaccusative classification of the simple position verbs […] comes from their behaviour in the *there*-insertion of the form "there V NP PP" ' and that such construction are non-agentive. Following Levin & Rappaport Hovav, the verbs *lay*, *stand*, *float* and *hover* could, thus, could in

principle be classified as unaccusative, although not without caution[35].

16 targets used in the previous three experiments were amended for this study and paired with primes (see examples in Table 3. 4, see Appendix 2 for the full set of stimuli). As with the primes, the targets were presented as simple two-frame animations depicting transitive events of *lifting*, *pushing*, *splashing* and *drying*, each repeated four times with different agent and theme entities.

Table 3. 4 Examples of targets, Experiment 4b.

Pushing		Splashing	
EP Target	UP Target	EP Target	UP Target
Bulldozer pushing logs.	Tractor pushing sheep.	Bus splashing traffic-light.	Hose splashing mouse.

Following a pilot run, a small symbol of a 'talking head' was added to the top left corner of each target to indicate that these animations were for the participant to describe. While this did not appear to be an issue in the previous experiments where the printed prime and target pictures were used, in this digitalised version of the experiment the general pace of the procedure was much faster, therefore such aid was necessary for the participants, and particularly important for the baseline condition, where only every second animation appearing on the screen was for them to describe.

In half of the targets the intended arguments were of an equal prominence (EP),

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[35] It must also be noted that the verbs *lay* and *stand* could be interpreted as unergatives in those cases where their argument is animate, because the action in these cases may be considered intentional.

i.e. both the thematic object and subject were inanimate, and in the rest – the targets followed an unequal prominence of arguments (UP), where the agent was inanimate, and the patient was animate.

In order to establish how primes and targets should be paired in this experiment, the priming data collected from English-speaking children (Experiment 3) were examined in terms of the potential influence of match/mismatch in the distribution of animacy between the primes and the targets. Recall that Experiment 3 had the following four prime-target pairings: EP prime-EP target, UP prime-UP target, EP prime-UP target, UP prime-EP target. An ANOVA was run on the proportion of passive responses with a between-subject factor of condition (three levels: passive, active and baseline) and a within-subject factor of prime-target paring type (four levels: EP prime-EP target, UP prime-UP target, EP prime-UP target, UP prime-EP target). The analysis returned insignificant results demonstrating that the participants' responses were not affected by the match/mismatch of the animacy distribution between the primes and the targets. Following this exercise, in the present Experiment 4, the primes and targets were matched for animacy distribution. This meant that the EP primes were always followed by the EP targets and the UP primes were always followed the UP targets.

Each passive and locative prime presenting the same entities was paired up with a specific target picture, and this set-up stayed unchanged, e.g. a prime containing a worm and a mushroom in either of the two conditions was always followed by a target depicting a tractor pushing a sheep.

The same 80 fillers used in Experiment 1 were incorporated in the experimental set: 40 as the filler primes (4 of which repeated) and 40 as the filler targets (4 of which repeated) (see examples in Table 2. 11). These items contained drawings of objects and simple intransitive actions, e.g. a duck swimming.

The items were presented in a pseudo-randomised order ensuring that there was a minimum of two filler prime-target pairs between the experimental items and that for each of the four primes containing the same verb there was a target that could be described with one of the four target verbs. Two item lists were created: half of the participants in each condition were exposed to list 1, and the other half received list 2. This aspect, an as an additional analysis showed, did not affect the responses.

3.3.1.4.　　　　Procedure

The online pilot (Exp. 4a) started with an introduction and an explanation of the procedure, followed by a brief training (see the script in Appendix 2a). In the passive and locative conditions each prime image was accompanied by a prime sentence (either passive or intransitive with a locative adjunct) and the participants were instructed to read it and verify whether the description matched the depicted event by clicking "yes" or "no". This was designed to encourage the participants to read the primes carefully. All prime sentences matched the depicted events, only some of the filler sentences mismatched the pictures. In the baseline condition, the prime images were presented without a description, but the participants were asked to pay attention to them nevertheless, and when requested, verify whether they had seen the image earlier in the task by clicking "yes" or "no". Only some of the fillers, but none of the prime event pictures were repeated. The target images, including the filler targets, were displayed without descriptions and the participants were instructed to type appropriate descriptions using simple full sentences in the space provided as quickly as possible without paying much attention to the punctuation and spelling.

The main experiment (Exp. 4b) was run individually, in a quiet room. The participants and the experimenter took turns to describe events and objects presented either in single images or in schematic animations on a 13" laptop screen. The experimenter's descriptions were scripted to follow a given prime construction: a full passive in the passive condition and an intransitive with locative adjunct in the locative condition. In the baseline the participants viewed the prime events in silence. The participants were instructed to describe the images and animations as quickly as possible making sure that events are described with full sentences. One-word descriptions of objects were said to be acceptable.

A short training was included prior to testing. The training included three prime-target pairs: one of them presented objects and the other two presented events. An additional memory task was introduced as a distractor: the participants were asked to look carefully at all the images and indicate when they notice repeats. Only the filler images were used for repetitions.

The procedure lasted approximate between 10 and 20 minutes. The responses were audio-recorded, transcribed and coded for analysis.

3.3.2.   Coding

A response was coded as *full passive (FP)* if it contained the intended thematic object (patient/theme) in the subject position, followed by an auxiliary (contracted auxiliary form was also accepted), the verb in past participle form and the intended thematic subject (agent) in a *by*-phrase. Both *be*- and *get*-passives were accepted, although the latter were a rare occasion. A category of *agentless constructions* incorporated short passives (i.e. the passives with a missing *by*-phrase), unaccusative responses (i.e. those where the intended patient/theme was in the subject position and followed by an unaccusative verb) and copular constructions (i.e. those where the intended patient/theme was in the subject position and followed by an auxiliary and an adjective). This category was included to investigate the effect of animacy in targets. The rest of the responses, including transitive active constructions and semantically unfaithful utterances, were coded as *other*.

3.3.3.   Results

The summary of the results for online pilot and the lab-based experiment is in Table 3. 5 below.

Table 3. 5 Proportion of full passive, agentless and 'other' responses produced across the conditions by the English-speaking adults, Experiment 4a (online) and 4b (lab-based).

condition	Full passives		Agentless		Other	
	online	lab-based	online	lab-based	online	Lab-based
baseline (n=24/22)	10.4 (40)	18.2 (64)	4.7 (18)	22.4 (79)	84.9 (326)	59.4 (209)
locative (n=18/22)	11.1 (32)	19.9 (70)	7.3 (21)	13.9 (49)	81.6 (235)	66.2 (233)
passive (n=14/22)	28.6 (64)	49.2 (173)	7.1 (16)	14.8 (52)	64.3 (144)	36 (127)

A mixed effects ANOVA with on the proportion of full passive (FP) responses was run with a between subject factor of condition (3 levels: baseline, locative and passive) and within-subject factor of target type (2 levels: EP targets and UP targets)

167

on both data sets: the online pilot and the lab-based experiment. The analysis of the responses obtained from the online pilot returned a significant main effect of condition ($F_{(2, 53)} = 5.689$, $p = .006$, $\eta p^2 = .177$, Observed Power $= .844$)[36]. Bonferroni's multiple comparisons revealed that the effect was due to the higher proportion of FPs in the passive condition (M = 28.6) compared to the baseline (M = 10.4) (p = .008) and locative condition (M = 11.1) (p = .018). There was no difference in the baseline and the locative condition. The analysis also showed a main effect of target type ($F_{(1, 53)} = 34.796$, $p < .0001$, $\eta p^2 = .396$, Observed Power = 1.000), which, following the descriptive statistics, was due to significantly more full passives produced for the UP targets (M = 24.9) compared to the EP targets (M = 8.5). The condition*target type interaction was also significant ($F_{(2, 53)} = 3.701$, $p = .031$, $\eta p^2 = .123$, Observed Power = .655). The post hoc tests with Bonferroni corrections indicated that this was due to the larger difference in the FP responses between EP and UP targets in the passive condition and the locative conditions, compared to the baseline condition, where the difference was only marginally significant. See Figure 3. 3 below.

Figure 3. 3 Average proportion of full passive responses (FP) produced across the conditions by English-speaking adults, Experiment 4a, online study.
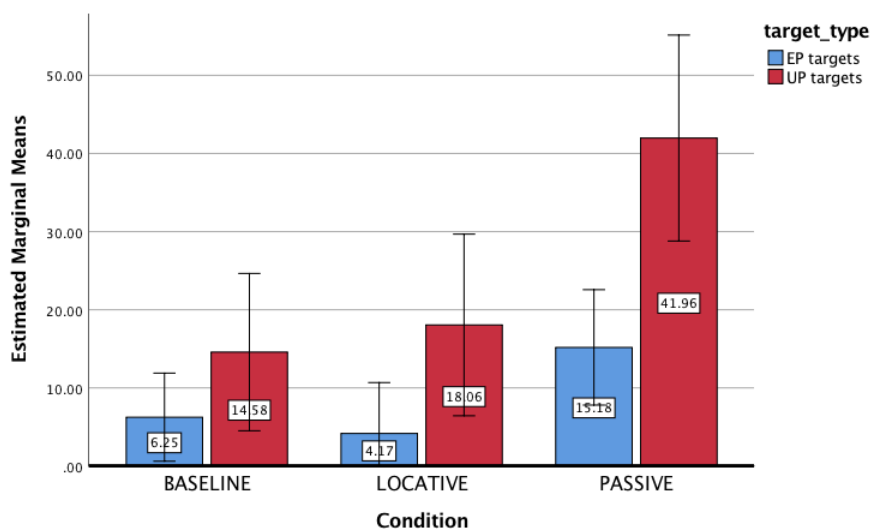
The results of the main experiment were very similar to the ones obtained from the online pilot. The analysis returned a highly significant main effect of condition (F

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[36] A marginal violation of the homogeneity of variances assumption in both online and lab-based data for FP responses for the EP targets, was considered acceptable, see footnote 24.

(2, 63) = 16.455, p < .0001, ηp 2 = .343, Observed Power = .999). Bonferroni's multiple comparisons revealed that it was due to a higher proportion of full passive responses in the passive condition (M = 49.2) compared to the baseline (M = 18.2) and the locative (M = 19.9) conditions. There was no difference between the locative and the baseline conditions. The analysis also showed a highly significant main effect of target type (F (1, 63) = 127.378, p < .001, ηp 2 = .669, Observed Power = 1.000), which was due to more FP responses produced for the UP targets (M = 44.9) than for the EP targets (M = 13.3). A significant condition*target type interaction (F (2, 63) = 5.354, p = 0.007, ηp 2 = .145, Observed Power = .824). The post hoc tests with Bonferroni corrections revealed that this was due to a larger difference between the proportion of FP produced for the UP (M = 71) and EP targets (M = 27.3) in the passive condition compared to this difference in the locative condition (UP: M = 30.6; EP: M = 9.1) and the baseline (UP: M = 32.9; EP: M = 3.4). The EP vs UP difference, however, was significant in every condition. The results are presented in Figure 3. 4.

Figure 3. 4 Average proportion of full passive responses (FP) produced across the conditions by English-speaking adults, Experiment 4b, lab-based study.
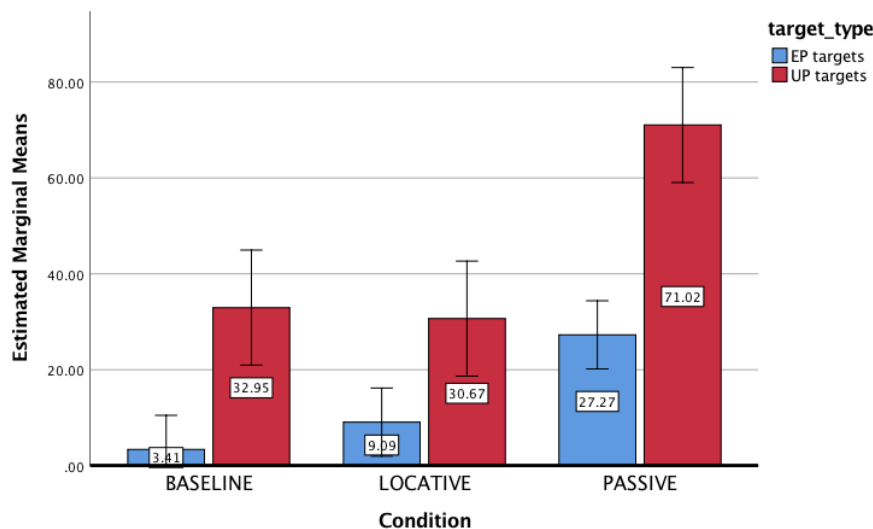
An ANOVA was also conducted on the proportion of agentless responses (unaccusatives, copular constructions and short passive). The analysis aimed to establish the effects of the animacy distribution in the targets on the structure selected for the descriptions. There was no main effect of condition either in the online data (p = .497) or in the lab-based data (p = .194), indicating that agentless responses did not vary across conditions. The effect of target type was not significant in the online

data (p = .574), but marginally significant in the lab-based data (F (1, 63) = 3.740, p = .058, ηp 2 = .056, Observed Power = .478) due to more agentless targets produced for the UP targets (M = 19.3) than for the EP targets (14.8). No interaction was detected in either of the data. See the results in Figure 3. 5 and Figure 3. 6. below.

Figure 3. 5 Average proportion of agentless responses produced across the conditions by English-speaking adults, Experiment 4a, online study.
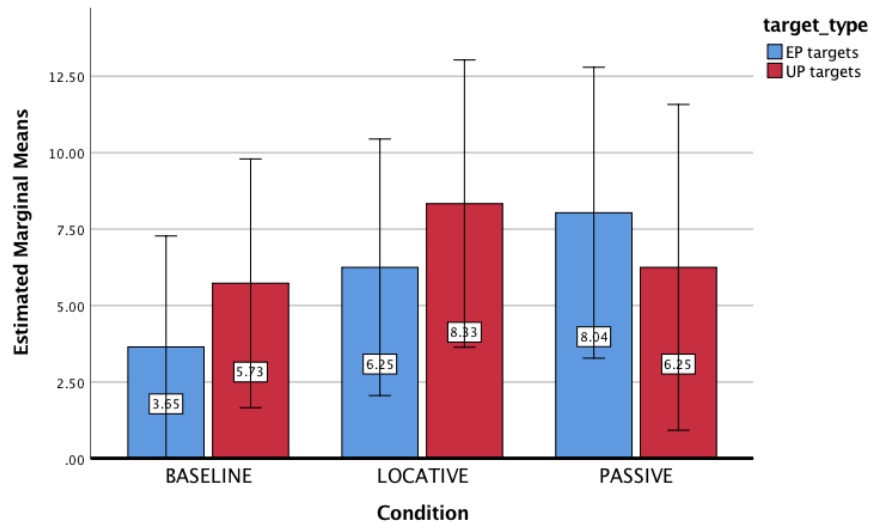
Figure 3. 6 Average proportion of agentless responses produced across the conditions by English-speaking adults, Experiment 4b, lab-based study.

3.3.4. Discussion
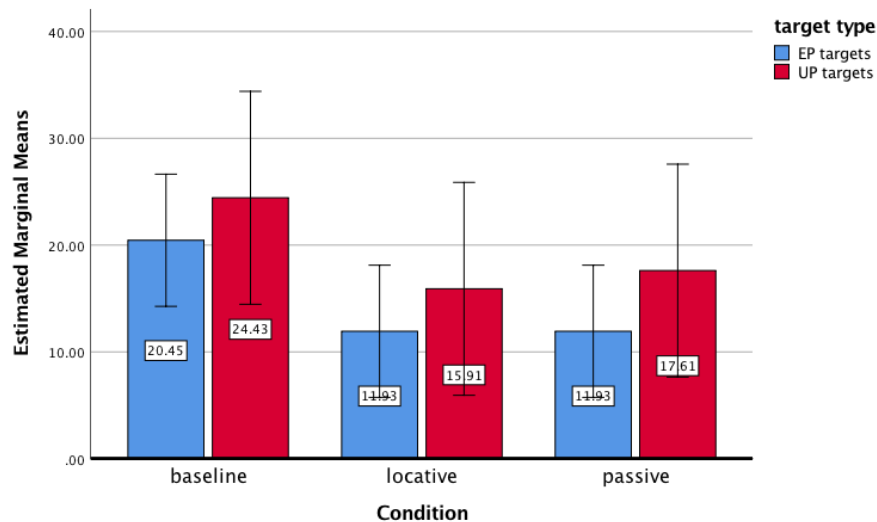
The results of Experiment 4a and 4b, which aimed to replicate Bock and Loebell's (1990) second study controlling for animacy in the target events, drastically differ from those obtained by Bock and Loebell themselves. A reliable passive priming effect was observed in the data: there were significantly more full passive (FP) responses in the passive condition compared the baseline and the locative condition. Importantly, the proportion of FPs observed in the locative condition remained the same as in the baseline. Contrary to Bock and Loebell's claim, such results suggest that priming is sensitive to the syntactic variations that go beyond surface constituent structure. Hearing unaccusative locative prime sentences like *The balloon was hovering by the stool* was not sufficient to evoke an increase in production of full passive targets despite the fact that their linear constituent structure (NP-aux-V-PP) as well as the surface syntax are identical to those in the passive (see Figure 3. 1).

Furthermore, these results suggest that priming may be sensitive to the information above and beyond underlying syntactic representations, i.e. the positions of constituents prior to movement. This is because even though the passive and the unaccusative primes are identical in this sense (see Figure 3. 2), this similarity did not yield passive priming in the locative condition. As discussed in section 3.1, the external argument of a passive verb undergoes saturation, in other words, it is suppressed. However, this argument is still interpreted semantically, although not realised syntactically (Reinhart, 2002). In addition, the suppressed external argument licences a special kind of *by*-phrase which carries a status of an a(rgument)-adjunct (Grimshaw, 1990). In a sentence with an unaccusative verb, on the other hand, the external θ-role is eliminated altogether by expletivization, a lexicon-based operation of reduction. Here, since the external argument is reduced, an a-adjunct cannot be licenced. Importantly, the two operations, saturation and expletivization, are in complementary distribution (Reinhart, 2002).

What is crucial for our discussion is that it is the argument structure of a verb that determines the type of valence-changing operation the verb would undergo. This highlights that the distinction between the passive and the unaccusative construction comes down to the differences in their argument-structural properties. Therefore, the increase of FPs in the passive but not in the locative condition suggests that syntactic

171

priming is indeed sensitive to the argument structure of the primes supporting Argument Structure Priming Hypothesis.

However, the findings should be treated with caution. While the prime verbs *lay*, *stand*, *float* and *hover* have been treated as unaccusatives, some of the unaccusivity diagnostics run on the verbs did not yield definitive results. If these prime verbs are considered as unergative intransitive rather than unaccusative intransitive, the foot-of-the-chain position of their grammatical subject would diverge from that of the passive. Recall that in an unergative construction the subject is originated in the specifier of VP position, while in a passive sentence it starts in the complement of V position (compare Figure 3. 1(b) and Figure 3. 2(b)). Following the above, the reason for the absence of the locative-to-passive priming could then be also attributed to the difference between the foot-of-the-chain position of the grammatical subject in the passive primes and its foot-of-the-chain position in the locative primes. Nevertheless, as discussed in Chapter 1, it is the argument structure of a predicate that gives rise to the underlying syntactic representations that reflect pre-movement positions of constituents, which allows us to maintain the Argument Structure Priming hypothesis.

Let us next consider the effect of animacy distribution in the targets. In section 3.1 I proposed an explanation for the results of B&L's Experiment 2, which was grounded in the APH hypothesis (Titov, 2012, 2017). Irrespective of the type of the prime received, significantly more passives were produced for the targets where the intended arguments had an unequal interpretive prominence (UP), having an animate patient and an inanimate agent, compared to those where the arguments were both inanimate, giving them an equal prominence status (EP). This pattern of responses entirely reflected the linear order imposed by the APH and is in line with the results observed in the Experiment 1, 2 and 3: the UP target events elicited a higher proportion of full passives in the baseline (pilot – 15%; lab-based – 33%), the locative (pilot – 18%; lab-based – 31%) and the passive condition (pilot – 42%, lab-based – 71%) compared to the target events where both entities were inanimate, which triggered only 3% of FPs in the baseline of the lab-based experiment (pilot – 6%), 9% of FPs in the locative (pilot – 4%) and 27% in the passive condition (pilot – 15%).

What is significant in these results, particularly in the view that I aimed to verify the proposal to attribute the results obtained by B&L (Exp. 2) to the unequal animacy distribution in the target events, was that the proportion of the UP FP responses in the present study was almost identical in the baseline and the locative conditions.

This demonstrates that full passives were just as likely descriptions for these events after hearing the locative primes as they were in the absence of the primes, reflecting the APH-driven licencing of the passive. These findings suggest that the increase of the FP responses in the locative condition compared to the active condition in B&L's study, cannot be attributed to the effect of the locative prime. Instead it should be treated as natural inclination to describe the events with inanimate agents and human patients with a full passive, the structure that is most suited to reflect the demands of the relevant interpretive prominence of the arguments in these events in English[37].

It should be pointed out that the results on FPs in the locative UP condition of the present experiment did not replicate those obtained in the locative condition of B&L's second experiment (31% vs 80% respectively). Adopting a within-subject design could be one of the reasons for the increase of the FP responses in the B&L's locative condition: although fillers were included in the experimental set, prime-contamination could still be an issue as the decay of priming effects had been shown to be slow (Hartsuiker, Bernolet, Schoonbaert, Speybroeck & Vanderelst, 2008; Hartsuiker & Kolk, 1998). Thus, hearing a passive prime could have made an impact which lasted over several sentences subsequently heard and produced after the passive prime itself. This explanation is plausible particularly considering that as per inverse frequency interaction effects account, an infrequent construction such as a passive would be expected to yield a stronger priming compared to more frequent constructions (Jaeger & Snider, 2013; Reitter et.al., 2011). In addition, as outlined earlier in the chapter, in the absence of images depicting the exact event described by the prime, it is reasonable to suggest that at least some passive primes in the B&L's study could have been perceived as short passives with a locative PP adjunct (e.g. *The 747 was alerted by the control tower* or *The construction worker was hit by the bulldozer*), which could have minimised the overall effect of the full passive. Finally, while in the present experiment all responses were analysed, recall that B&L removed the responses which did not follow a passive or an active structure from their analysis. This was likely to have skewed the proportional calculations, making it difficult to judge exactly which proportion of the overall responses were passives.

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[37] In addition to a highly significant target type effect observed in the full passive responses, the effect was also detected in the responses containing agentless constructions in Experiment 4b, although admittedly, it was marginal. The result further highlights the impact of animacy distribution on the structural choices participants make during a priming procedure.

It is noteworthy that there was an increase of the FP responses in the EP locative condition compared to the EP baseline (3% vs 9%); thus, although insignificant, these results go in the direction of the B&L's findings. Such increase could be explained by the lexical priming effect triggered by the presence of a *by*-phrase in the locative condition. Indeed, Ziegler, Bencini, Goldberg and Snedeker (2019) showed that that the production of full passives after hearing intransitive primes with a locative *by*-adjunct was higher than after the exposure to primes with a locative PP adjunct headed by preposition such as *at*, *near*, *below* and *around*.

Finally, it should be mentioned that the results of the online and the lab-based study follow very similar patterns, although the magnitude of priming was smaller in the latter compared to the former. This highlights that passive priming is not restricted to a priming context where the primes are explicitly produced by an experimenter.

3.4. Experiment 5: English-speaking children

An additional objective of the present study was to explore potential differences in priming effects between adults and children. If children display constituent structure priming effects, we may suggest that their syntactic processing differs qualitatively from that of adults' in the sense that they rely on superficial structural aspects like linear surface constituent order. Any similarities found between the child and the adult data could be used as evidence for children's linguistic competence, providing support to the continuity approach to language acquisition.

3.4.1. Methods

3.4.1.1. Participants

60 English-speaking children aged 4 to 7 (mean age = 6;0, 26 boys) from a London primary school participated in this study after obtaining written informed consent from their parents; verbal consent was sought from the children prior to testing. As indicated by parents, 34 of the participants were monolingual, while the rest had English as their first language and spoke an additional language at varying

levels of proficiency (languages included Bantu, Filipino, French, Igbo, Hungarian, Italian, Portuguese, Polish, Russian, Spanish, Thai, Vietnamese and Yoruba). To assess the level of perceptive grammar, the participants were tested on the Test for Receptive Grammar (TROG II) (Bishop, 2003). The assessment returned standardised scores ranging from just below average (70) to above average (130). The participants were randomly assigned to one of the three conditions: passive (n = 20), locative (n = 20) and baseline (n = 20).

3.4.1.2. Design and Materials

The experiment was run as a between-subject study (passive, locative and no-prime baseline condition). The materials created for Experiment 4b were used, although the fillers were omitted to minimise fatigue during the testing (see Appendix 2 for full set of items). As with the adults, the animacy in the targets was controlled and manipulated, i.e. half of the targets were EP, and the other half – UP. In addition, as in Experiment 2 and 3 with Russian- and English-speaking children, lexical warm-up items were introduced every two prime-target pairs (see example in Figure 2. 7). This was done to ensure that children understand the depicted events and to encourage children to use the intended verbs in their target descriptions.

3.4.1.3. Procedure

The children were tested individually in a quiet room at their school. The procedure lasted approximately 40 minutes (15-20 minutes for TROG II assessment and 15-20 minutes for priming test) and was identical to the one followed in Experiments 2 and 3 except that the stimuli were presented in a two-frame animation sequence format on a 13" laptop screen rather than as A-4 printed images. A short training was also included prior to testing. The training contained one warm-up item, which included 4 still images of intransitive events (e.g. rabbit jumping) followed by two training prime-target animated pairings, all of which depicted unrelated, non-monotransitive events (e.g. duck starting to swim, girl placing jar on stairs).

3.4.2. Coding

The coding approach utilised in Experiment 4 with English-speaking adults was used to analyse these data. A response was coded as full *passive (FP)* if it contained the intended patient/theme in the subject position, followed by an auxiliary (contracted auxiliary form was also accepted), the verb in past participle form and the intended agent in a *by*-phrase. Both *be*- and *get*-passives were accepted, the latter being the most frequent FP produced by the children. *Agentless constructions* were also analysed separately; this category, as with the adults included short passives, unaccusatives and copular constructions. The rest of the responses including active constructions and semantically unfaithful utterances were coded as *other*.

The results overall contained much less noise than the child data in Experiment 2 and 3 with the Russian and English children, and the majority of responses contained single utterances. However, on a rare occasion an unrelated utterance preceded a valid/semantically faithful response, e.g. *The owl went into the water and the fan dried it*. In these cases, the first part of the coordination was omitted, i.e. not considered for coding, while the second was coded accordingly. In the baseline, if any of the valid structures emerged in the third utterance, it was also coded accordingly (e.g. *The owl went into the water, and it was upset, and then the fan dried it*).

3.4.3. Results

The summary of the results is presented in Table 3. 1 below.

Table 3. 6 Proportion of full passive, agentless and 'other' responses produced across the conditions by the English-speaking children aged 4 to 7, Experiment 5.

condition	Full passive	Agentless	Other
baseline (n=20)	0.6 (2)	30.3 (97)	69.1 (221)
locative (n=20)	4.1 (13)	30.9 (99)	65.0 (208)
passive (n=20)	14.7 (47)	29.7 (95)	55.6 (178)

A mixed ANOVA was run on the full passive responses (FP) with a between subject factor of condition (3 levels: baseline, locative and passive) and a within subject factor of target type (2 levels: EP vs UP). The analysis showed a significant main effect of condition (F (2, 57) = 4.949, p = .010, ηp 2 = .148, Observed Power = .789)[38]. Bonferroni multiple comparisons tests indicated that this effect was due to a higher proportion of FP responses produced in the passive condition (M = 14.7) compared to the baseline (M = 0.6) (p = .011). There was no significant difference found between the baseline and the locative condition, and the difference between the passive and the locative condition (M = 4.06) was found marginally significant (p = .079). The analysis also showed a main effect of target type (F (1, 57) = 8.034, p = .006, ηp 2 = .124, Observed Power = .796), which was due to a higher proportion of FPs produced in response the UP targets (M = 8.5) compared to the EP targets (M = 4.4). The target type*condition was not significant (p = .301). See Figure 3. 7.

Figure 3. 7 Average proportion of full passive responses (FP) produced across the conditions by English-speaking children aged 4 to 7, Experiment 5.
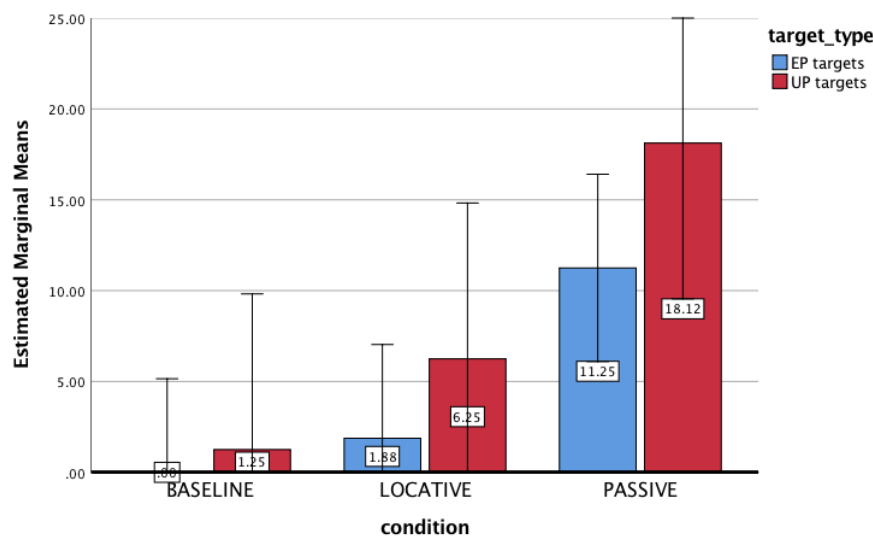
As with the adults' data, an ANOVA was also conducted on the proportion of agentless responses (short passives, unaccusatives and copular constructions combined), which was run to establish animacy distribution effects on sentence structure. The analysis returned a significant main effect of target type (F(1, 57) =

[38] Homogeneity of variances was marginally violated, but the violation was considered acceptable – see footnote 24.

4.377, p = .041, ηp 2 = .071, Observed Power = .539), which was due to a higher proportion of agentless descriptions in response to the UP targets (M = 32.92) compared to the EP targets (27.71). There was no main effect of condition (p = .987) or target type*condition interaction (p = 242) observed in the data. The results are presented in Figure 3. 8.

Figure 3. 8 Average proportion of agentless responses produced across the conditions by English-speaking children aged 4 to 7, Experiment 5.
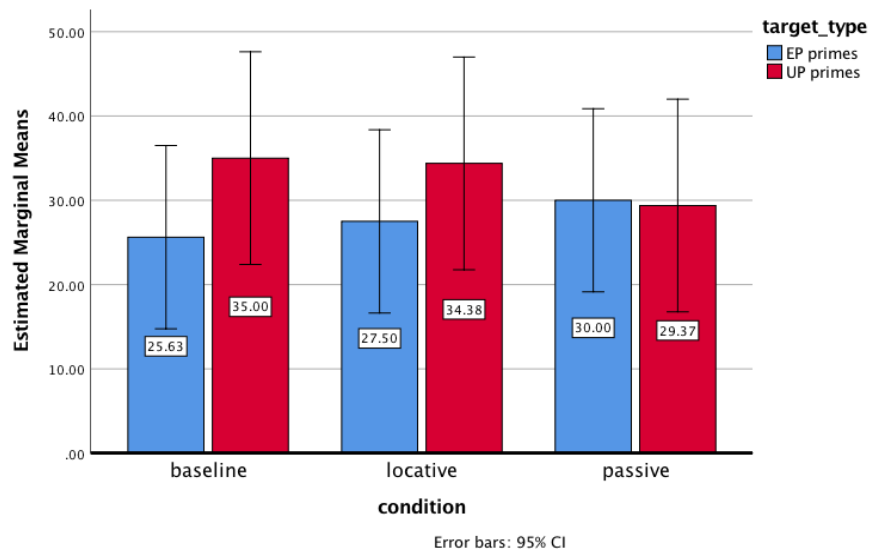
3.4.4.   Discussion

The results of the present priming experiment demonstrate a reliable priming effect of the passive despite the issues surrounding the acquisition of passives widely described in the literature. The children produced more passives after hearing passive primes compared to when no primes were heard and marginally more than after the exposure to the locative intransitive primes. At the same time, the proportion of FPs produced in the locative condition remained statistically indistinguishable from the baseline condition, reflecting the fact that young children were not inclined to produce full passives without prior exposure to the passive primes, which is in line with the findings demonstrating general issues in the acquisition of the passive. Importantly, hearing the primes which adhered to the same constituent structure as the that of the passive (NP-aux-V-PP), but differed from the passive in its argument-

structural aspects, did not trigger passive descriptions of the transitive even targets. This suggests that, just as the mature English speakers, 4- to -7-year old children were sensitive to the argument-structural status of the prime verbs.

The effect of animacy distribution in the targets was again strong in the data. The children produced more FP descriptions for the events which had animate patient/theme and inanimate agent/cause. The effects were particularly noticeable in the passive condition and less so in the locative and the baseline, owing to the fact that children avoided this structure altogether under conditions which do not prompt its production. The impact of the animacy distribution was more visible in the production of agentless constructions instead, with equally higher proportion of such targets produced for the UP events compared to the EP targets in the baseline and the locative conditions. Considering the issues with the acquisition of passives, it is not surprising that the relevant interpretive prominence of the intended arguments in the targets was often manifested in the production of the structures that are syntactically less complex that the passive.

3.5. General Discussion.

The study investigated the claim put forward by Bock and Loebell (1990) that syntactic priming constitutes repetition of linear surface phrasal order in a sentence. The proposal is based on the observation that in Bock and Loebell's study, passive primes (e.g. *The construction worker was hit by the bulldozer*) and intransitive construction primes containing a locative adjunct (e.g. *The construction worker was digging by the bulldozer*) triggered an equal increase of passive responses compared to active primes (e.g. *The construction worker drove the bulldozer*). The researchers propose that these results can be accounted for by the fact that the passive and the locative constructions are identical in their syntactic structure, and that priming is sensitive to it. Crucially, for Bock and Loebell, syntax boils down to the linear surface phrase order of a sentence, while other syntactic aspects which stem from its verb's argument structure, appear irrelevant.

Thus, one of the hypotheses tested in the two experiments was that priming could function on the level of surface constituent order only and is blind to the predicate-argument structure of primes (*H0*). The hypothesis predicted an equal

increase of passive responses in the passive and the locative conditions compared to the baseline. The prediction was not borne out. The results from the Experiments 4 and 5 with English speaking adults and children provided no support for the existence of this kind of priming. Despite the linear order of constituents in the locative primes (e.g. *The wasp was hovering by the apple*) being identical to those in the passive primes (e.g. *The wasp was squashed by the apple*), i.e. NP-aux-V-PP, the locative primes did not promote the production of full passive targets, while the passive primes did. The current findings demonstrate that, contrary to Bock and Loebell's (1990) claim, syntactic priming cannot be reduced to linear constituent order repetition. It could, therefore, be concluded that the similarity in constituent order is not sufficient for priming to occur.

On the main hypothesis (*H1*), speakers could be sensitive to the argument structure of the prime verb. It was proposed that there are at least two argument-structural properties that are susceptible to priming: (1) the type of lexical operation applied to the external argument when the valence of the verb changes; and (2) the status of the PP *by*-phrase, where (2) is directly linked to (1). On this hypothesis, any constituent order repetition observed in priming tasks would be a collateral effect of priming that is sensitive to these aspects. The results provide strong evidence in support of this view. The increase in the full passive responses after hearing the passive primes, but not after hearing the unaccusative primes, allows to isolate the argument-structural differences between these constructions as the information to which priming could be sensitive to.

As discussed in section 3.3.3, taking into account the somewhat uncertain results of the unaccusivity diagnostics run on the verbs utilised for the locative priming sentences (*lay*, *stand*, *float* and *hover*), the findings should be treated with some caution. Classifying these verbs as unergative rather than unaccusative would restrict the conclusions we could make based on the present data. As established earlier, the foot-of-the chain position of the grammatical subject in a passive is the complement of V, while in an unergative structure it is the specifier of VP. This is because the single argument of the verb in the former is internal, while in the latter – it is external. Although the pre-movement configurations are indeed determined by verbs' argument structure, one could argue that it is these underlying configurations alone that are subject to priming rather than broader argument-structural properties of prime verbs. The final experiment reported in Chapter 4 is an attempt to resolve the issue.

The second aim was to explore a possibility that the results obtained by Bock and Loebell (1990) (Exp. 2) could be attributed to the unequal animacy distribution in the target events. The proposal was based on the hypothesis which states that the linear order of arguments in a sentence is controlled by their relative interpretive prominence, where the prominence is defined by the four features that form the following hierarchy: ±presupposed > ±referential > ±human> ±animate (Titov, 2012, 2017). While the first three transitive priming experiments reported in Chapter 2 provided strong support to this hypothesis, demonstrating that the argument prominence in targets of a priming task were a strong predictor of the responses produced by the participants, the question remained whether the same effects would be observed in a non-transitive priming condition.

The adult as well as the child data obtained in this study demonstrated that animacy distribution in the targets greatly affects the structure selected for the target description. Importantly, these animacy effects were observed not only in the responses produced by the participants exposed to the transitive (passive) primes, but also in the responses of those who were exposed to the intransitive (locative) primes. Reflecting the natural licensing of the passive in English, a higher proportion of full passive responses was observed across the conditions when the intended patient in the target events was animate and the agent was inanimate, compared to when both referents were inanimate. Unequal prominence of arguments (as defined by animacy) in the target events guided the syntactic choices in the native English-speaking adults and 4- to 7-year olds alike. The above supports the proposal that the increase of the passive responses in the locative condition in B&L's study may indeed be attributed to the unequal animacy distribution of [±human] and [±animate] features in the target events. It could then be concluded that no appeal to the constituent priming effects were required to explain these data.

Another objective of the present study was to explore potential differences in the priming effects observed between adults and young children. Although the children generally produced less passives (passive cond. – 15%, locative cond. – 0.6%, baseline – 4%) than the adults (passive cond. – 29%, locative cond. – 11%, baseline – 10%), the patterns of responses were very similar. The above suggests that children's syntactic knowledge does not qualitatively differ from that of mature speakers. The children in the present study did not seem to rely on such superficial aspects of syntactic structure as linear surface constituent order. Instead, in spite of

their underdeveloped short-term memory capacity (see Gathercole & Hitch, 1993 for review), the children were susceptible to the argument-structural properties of the prime verbs. In addition, just like the adults, the children were affected by the animacy distribution in the targets whether they were exposed to the passive or the intransitive locative primes. The above provides evidence in support of the continuity approach to language acquisition.

3.6.   Conclusion

Based on the data obtained from the native speakers of English, both adults and children, the present study evaluated the Constituent Structure Priming hypothesis (*H0*) (Bock & Loebell, 1990) which states that priming functions on the level of surface constituent order and is blind to aspects which lay beyond this surface constituency. The data provided no evidence to the above. In contrast, the results supported the Argument Structure Priming Hypothesis, showing that speakers were sensitive to the argument structure of the verbs in the primes.

As discussed in Chapter 1, argument-structural properties form part of a predicate's lemma. The lemma node for a given verb and the relevant combinatorial nodes linked to it are activated when a prime sentence is being processed. This activation lasts long enough to impact on the early stages of sentence production, specifically, it affects the grammatical encoding phase. The data from the present experiments suggest that surface constituent structure, as one of the later steps of sentence processing, is not subject to priming. Thus, its repetition as part of a priming task may be epiphenomenal to the Argument Structure Priming effects.

The results of Experiments 4 and 5, which are consistent with the findings of Experiments 1-3 reported in Chapter 2, also provide support to the APH-based hypothesis that animacy distribution is a strong predictor of the sentence structure produced by speakers, be it part of a priming task or not.

Remarkably, the patters of responses observed in the adults and the child data are very similar, suggesting that in the process of sentence generation, young children, just like adults, rely on the prime verb's argument structure, rather than on the superficial linear order of constituents; and that children's sensitivity to the relative distribution of the animacy in a sentence matches that of adults.

4.   Argument Structure Priming: Evidence from Russian

4.1.   Introduction

Evidence from the English data reported in Chapter 3 strongly suggests that linear constituent structure in and of itself is not subject to priming and that the argument-structural properties of the prime play a crucial role in structural choices made by the participants during a priming procedure. However, these data address the constituent priming hypothesis in English only. In order to construct a better understanding of the mechanisms underpinning syntactic priming, the (linear surface) Constituent Structure Priming hypothesis proposed by Bock and colleagues based on the evidence from English (Bock, 1985, Bock & Loebell, 1990; Bock et.al., 1992), should be also tested cross-linguistically.

Russian appears to be a good candidate because, being a morphologically rich language, it allows for a wide variety of word order alterations and, thus, provides an abundance of constructions which are matched in their linear surface constituent order while being distinct otherwise (and visa versa). In addition, as we shall see later in the chapter, Russian allows to explore the hypothesis that not only surface constituent structure similarity between a prime and a target is insufficient for priming to occur, but also that syntactic priming could be observed in the absence of this similarity as long as the verbs in the prime and the target share enough relevant argument-structural properties.

It was relatively straight forward to adopt Bock and Loebell's (1990) methodology for Experiments 4 and 5 with English speakers, but to replicate this design in Russian proved challenging. Recall that Experiments 4 and 5 tested passives like *The bucket was scratched by the gate* (passive condition) and intransitive sentences with a locative adjunct like *The bucket was standing by the gate* (locative condition) against a no-prime baseline. To create a parallel to such stimuli, one could take an advantage of the similarity between the Russian passive and the Russian locative intransitive construction. The thematic subject that surfaces as a *by*-phrase in the English passive, is realised as an NP adjunct marked with the Instrumental Case in the Russian passive. A locative adjunct NP appearing as part of

183

an intransitive construction can also carry Instrumental Case in Russian. Importantly, such locative structure and the passive follow the same constituent structure – NP$_{ACC}$-V-NP$_{INSTR}$. However, unlike the English locative PP adjuncts, Russian locative NP adjuncts carrying Instrumental Case are not only marked stylistically, but their use is also heavily restricted by a number of lexical and syntactic properties to the point that they could perhaps be considered as idiomatic expressions – compare the examples in (22) below.

22. (a)   *Soldat bežal po lesu.*

Soldier ran   on forestDAT

The soldier was running through the forest.

   (b)   *Soldat bežal lesom.*

Soldier ran   forrestINSTR

The soldier was running through the forest.

   (c)   *Soldat bežal po trave*

Soldier ran   on grassDAT

The soldier was running through the grass.

   (d)   **Soldat bežal travoj.*

Soldier ran   grassINSTR

The soldier was running through the grass.

Bearing in mind the difficulties outlined above, an alternative to testing the passive and the locative intransitive primes was sought, and constructions with 3-place predicates presented this alternative. English 3-place predicate structures with an indirect object (IO) prepositional phrase (PP) have been widely used in priming with adults and children to assess the effects of prepositional and double object dative primes (Bernolet et.al., 2016; Bock, 1986; Bock et.al., 2007; Buckle et.al., 2017; Cho-Reyes & Thompson, 2012; Gruberg et.al., 2019; Peter et.al., 2015; Thothathiri, Snedeker, J. 2008; Tooley & Bock, 2014; Ziegler & Snedeker, 2018 amongst others). Furthermore, some of these constructions were shown to be suitable for testing the effects of argument-structural distinctions between the primes that followed identical

constituent order. For example, a study by Ziegler and Snedeker (2018, Exp.11) discussed earlier, where English 3-place predicate constructions were used as primes, demonstrated the relevance of the argument-structural aspects for priming. In this experiment the production of the prepositional object dative targets (POD) was measured after hearing the POD primes (e.g. *The boy gave the lamp to the rooster*) and the monotransitive prepositional locative constructions (PLoc) (e.g. *The boy lugged the lamp past the rooster*). The analysis showed more POD targets in the POD condition (73%) than in the PLoc condition (62%) despite the two following the same constituent structure (i.e. NP-V-NP-PP). As I proposed earlier, one can interpret these results to show that priming is driven by the argument-structural differences between the verbs in the primes, specifically, that it is sensitive to the number of arguments predicates in the primes subcategorise for.

Another study that utilised English 3-argument verb constructions and inadvertently showed the relevance of argument structure for priming was conducted by Tooley and Bock (2014). The researchers again tested primes with identical constituent structure (i.e. NP-V-NP-PP) such as *The widow gave the Mercedes to the church*, and *The mother cut some steak for the son* in a priming tasks that incorporated both production and comprehension measures. The two constructions were termed *to*-dative and *for*-dative respectively, but both were treated as 3-argument verb structures of the same kind, namely as POD. These primes were pitted against double object dative sentences such as *The widow gave the church the Mercedes*. Although the comparison between the *to*-datives and the *for*-datives was not the aim of the experiment, Tooley and Bock report that the results of a comprehension measure showed an increase in production of POD responses after the exposure to the *to*-datives but not after the *for*-datives.

The crucial distinction between these primes, I would again argue, is that the location (i.e. *the church*) in the fromer is a true argument, while the benefactor (i.e. *the son*) in the latter is not. It has been observed that the prepositional phrases of the kind the *for*-dative primes contained in this experiment, combine the characteristics of arguments and adjuncts but generally behave as the latter, often exhibiting the properties of adjunct in a number of argument/adjunct diagnostics (Rákosi, 2012). The *for*-dative construction could thus be equated with a monotransitive structure, highlighting that the researchers, perhaps unintentionally, compared primes that contained verbs which were distinct in their argument structure.

What the two studies highlighted above demonstrate is that, when it comes to testing the influence of argument-structural properties of the prime, pitting 3-argument verbs with a PP argument against 2-argument verbs with a PP adjunct seems to present an acceptable alternative to the passive/locative contrast used in the experiments reported in Chapter 3. Russian 3-argument verbs are frequent and productive, and their acquisition has been shown to be much less problematic than that of the Russian passive (Mykhaylyk, Rodina, Anderssen, 2013). In addition, a [location] PP argument in a Russian 3-argument verb does not require an overt realisation[39]. This property allows for an even closer comparison between 3-argument verbs with a PP object and 2-argument verbs with a PP adjunct, as not only they share the same NP-V-NP-PP constituent structure, but the PP that forms its part is optional in both cases. Importantly, the constructions are clearly distinct in their argument structure.

4.2.   Experiment 6: Aims, Hypotheses and Predictions

Contrary to the findings by Bock and Loebell (1990), the English data from Experiments 4 and 5 provided no support for the claim that priming constituents repetition of linear surface phrase order of a sentence. The main aim of the present enquiry was to explore this issue in Russian and to investigate a possibility that syntactic priming taps into the abstract syntactic representation which incorporates the information on predicates' argument structure. Thus, Experiment 6 reported in this chapter address the following question: *Can Russian provide further evidence that priming is driven by the argument structure rather than the surface constituent structure similarities between the prime and the target?* In addition, I asked *whether priming can be detected in the absence of this constituent structure similarity when the prime and the target share (at least some) argument-structural properties.*

The main hypothesis tested here was that *priming is sensitive to the number of arguments a verb takes, and the constituent order repetition observed in a priming task is a collateral effect of this sensitivity* (*H1*). This constitutes the first part of the

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[39] Note, however, that there are some restrictions on this optionality. The discussion on such restrictions is beyond the scope of the dissertation; suffice it to say that in the 3-place predicate sentences used as primes in the present study the [location] PP object it is always optional.

overarching Argument Structure Priming hypothesis (formulated in (4)) which guides the experimental work reported in this thesis. The null hypothesis (*H0*) is that *priming functions on the level of surface constituent order and is not sensitive to the argument-structural properties of a sentence that lay beyond the surface constituency (Constituent Structure Priming hypothesis).*

To demonstrate the predictions the hypotheses make for Russian 3-place predicate constructions, let us consider the following examples: full 3-argument structures (i.e. the structures where both internal arguments are overtly realised despite the [location] argument being optional) *Devočka postavila kuvšin na stupen'ki* /GirlNOM placed jugACC on stepsACC; or *Mal'čik otodvinul škaf ot okna*/BoyNOM from-moved wardrobeACC from windowGEN; and 2-place predicate (monotransitive) constructions with a locative PP adjunct *Devočka razbila kuvšin na stupen'kax/*GirlNOM broke jugACC on stepsPREP; and *Mal'čik dvigal škaf na kuxne*/BoyNOM was-moving wardrobeACC on/in kitchenPREP. Let us also represent the argument structure of the verbs in these constructions in the same way it was done in Chapter 1. Consider Figure 4. 1(a-b) for examples of 3-place predicates and (c) for a 2-place predicate. Note that (a) and (b) are not strictly identical in terms of their argument structure as the PP argument in (a) but not in (b) has its own thematic structure indicated by '[…]', the issue I will return to in section 4.3.2.2. However, what they have in common is that unlike the verbs in (c), they are both 3-place predicates.

Figure 4. 1 Combinatorial node representations for the 3-argument verbs *postavit' na* (place on) and *otodvinut' ot* (move from) where PP forms part of the argument structure, and the 2-argument verb *razbit'* (break) and *dvigat'* (move) with a PP adjunct.

Thematic hierarchy: Agent > Experiencer > Goal/Source/Location > Theme
                         [i]   [ii]   [iii]   [iv]

(a) 3-place predicate structure: PP part of arg. structure (*postavit' na*/place on)	(b) 3-place predicate structure: PP part of arg. structure (*otodvinut' ot*/move from)	(c) 2-place predicate structure: PP adjunct (razbit' / break or *dvigat*/ move)
[θ, θ, θ[…]] | | [iv] [iii]	[θ, θ, θ] | | [iv] [iii]	[θ, θ] | [iv]

On the Constituent Structure Priming hypothesis (*H0*), when compared to a no-prime baseline, the exposure to these two primes is expected to trigger an equal increase in the production of any responses that adhere to the same NP-V-NP-PP constituent structure as the primes. On this hypothesis, the responses are not expected to contain the verbs with the same number of arguments as in the primes.

On *H1*, an increase in the production of constructions which, irrespective of their surface constituent structure, contain a verb that subcategorises for two internal arguments (e.g. *Mal'čik vytaščil palku iz peska*/Boy out-dragged stickACC out-of sandGEN/The boy pulled the stick out of the sand), is predicted in the 3-argument verb condition only, but not in the monotransitive. Such pattern is expected because 3-argument verb and monotransitive verb constructions are distinct in their argument structure, namely, in the number of arguments their verbs take. Additionally, since in most Russian 3-argument verb structures the [location] argument is optional, semantically interpreted but often omitted, a full 3-place predicate sentence containing all three of its arguments could be expected to also prime incomplete 3-argument verb targets where the [location] arguments is dropped (e.g. *Mal'čik vytaščil palku*/Boy out-dragged stickACC/The boy pulled the stick out). This is because both, constructions subcategorise for one external and two internal arguments despite following distinct constituent structures.

4.3. Methods

4.3.1. Participants

76 native Russian speakers (mean age = 24; 35 male) from a high school in St-Petersburg, Russia (both students and staff) volunteered to take part in the study. Consent was sought from the participants prior to participation. The data from two speakers were removed due to technical problems with the recording, and the data from further five speakers were removed due to the participants being under eighteen. The participants were randomly assigned to one of the three conditions: baseline (n = 23), monotransitive prime (n = 23) and 3-argument verb prime condition (n = 23). A short feedback received from the participants after the testing revealed that none of them understood the purpose of the experiment.

4.3.2.   Design and Materials

As in Experiments 1-5, a between-subject design was adopted for this study. The experiment had three conditions: 2-argument verb (monotransitive) (2-AV) condition (n = 23), 3-argument verb (3-AV) condition and no-prime baseline.

As discussed in the previous section, 3-AV constructions present a suitable opportunity for testing the hypotheses outlined above. However, the priming studies that utilised 3-AV constructions I reviewed earlier, tested *dative ditransitive* constructions. The problem one is faced when designing a priming study with dative ditransitives is that it is difficult to keep the internal arguments of dative verbs balanced in terms of their animacy distribution, as in most cases these verbs require an inanimate theme and an animate beneficiary. As we have seen from the results of Experiments 1 to 5, the animacy distribution in the targets of a priming task greatly influences participants' responses, and, therefore, cannot be ignored. In order to test true priming effects, the animacy distribution in the targets must be symmetrical.

There are also further issues with using 3-AV constructions which are specific to Russian. In order to keep primes as metrically similar as possible, the only major difference between the 3-AV and the 2-AV prime with a locative adjunct should be the variable manipulated, namely the verb type. For example, if a 3-AV prime presents a subject, a direct object (DO) theme and an indirect object (IO) location, its 2-AV prime counterpart should also have the same subject, theme DO and, importantly, a PP adjunct which is identical to the [location] IO in the 3-AV prime.

With this in mind, consider the two most frequent Russian prepositions assigning Dative Case which both can head indirect object PP and as well as PP adjuncts: *k* (to/towards/by/for) and *po* (on). While a PP IO headed by the preposition *k* (to/towards/by) would normally describe a location (23a), a PP adjunct headed by the same preposition with a very few exceptions would introduce a temporal, not a locative adjunct (23b). *Po* (on) can head both, a [location] PP IO (23c) and a locative PP adjunct (23d). The [location] PP in such cases, however, are questionable in terms of their argumenthood and, thus is not the best choice for priming stimuli.

23. (a) Ivan pridvinul stul   k stolu.
        Ivan towards-move chairACC to tableDAT
        Ivan pulled the chair close to the table.

    (b) Ivan zakončit rabotu   k večeru.
        Ivan will-finish workACC by eveningDAT
        Ivan will complete the job by the evening.

    (c) Maša razmazala krasku   po stolu.
        Masha smeared painACC on tableDAT
        Masha smeared paint all over the table.

    (d) Ivan taščil   tjažělyj   mešok   po doroge.
        Ivan dragged heavy   bagACC   on roadDAT
        Ivan was dragging a heavy bag along the road.

A promising alternative to the above are non-dative 3-AV and 2-AV constructions containing motion verbs and the preposition *na* (on). The preposition can be used both, in full 3-AV sentences and 2-AV monotransitive sentences with an adjunct, assigning Accusative Case to an argument NP in the former and Prepositional Case to an adjunct in the latter, see examples for the experimental items used in the present experiment in (24a) and (24b).

24. (a) Devočka postavila kuvšin   na stupen′ki.
        Girl   placed   jugACC on stepsACC
        The girl put the jug on the steps.

    (b) Devočka razbila kuvšin   na stupen′kax.
        Girl   broke jugACC on stepsPREP
        The girl broke the jub on the steps.

Such sentences are thus well fitted to test the Constituent Structure Priming hypothesis in Russian, because, while varying in their argument structure (the former having two internal arguments and the latter only one), they share their constituent

structure (NP-V-NP-PP). In addition, as mentioned earlier, in most Russian 3-AV constructions the location is an optional argument which can be omitted. This provides an opportunity for drawing a comparison between an optional PP IO and a PP adjunct, another optional element which, in contrast to the PP IO in the 3-AV sentence, does not form part of the monotransitive verb's argument structure.

Yet, these constructions also come with complications. The first issue is that in the literature on Russian there is no consensus regarding the syntactic positions of PPs in these structures. Potentially, a test for quantifier scope ambiguity resolution preferences could shed some light on the issue, or at the very least establish whether 3-AV sentences with PP IO and monotransitive sentences with PP adjunct are indeed similar in terms of their underlying syntactic representations. Adopting the design of Kurtzman and MacDonald (1993), I performed such a test online with 294 native speakers of Russian using Opinio survey platform. The results, however, were largely uninterpretable given the participants' general dispreference to the distributive reading in both $\exists<\forall$ and $\forall<\exists$ types of sentences, which was perhaps due to perceiving the existentially quantified NPs as specific in the absence of articles in Russian. The issue is not of crucial importance for my enquiry, because I do not argue for the underlying syntactic representation (i.e. base and/or intermediate positions of copies/traces within movement chains) as a pivotal priming locus, but rather for the role that predicates' argument-structural properties play in syntactic priming.

The second problem is that despite there being a vast amount of literature on argument structure of Russian verbs, there are no definitive set of diagnostics for argumenthood in Russian, particularly when it comes to [location] PP of the kind discussed above, although some appropriate tests are available as I will show below.

4.3.2.1.   Argumenthood Diagnostics in English

Before exploring possible argumenthood tests in Russian, it is useful first to highlight the diagnostics widely applied in English. Ackema (2015) highlights several criteria that distinguish arguments from adjuncts, presented in (25) below. However, Ackema highlights that none of these distinctions are flaw-free and that they cannot always provide conclusive results.

25. (a) *Limited Number Criterium*

   While there is no limit to the number of potential adjuncts present in a sentence, the maximum number of arguments does not normally exceed three.

   (b) *Optionality Criterium*

   Unlike arguments, adjuncts are not obligatory.

   (c) *Phrasal Status Criterium*

   An adjunct added to a constituent does not change the constituent type, while an argument added to a constituent creates a constituent of a different type.).

   (d) *Weak Island Criterium*

   While both arguments and adjunct may undergo long-distance wh-movement, i.e. a movement out of an embedded clause into the main clause, such movement from out of an island produces degraded results for an argument, but moving an adjunct out of an island produces worse results.

   (e) *Promotion to Subject Criterium*

   [Theme] and [goal] argument could be promoted to the subject in passive and middle sentences; in contrast, adjuncts cannot become subjects in this way.

Furthermore, the following tests, as summarized by Toivonen, Butt and King (2013) and Askema (2015) in (26-30), below are often used as argumenthood diagnostics in English.

26. *The Adjunct Island Test:*

   Extraction out of arguments is grammatical, but extraction from adjuncts is not.

(a)   I told Mandy <u>to fix the car</u>.   → argument

           What did you tell Mandy to fix?

(b)   Bill cried <u>after annoying Susan</u>. → adjunct

           *Who did Bill cry after annoying?

                       (Examples from Toivonen et.al. (2013: 506))

27.   *Relative Ordering Test*

         The relative ordering of adjuncts is less strict than those of arguments*.*

(a)   <u>Cheerfully</u>, Tobias ate an apple.

           Tobias <u>cheerfully</u> ate an apple.   → adjunct

           Tobias ate an apple <u>cheerfully</u>.

(b)   Tobias ate <u>an apple</u>.

           *Tobias <u>an apple</u> ate.   → argument

           *Tobias ate cheerfully <u>an apple</u>.

                       (Examples from Toivonen et.al. (2013: 507))

28.   *The Wh-word Conjunction Test*

         Two wh-words referring to arguments with distinct semantic roles cannot be conjoined (a), while two wh-adjuncts with distinct semantic roles can (b).

(a)   <u>Sam</u> showed the picture <u>to Kim</u>.   → arguments

           *What and to who(m) did Sam show?

(b)   Jolanda met a friend <u>in Minneapolis</u> <u>on Friday</u>. → adjuncts

           Where and when did Jolanda meet a friend?

                       (Examples from Toivonen et.al. (2013: 508))

29.   *The VP-anaphora test*

         In VP-anaphora sentences, adjuncts may be added to 'do so'

         phrases, but arguments may not*.*

(a)   Susie sold her stocks <u>yesterday</u> and Pat did so <u>today</u>. → adjunct

(b)   *Susie washed <u>her feet</u> and Pat did so <u>her hands</u>.   → argument

<div align="right">(Examples from Toivonen et.al. (2013: 509))</div>

30.   *VP-focussed Pseudo-cleft Test*
Adjuncts can occur after do in a VP-focussed pseudo-cleft,
arguments cannot.

(a)   a. Mia slept <u>in her room</u>.   → adjunct
What Mia did in her room was sleep.

(b)   Claire discussed <u>the problem</u>. → argument
*What Claire did the problem was discuss.

<div align="right">(Examples from Toivonen et.al. (2013: 509-510)</div>

4.3.2.2.   Argumenthood Diagnostics in Russian

In Russian, the diagnostics for distinguishing between internal arguments and adjuncts are much less straight forward than they are in English. Almost none of the criteria outlined above and traditionally used in English are applicable to Russian, because most of the constructions used in these tests are not part of the Russian grammar. Nevertheless, although not without their own issues, there are some argumenthood tests that work in Russian, which I will discuss next.

Question-type Test

Traditional prescriptive grammar literature on Russian suggests that the basic argumenthood diagnostic would be to pose a question to the sentential element being tested. If the suitable question is *Kak?* (How?), *Kogda* (When?), *Gde?* (Where?), *Kuda?* (Where to?), *Otkuda?* (Where from?), we are dealing with an adjunct; if it is a Case question, e.g. *Čego?* (WhatGEN?), to-Komu? (WhomDAT?), *Čto?* (WhatACC?), *Čem?* (by-WhatINSTR?), *V čëm?* (in-WhatPREP?), *O čëm?* (about-

WhatPREP?) – it is an object. However, being probably the most widely applicable, this approach, as we shall see, does not always provide us with satisfactory results.

The proponents of the formal approach to grammar at the start of the twentieth century relied mainly on morphological characteristics to establish the argument-structural role of a phrase in a sentence, while others (e.g. Sherba and Avanesov) suggested that argument-adjunct distinction is underpinned more by lexical semantics than by morphology (Akimova, 2009). Thus, arguing against the question-diagnostic, the formalists pointed out that often both a *wh*-question and a Case question could be felicitously posited to a tested sentential element. For example, the PP *in vase* (in vase) in (31a) could answer both questions *Where?* and *in-What*PREP*?*, and in (32a) the PP *from gun* answers both questions, the *wh*-question *from-Where?* and a case-question *from-Where*GEN? (Avanesov, 1936). However, Avanesov (1936) argued that when an explicit comparisons such as those between (31a) and (31b) and (32a) and (32b), are drawn, it becomes much more evident that the PP *in vase* (31a) answers the question *in-What*PREP*?*, and the *wh*-question *Where?* is only felicitous for the PP *in room* (31b). Similarly, the PP *iz ruž'ja* (from gun) in (32a) answers a case question *from-Where*GEN*?*, while the PP in (32b) – *wh*-question *from-Where?* The diagnostic therefore holds, clearly identifying the PPs in (31a) and (32a) as arguments, and the PPs in (31b) and (32b) as locative adjuncts.

31. (a)   Cvety   stojali v vaze.
           Flowers stood in vasePREP
           The flowers were in the vase.

    (b)   Cvety   stojali v komnate.
           Flowers stood in roomPREP
           The flowers were in the room.

32. (a)   On streljal iz   ruž'ja.
           He fired from handgunGEN
           He was shooting from a handgun.

(b)   On streljal iz zasady.

He fired from ambushGEN

He was shooting from an ambush.

Yet, there are some cases for which similar comparisons are challenging to establish. Such is the example in (33): the NP *train* is a felicitous answer to both questions, How? and by-WhatINSTR?

33.   On doexal   do goroda poezdom.

He travelled to city   trainINSTR

He reached the city by train.

(a)   Kak on doexal do goroda?

How he travelled to city?

How did he reach the city?

(b)   Čem   on doexal do goroda?

WhatINSTR he travelled to city?

How did he reach he city?

There are also further issues with the Question-type diagnostic. Sherba (1936) provided examples such as the ones in (34a,b,c), where the tested PP/NP is clearly the object which follows from the semantics of the verb which precedes it, yet it answers only a non-case *wh*-question such as *Gde?* (Where?). Furthermore, Sherba argued that with the cases like (34d) and (34e), the PP *in Leningrad* is the object in (34d) and the adjunct in (34e). This is because *to live* in (34d) means *to dwell* and therefore it requires a locative object, while in (34e) the verb does not have this interpretation, so the PP forms a part of a complex adjunct.

34. (a)   JA priexal v Kiev.

I   came   in KievPREP

I've come to Kiev.

(b)   JA priexal domoj.

I   came   towards-home

I've came home.

(c)   JA priexal souda.

I   came   here

I've come here.

(d)   On živet   v Leningrade.

He lives in LeningradPREP

He lives in Leningrad.

(e)   On živet v svoë   udovol′stvie   v Leningrade.

He lives in selfACC pleasureACC in LeningradPREP

He lives the life of leisure in Leningrad.

(Examples from Sherba (1936)

Sherba, thus, suggested that when running argumenthood diagnostics, it is critical to consider conceptual aspects of the verbs in question and the context they appear in, rather than relying on the grammatical form of the sentential element tested (e.g. its Case), what kind of question it answers, or which part of speech it belongs to. Conceptual aspects of the verb are often ambiguous and, therefore, debatable, which means that this diagnostic might also be somewhat vague.

Coordination Test

The diagnostics presented so far admittedly leave us with some uncertainty. Avanesov (1936) suggested one more test, which seems to be informative, although as we shall see later in the section, it is also not without its issues. This diagnostic is based on the assumption that a possibility of a coordinative relationship between phrases which are expressed by different morphological categories formally indicates that their syntactic functions are the same. In other words, phrases coordinated through prosody or by the means of conjunctions carry the same grammatical function. For instance, as (35) shows, coordination is possible between constituents

that share grammatical function and syntactic category, with (a) involving a coordination of NP objects, (b) VP objects and (c) PP objects.

35. (a)   Petr kupil   novuju   knigu   i svežuju gazetu.
          Peter bought newACC bookACC and freshACC newspaperACC
          Peter bought a new book and a fresh newspaper.

    (b)   Maša uže   naučilas′ čitat′ i   pisat′.
          Masha already learnt   to-read and to-write
          Masha has already learnt how to read and write.

    (c)   Ona kataetsia na lyzhah   i   na konkah.
          She skates   on skisPREP and on skatesPREP
          She can ski and skate.

Adjuncts can also be coordinated, see (36a). Moreover, as (36b) shows, the coordinates need not be of the identical syntactic categories, so long as they share the same grammatical function. This is easier to illustrate with adjuncts, because arguments, being selected by their verbs are often required to be also identical in their syntactic categories. But as (36b) illustrates this is not a requirement for the coordination per se, it is an indirect consequence of categorical selection.

36. (a)   Oni razbegalis′ bystro (i) v raznyx napravlenijax.
          They scattered   fast (and) in different directions
          They scattered fast and in all directions.
                                                    (Example from Avanesov (1936))
    (b)   On prepodaet interesno, (i)   s   uvlecheniem.
          He teaches interestingly, (and) with enthusiasm
          He teaches interestingly and enthusiastically.
                                                    (Example from Avanesov (1936))

Now consider the example in (37). Here we can see that although syntactic categorical identity is not necessary, the adjunct cannot be coordinated with the argument. Compare (37) below with (36b) above.

37.　　　　　　*On prepodaet interesno, (i)　s　kollegami.

　　　　　　　He teaches　interestingly, (and) with　colleaguesINSTR

　　　　　　　*He teaches interestingly (and) with the colleagues.

(Example from Avanesov (1936))

The same can be illustrated by the following minimal pairs in (38a) and (38b):

38.　(a)　　Lector　vstrechaetsia so studentami　　　postojanno, (i)　s　uvlecheniem.

　　　　　　Lecturer　meets　　　with studentsINSTR constantly (and) with enthusiasm

　　　　　　The lecturer meets the students constantly (and) with enthusiasm.

　　　(b)　　*Lector vstrechaetsia so　studentami,　(i)　　postojanno.

　　　　　　Lector meets　　　　with studentsINSTR (and) constantly

　　　　　　*The lecturer meets the students, (and) constantly.

Applying this diagnostic test to my experimental items, we can see that *break* is monotransitive and *place* is 3-AV based on the examples (39a) and (39b). However, in addition to the unsurprising ungrammaticality of the coordination between the [manner] adjunct and the [location] argument in (39d), the coordination of the [manner] adjunct and the locative adjunct in (39c) also yields somewhat degraded results, which highlight that the diagnostic in question is not always applicable.

39.　(a)　　Devočka razbila kuvšin　special′no, (i)　　bez　vsjakoj pričiny.

　　　　　　Girl　　　broke　jugACC deliberately (and)　without any　　reason

　　　　　　The girl broke the jug deliberately, (and) for no reason.

　　　(b)　　*Devočka postavila kuvšin　special′no, (i)　　na stupen′ki.

　　　　　　Girl　　　　placed　jugACC deliberately (and)　on stepsACC

　　　　　　*The girl placed the jug deliberately, and on the steps.

(c)　　?Devočka razbila kuvšin eščë daže ne vojdja　v　dom, (i)　　　na stupen'kax.

　　　　　Girl　　broke jug　yet　even not entering in house (and) on stepsPREP

　　　　　?The girl broke the jug even before entering the house (and) on the steps.

(d)　　*Devočka postavila kuvšin eščë daže ne vojdja　v dom (i) na stupen′ki.

　　　　　The girl　placed　jug　yet　even not entering in house on stepsACC

　　　　　*The girl placed the jug on the steps (and) even before she entered the house.

In addition to the above, Russian provides a further argumenthood diagnostic, which is specific to the 3-AV constructions containing complex motion predicates. This diagnostic is useful for my enquiry because the target responses obtained in the present experiment contained such structures in abundance.

Lexical and Superlexical Prefixation

To explain the diagnostic, let us consider the examples complex motion 3-place predicates produced by the native Russian speakers in the current experiment, *zakatit'* (behind-roll), *otodvinut'* (from-move), *perebrosit'* (over-throw) and *izvleč* (out-of-take) (40), paying particular attention to the prefixation of the verbs and the prepositions highlighted in bold. It appears that these verbal prefixes and the prepositions are very similar not only in meaning, but also, in most cases (except from 40c), in form. Why is this important?

40.　(a)　**za**katit'　　tačku　　　　　__**za**__　　saraj

　　　　　　behind-roll wheelbarrowACC behind shedACC

　　　　　　to roll the wheelbarrow behind the shed

　　(b)　**oto**dvinut'　škaf　　　　**ot**　　okna.

　　　　　　from-move wardrobeACC **from** windowGEN

　　　　　　to move the wardrobe away from the window

(c)   **pere**brosit' botinok   **čerez** ručej

         over-throw shoeACC **over**   streamACC

         to throw the shoe over the stream

(d)   **iz**vleč   jajco   **iz**   dupla

         out-of-bring eggACC **out-of** tree-holeGEN

         to take the egg out of the tree-hole

Following a rigorous analysis of Russian and other Slavic prefixed motion verbs, Romanova (2006) argues that the prefixes of this kind, termed *lexical* (as opposed to *superlexical*) form part of the prepositional phrase, and that 'a lexical prefix together with the associated prepositional phrase introduces a predicational relation, the Figure, which then gets promoted to the object position of the verb' (Romanova, 2006: 75). Other authors also suggest that *lexical* prefixes affect argument-structural configurations, while *superlexical* prefixes do not (Babko-Malaya, 1999; Di Sciullo and Slabakova, Gehrke, 2008; 2005; Ramchand, 2004; Svenonius, 2004; see Ramchand & Svenonius, 2002 for similar arguments made for particles in Germanic languages). On this view in becomes apparent why in many cases, although not always, lexical prefixes are homophonous with the prepositions that follow lexically prefixed verbs (see 40a, b and d above). Highlighting that the presence of a prepositional phrase is consequential to the presence of a lexical prefix, Romanova suggests that prepositional phrases are obligatory with all the transitive motion verbs that are lexically prefixed. It should be noted, however, that such PPs can still be omitted, although they are of course semantically presupposed and interpreted.

Bearing in mind Romanova's observation, I will analyse the constructions presented above as complex motion 3-place predicate (i.e. prefix + verb + preposition) which subcategorise for two internal arguments – [theme] NP and [location] NP. Such analysis would be akin to that of Marantz (1984), who suggests that the verb and the preposition in complex predicates such as *believe in* or *rely on* form a unit which then selects its argument NP. Marantz highlights that complex predicates select their [location] argument NP only through a specific preposition, which shows that there is a semantic link between the predicate and the argument NP. Motion verbs like *put* or *place*, on the other hand, can select the [location] argument through a variety of prepositions (e.g. *put on/under/in*), demonstrating a

luck of a direct semantic relation with the [location] NP. Following Marantz, in such cases the whole [location] PP forms an argument of the motion verb, and the PP itself has its own internal thematic structure.

There is an important point to make here which will become crucial to analyse the data from the present experiment as evidence in support of the Argument Structure Priming hypothesis this thesis defends. The complex predicates (as in *Mal'čik otodvinul škaf ot okna*/BoyNOM from-moved wardrobeACC from windowGEN/The boy moved the wardrobe away from the window) and the verbs with a PP argument (as in *Devočka postavila kuvšin na stupen'ki*/GirlNOM put jugACC on stepsACC) may indeed project structures that differ in their underlying syntax, i.e. in the architecture of the movement chains within them. These constructions may be represented as suggested earlier in Figure 4. 1, repeated below in Figure 4. 2 for convenience: while in (a) the PP is an argument, which itself has its own thematic structure (shown with '[…]'), in (b) the second internal argument of the complex [verb + preposition] predicate is the NP within the PP. However, they have an important argument-structural property in common – they are both 3-place predicates that take two internal arguments.

Figure 4. 2 Combinatorial node representations for the 3-argument verbs *postavit' na* (place on) and *otodvinut' ot* (move from) where PP forms part of the argument structure, albeit in two distinct ways.

Thematic hierarchy: Agent > Experiencer > Goal/Source/Location > Theme
                    [i]   [ii]   [iii]   [iv]

(a)
3-place predicate structure: PP – argument of simple verb predicate (*postavit' na*/place on)

$[\underline{\theta}, \theta, \theta[…]]$
| |
[iv] [iii]

(b)
3-place predicate structure: NP within PP – argument of complex verb+preposition predicate (*otodvinut' ot*/move from)

$[\underline{\theta}, \theta, \theta]$
| |
[iv] [iii]

In order to be able to treat a given prefixed verb with a [location] argument NP within a PP as a complex 3-place predicate, it is first necessity to establish whether the prefix is lexical or superlexical. Romanova (2006: 20, 62-63) outlines four general diagnostics for distinguishing one class of prefixes from the other (see 41-44 below):

(1) secondary imperfectively, (2) prefix stacking order, (3) meaning distinction and (4) perfective form derivation.

41.   *Secondary Perfectivity*

Lexically prefixed perfective verbs have secondary imperfective; superlexically prefixed verbs do not

(a)   pisat' - zapisat' - **za**pisyvat'
      write - have in-write - in-writing
      write- have made notes- making notes

      čitat' - **perečitat'** - **pere**čityvat'
      read - have re-read - re-reading

      sidet' - vysidet' - vysiživat'
      seat - out-sit - out-sitting
      seat - have hatched - hatching

(b)   resat'-pereresat'-***pere**rezyvat' (vsex kur)
      cut- have out-cut- out-cutting (all hens)
      cut- have severedDISTRIBUTIVE- was severing (all hens)

      begat'-perebegat'-***pere**begivat'
      (inceptive)moveINF, (distributive)cutINF (all hens),
      (delimitative)runINF
      start moving, slaughter (all the chickens) distributively, run for a while

                              (Examples adopted from Romanove, 2006: 2)

42.   *Prefix Stacking Order*

When two prefixes stack a lexical prefix is always the inner one (p.62) (a), never the other way around (b).

(a) Avtor **na-vy-**dumyval složnyx linij

AuthorNOM (cumulative)out-thought complex plot-linesGEN

The author has invented a lot of complex story lines.

(Example from Romanove, 2006: 62)

(b) Avtor ***vy-na-**dumyval složnyx linij

AuthorNOM (cumulative)out-thought complex plot-linesGEN

The author has invented a lot of complex story lines.

43. *Meaning Distinction*

Lexical prefixes turn 'activities and states into telic accomplishments and achievements' (p.61); importantly, more often not these prefixes do not conform to systematic meanings, they create novel words (43a, b), while superlexical prefixes have regularly occurring meanings (e.g. 'begin', 'end') (43c, d) (p.2, p.63)

(a) On bil sobaku.

HeNOM was-beating dogACC

He was-beating the dog.

(b) On menja **pere**bil.

HeNOM me.ACC across-beat

He interrupted me.

(Example from Romanova, 2006: 62)

(c) Devočka čitala knigu.

GirlNOM readPROG bookACC

The girl was reading the book

(d) Devočka **do**čitala knigu.

Girl readPERF book

The girl has finished reading the book.

44.   *Perfective Form Derivation*

Superlexical prefixes do not necessary change the verb's event structure as lexical prefixes do, but always turn an imperfective verb into a perfective.

(a)   ležať: lie STATE

poležať: lie for a while, PERF.STATE

(b)   peť: sing ACTIVITY

propeť: sing for a specified amount of time, PERF. ACTIVITY

(c)   igrat': play ACTIVITY

zaigrat': start playing, ACHIEVEMENT

(Example from Romanova, 2006: 20)

The lexical prefixation on a motion verb, thus, appears to be a useful diagnostic, but what if the motion verb is not prefixed, how could we identify the argument-structural status of the prepositional phrase in such sentence if the other tests outlined earlier in this section fail to provide a definite answer, which can often be the case?

The Status of the Motion Verb

Romanova (2006) provides a useful strategy to deal with the issue. Motion verbs are divided into two broad classes, *directed* or *non-directed*, and while the directed verbs require a prepositional phrase as their complement, the non-directed verbs cannot accept PP phrases that are other than adjuncts. Following Romanova (2006), several tests could be suggested to establish the directed vs. non-directed status of a motion verb: compatibility with phase and abilitative verbs, see (45), type of prefixation, see (46), and combinability with directional or locative PPs, see (Romanova, 2006: 130-131).

45.   *Compatibility with Phase and Abilitative Verbs*
        Independently of verbs' aspectual properties, non-directed motion
        verbs are fully acceptable with phase verbs (a) or abilitative modal
        verbs (c); in contrast, combining directed motion verbs with phase
        verbs (b) or abilitative modal verbs (d) produces degraded results.

        (a)   Mal'čik   načal vozitʹ tačku   (tuda sjuda).
                BoyNOM began roll   wheelbarrowACC (there here)
                The boy began to roll the wheelbarrow (back and forth).

        (b)   *Mal'čik načal vezti tačku   v saraj.
                BoyNOM began drive wheelbarrowACC in shedPREP
                *Boy began to drive the wheelbarrow into the shed.

        (c)   Mal'čik   uže   umeet   vozitʹ tačku.
                BoyACC already can roll wheelbarrowACC
                The boy can already move a wheelbarrow.

        (d)   ?Mal'čik   uže   umeet vezti tačku.
                BoyNOM already can   drive wheelbarrow.
                ?The boy can already drive a wheelbarrow.

46.   *Prefixation Type*
        Directed motion verbs take lexical prefixes (a); non-directed motion
        verbs take superlexical prefixes (b).

        (a)   Mal'čik   **ot**vozil tačku   v saraj.   /*tuda sjuda vsë utro.
                BoyACC drove wheelbarrowACC in shedPREP/ there here all
                morning
                The boy was driving the wheelbarrow into the shed/*back and forth
                all morning.

        (b)   Mal'čik   **pro**vozil tačku   *v saraj/ tuda sjuda vsë utro.
                BoyACC rolled   wheelbarrowACC in shed/there here all morning

The boy was rolling the wheelbarrow *into the shed/back and forth all morning.

47   *Combining with Directional/Locative PPs*
Directed motion verbs combine with directional PPs (a), non-directed motion verbs can combine with locative PPs (b).

(a)   Mal′čik   vez   tačku   v saraj.
BoyNOM drove wheelbarrowACC in shedACC
The boy drove the wheelbarrow into the shed.

(b)   Mal′čik   vozil   tačku   v sarae.
BoyNOM rolled wheelbarrowACC in shedPREP
The boy rolled the wheelbarrow inside the shed.

To conclude the overview of the argumenthood diagnostics available in Russian, the tests related to lexical/superlexical prefixation and motion verbs' identity proposed by Romanova's (2006) and outlined above, appear to be the most suitable for the present enquiry. Therefore, not only were they applied to the verbs selected for the prime sentences and the verbs which could potentially be used to describe the target events, but they also guided the coding process throughout, to which I come back in section 4.4.
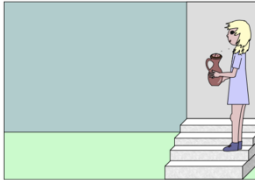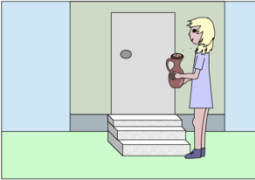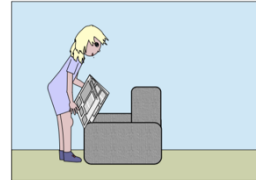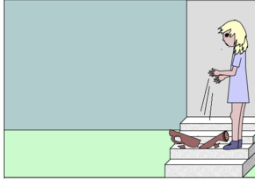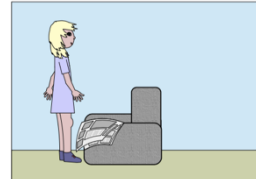
4.3.2.3.   Primes

Two sets of 16 experimental items were created – one for the experimenter and one for the participants. The prime set had three variants, one for each condition. As in Experiments 4b and 5, each experimental item (including both, the primes and the targets) consisted of two images (the start and the end of an event), which, when presented one after another, created a schematic two-frame animated sequence. The stimuli were displayed on a 13″ laptop screen.

In the monotransitive (2-argument verb) condition set, the priming animations presented monotransitive events and their locations. Those were accompanied by

monotransitive sentences with a locative PP adjuncts, e.g. *Devočka razbila kuvšin na stupen'kax*/Girl broke jug on stairs (see examples in Table 4. 1 below and Appendix 3 for the full set of stimuli).

Table 4. 1 Examples of 2-argument verb (monotransitive) primes and 3-argument verb primes used in Experiment 6.

2-argument prime event	3-argument prime event	2-argument prime event	3-argument prime event
Devočka razbila kuvšin na stupen'kax. GirlNOM broke jugACC on stepsPREP.	*Devočka postavila kuvshin na stupen'ki.* GirlNOM placed jugACC on stepsACC	*Devočka polistala gazetu na kresle.* GirlNOM leafed-through newspaperACC on armchairPREP.	*Devočka položila gazetu na kreslo.* GirlNOM leafed-through newspaperACC on armchairACC

In the 3-argument verb condition set the priming animations had the same referents as in the monotransitive set but depicted different events. Those events were accompanied by the prime sentences containing 3-argument verbs with direct object NP and indirect object PP of location, e.g. *Devočka postavila kuvshin na stupen'ki* /Girl placed jug on stairs (Table 4. 1). The baseline prime animation sequences contained an even mixture of the events used in the monotransitive and the 3-argument verb conditions. The events were viewed in silence.

There was one subject NP which appeared in all priming sentences (girl). The girl in the prime images was depicted performing four different actions four times, each time with different objects. Four verbs selected for priming sentences in the monotransitive condition were *požonglirovat'* (juggle), *poigrat'* (play), *polistat'* (leaf-through, e.g. a book) and *razbit'* (break). Further four verbs, *nažat'* (push-down), *nadavit'* (press), *položit'* (put) and *postavit'* (place), were used in the 3-AV condition. All verbs were marked with perfective aspect. All PPs in both prime conditions were

headed by the preposition *na* (on) which is well suited to introduce both PP object location and locative PP adjunct. The prepositions heading PP adjuncts in the 2-AV monotransitive condition assign Prepositional Case to their nouns, while prepositions heading indirect object PPs in the 3-AV condition – Accusative Case.

In half of the monotransitive and half of the 3-AV primes the object NPs carried Accusative Case, e.g. Devočka razbila kuvšin na stupen'kah/GirlNOM broke jugACC on stepsPREP (monotransitive prime), and *Devočka postavila kuvšin na stupen'ki/*GirlNOM placed jugACC on stepsACC (3-AV prime). It was however challenging to find suitable verbs with internal objects selecting Accusative Case, so in the other half of the monotransitive and 3-AV primes, the object NP carried Instrumental Case, e.g. *Devočka požonglirovala jablokami na šare/*GirlNOM juggled applesINSTR on rubber-ballPREP (monotrasntiive), and *Devočka nažala jablokami na šar/*GirlNOM push-down applesINSTR on rubber-ballACC (3-AV).

I was aware of the uncertainty in the way the phrases denoting an Instrument Case are treated in the literature. For example, some authors analyse them as part of the argument structure (Bresnan 1982), while others argue that they often combine the properties of arguments and adjuncts, therefore they should be treated as thematic adjuncts (Rákosi, 2012). Yet others suggest that that these phrases have a special argument-structural status which may distinguish them from canonical arguments (Needham & Toivonen, 2011, Webb, 2008).

At the time of designing the experiment, I reasoned that their structural status is sufficiently different from that of manner adjuncts to be suitable test items for the 3-AV condition. This, however, turned out not to be the case. The results of the present data indicated that the argument-structural status of the verbs considered to have INSTR-marked theme NP, appeared to be questionable. Such NPs may have not formed a part of the verbs' argument structure after all, at least in a conventional way. These NPs behaved more like manner adjunct and, thus, the decision was taken to remove them from the data analysis, which was then performed only on those items that contained clearly ACC-marked internal arguments.

4.3.2.4.   Targets

Just like in the priming studies which tested passive structures against active,

209

the design of the target images for this experiment had to be such that they could be described using either of the priming structures tested – 2-AV or 3-AV sentences. To establish whether they were equally likely to elicit the two structures, the target animation sequences were subjected to two rounds of piloting, the first was conducted face to face and the second – online. Following the results of this pilot phase four out of ten events tested were established as suitable for the main experiment. The responses showed that the participants were equally likely to describe the events either using monotransitive verbs, or complex predicates of the kind discussed in section 4.3.2.2, which contained lexically prefixed verbs and, optionally, an NP [location] argument within a PP. For example, a target image of boy putting a scooter behind a wall was described either with a 2-AV monotransitive *katat'* (roll) or a 3-AV *zakatit'* (behind-roll/to roll behind); or an image of a boy moving a wardrobe away from a window was described either with a monotransitive *tolkat'* (push) or a 3-AV *otodvinut'* (from-move/move away from)[40].
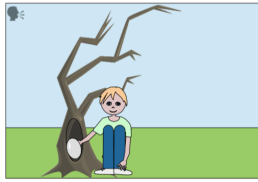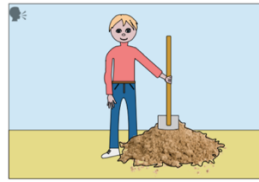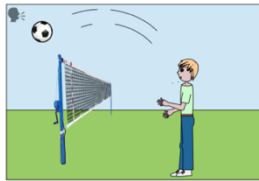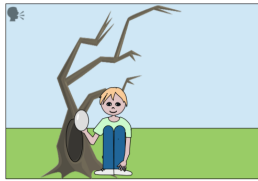
Once it was confirmed that the piloted events were compatible with both 3-AV and 2-AV responses, to create a full set of 16 targets, each of these four events was used four times, every time with different entities. The only referent that stayed the same across the target events was the subject (boy) (see examples in Table 4. 2, belo and Appendix 3 for the full list of target items). Every target event was then paired up with a 2-AV or a 3-AV variant of the prime, e.g. a prime containing a girl, a jug and stairs in either of the two conditions was always followed by a target depicting a boy moving a spoon away from a plate.

In addition to the prime and target images, 80 fillers (8 were repeats), were included in the experimental set (40 for the prime set and 40 for the target set). The filler images were identical to the ones used in the Experiment 1, 4a and 4b.

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[40] As highlighted in section 4.3.2.2, the verbs with a [location] argument PP like those used in for the primes, e.g. *postavit' (na)* / place (on), and complex predicates such as *otodvinut' (ot)* / from-move from, may project constructions which are distinct in their underlying syntax despite the fact that both of them have two internal arguments. This aspect was overlooked when the experimental stimuli were created. However, as we shall see from the priming patterns observed in Experiment 6, the two predicates nevertheless appear to share some argument-structural properties which seem to be strong enough to evoke priming from one to another even in the absence of surface constituent structure similarity between the sentences they project.

Table 4. 2 Examples of targets, Experiment 6.

Boy throws away shoe/throws shoe over stream.	Boy throws away ball/throws ball over fence.	Boy holds egg /pulls egg out of tree-hole.	Boy holds spade /pulls spade out of sand-heap.

The items were presented in a pseudo-randomised order ensuring that there was a minimum of two filler prime-target pairs between the experimental items and that for each of the four primes containing the same verb there was a target that could be described with one of the four target verbs. Two item order lists were created, half of the participants in each condition received order 1, and the other half received order 2 (the analysis showed no effect of the order of item presentation).

4.3.3. Procedure.

The procedure was the same as in Experiment 4b with the adult English speakers. The participants were assigned to one the three conditions, the 2-argument verb (monotransitive) condition (2-AV), the 3-argument verb (3-AV) condition and the no-prime baseline, and tested individually in a quiet room. The procedure lasted approximately between 10 and 15 minutes. The responses were audio-recorded, transcribed and coded for analysis.

4.4.　　　　　　　　Coding

　　　The responses were only considered for one of the codes specified below if the target description was semantically faithful to the depicted target image event, the target responses which were not, were coded as *other*.

　　　In order to explore the Constituent Structure Priming hypothesis, the *NP-V-NP-PP* category was created. A response was coded as *NP-V-NP-PP*, only if it adhered to the NP-V-NP-PP constituent order. This category included responses that followed the exact structure of the primes, i.e. 2-AV monotransitives with an adjunct, e.g. Malʹčik dvigaet ložku okolo tarelki/BoyNOM moves spoonACC near plateGEN, or 3-place predicate sentences with a [location] object PP, e.g. Malʹčik položil ložku na stol/BoyNOM put spoonACC on tableACC. This category included responses containing complex 3-place predicates with a [location] NP within a PP, e.g. Malʹčik otodvinul ložku ot tarelki/BoyNOM from-moved spoonACC from plateGEN. The 3-AV responses, where the PP was omitted, but an adjunct was added instead, were also coded as *NP-V-NP-PP*, but only if they followed the NP-V-NP-PP constituent structure, e.g. *Malʹčik perebrosil botinok (čerez lužu) na druguju storonu*/BoyNOM over-threw shoeACC (over puddleACC) on other sideACC, where the bracketed element denotes the omitted PP containing the [location] argument.

　　　A response was coded as *3-argument verb response (3-AVR)* as long as it contained a 3-place predicate and the agent in the subject position. The vast majority of 3-AVR were constructions that I earlier analysed as containing complex predicates with a [location] NP within a PP. The category included 3-AV target responses with or without an overtly realised arguments following either canonical orders, e.g. *Malʹchik vytashchil lopatu (is peska)*/BoyACC out-pulled spadeACC (out-of sandGEN), or scrambled orders, e.g. *Malʹchik (iz peska) lopatu vytashchil*/BoyACC (out-of sand) spadeACC out-pulled. The 3-AVR which contained an additional PP adjunct were also included in this category, whether they had all their arguments realised or not, e.g. *Malʹčik perebrosil botinok (čerez lužu) na druguju storonu*/BoyNOM over-threw shoeACC (over puddleACC) on other sideACC. This category was created in an attempt to assess the influence of the argument structure of the prime above the effects evoked by its surface constituency or by the underlying syntax. This is because the scrambled orders of 3-AV constructions differ from their

canonical orders not only in their constituent structure, but also in their underlying syntactic architecture, although the latter would depend on the theory adopted.

Another, narrower category of 3-argument verb responses was later added as a post hoc measure. A target description was coded as *incomplete 3-argument verb response (Inc.3-AVR)* if it had the agent in the subject position and a 3-AV, but contained neither an optional PP argument, nor a PP adjunct, e.g. Mal'čik položil ložku/BoyNOM put spoonACC, or Mal'čik otodvinul ložku/BoyNOM from-moved spoonACC. Both canonical and scrambled orders were included. Such coding category was created because the production of both, the *3-AV* and the *NP-V-NP-PP* responses could be driven not only by the constituent or argument structure of the primes, but also by some of their non-syntactic aspects. Specifically, it was possible that, rather than being influenced by the argument structure of the primes, the target responses were affected by the fact that the experimenter's descriptions contained all three referents depicted in the primes (e.g. the girl, the jug and the steps). The structural options for the participants to describe the targets so that the three referents depicted in there could be mentioned were limited, and the most appropriate of them were full 3-AV and 2-AV monotransitive constructions with an adjunct. The *Inc.3-AVR* category was useful for the analysis because such responses could not have been the result of the three-referent repetition since only two depicted referents appeared as part of the Inc.3-AV responses.

Note that some responses were included in more than one of category. For example, a 3-argument verb response formed part of the NP-V-NP-PP category if it followed this constituent order, but it was also included in the 3-AVR category irrespective of its surface constituent structure. Further, a 3-argument verb response that was missing its optional argument was included in the 3-AVR as well as in the Inc.3-AVR category.

To establish the transitivity of the motion verb appearing in the target responses, the diagnostics discussed in section 4.3.2.2 were implemented. Non-motion verb responses were dismissed and coded as *other* since the target events were such that describing them with a non-motion verb would yield semantically unfaithful description. When the verb was a prefixed motion verb, the tests for the lexical/superlexical prefixation (Romanova, 2006) were applied: if the verbal prefix was identified as lexical, the verb was considered as 3-place predicate and the response coded accordingly, if the prefix was superlexical, the verb was judged to be

monotransitive and coded as *other*. If the motion verb was unprefixed, the tests identifying its type, i.e. directed vs. non-directed were used. Following Romanova (2006), only the directed verbs were then considered as 3-place predicate and categorised according to the system outlined above.

All other structures were coded as *other*; those included intransitive sentences, constructions with monotransitive verbs which did not follow the structure of the prime, semantically unfaithful descriptions, and incomplete and one-word utterances.

4.4.1. Results

Recall that the analysis was performed only on the items involving ACC-marked internal arguments. The summary of results for Experiment 6, including NP-V-NP-PP, 3-argument verb responses (3-AVR), and incomplete 3-argument verb responses (Inc.3-AVR) are presented in Table 4. 3 below.

Table 4. 3 Proportion of NP-V-NP-PP, 3-argument verb responses (3-AVR) and incomplete 3-argument verb responses (Inc.3-AVR) produced across the conditions by the Russian-speaking adults, Experiment 6.

condition	NP-V-NP-PP	3-AVR	Inc.3-AVR
baseline (n=23)	29.4 (54)	42.9 (79)	17.4 (32)
2-AV (n=23)	51.6 (95)	55.4 (102)	9.8 (18)
3-AV (n=23)	45.1(83)	70.1 (129)	23.4 (43)

In order to explore the Constituent Structure Priming hypothesis, the first dependent measure analysed was the category of NP-V-NP-PP responses. A one-way ANOVA was run on the proportion of these responses with one between-subject variable of condition (3 levels: baseline, 2-AV and 3-AV condition). The analysis returned a significant effect of condition ($F_{(2, 66)} = 4.469$, $p = .015$). The post hoc tests with Bonferroni corrections for multiple comparisons revealed that the effect was due to a significantly higher proportion of NP-V-NP-PP responses produced in the 2-

AV condition (M = 51.6) than in the baseline condition (29.4) (p = .015) with no differences between any other conditions (see Figure 4. 3).

Figure 4. 3 Average proportion of NP-V-NP-PP responses produced across the conditions by Russian-speaking adults, Experiment 6.
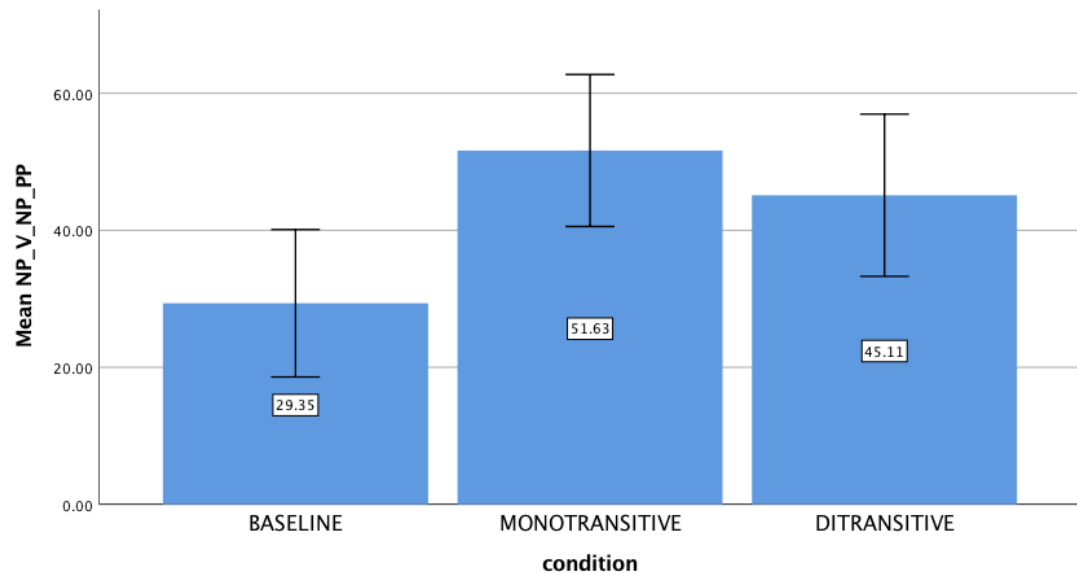
In order to explore whether priming is susceptible to the number of arguments a verb subcategorises, a one-way ANOVA with a between-subject factor of condition (baseline, 2-AV and 3-AV condition) was run on the proportion of 3-AVR. The analysis returned a significant effect of condition ($F_{(2, 66)} = 10.907$, $p < .001$), which, the post hoc tests revealed, was due to more 3-AVR in the 3-AV condition (M = 70.1) than in the baseline (M = 42.9) ($p < .001$) or the 2-AV condition (M = 55.4) ($p = .043$). No difference in 3-AVR between the baseline and the 2-AV condition was detected ($p = .107$). See the result in Figure 4. 4.

Figure 4. 4 Average proportion of 3-agument verb responses (3-AVR) produced across the conditions by Russian-speaking adults, Experiment 6.
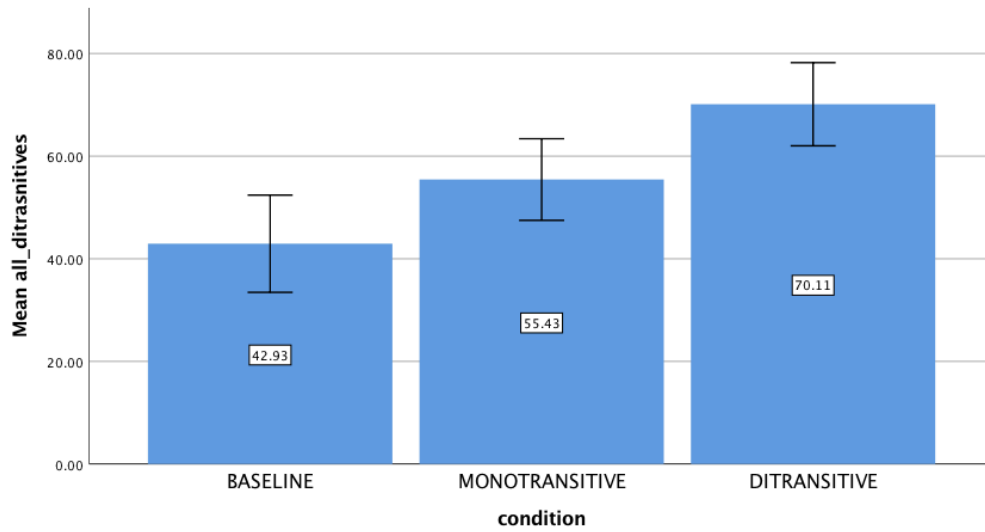
The categories selected for the analyses presented above, however, are compatible not only with the respective hypotheses they were supposed to test. While analysing the NP-V-NP-PP category possibly addresses the Constituent Structure Priming hypothesis, as discussed in the previous section, the results for this measure could have been potentially driven by an artefact unrelated to the prime structures: hearing primes which contained three nouns denoting three elements in the prime picture might have prompted the participants to include three nouns in their own target descriptions as well. The same issue is relevant with respect to the category of 3-AV responses, which was created to address the Argument Structure Priming Hypothesis, as it could be that most of these responses were actually those containing three referents.

In an attempt to tease apart the potential effects of this, a one-way ANOVA was run on the proportions of incomplete 3-argument verb responses (Inc.3-AVR). Since the assumption of homogeneity of variance was violated for these data, the Welch's adjusted F ratio was used for the analysis, which returned statistically significant effect of condition (Welch's $F(2, 40.961) = 5.917$, $p = .006$). The post hoc tests with Games Howell corrections for multiple comparisons indicated that the effect was due to a higher proportion of Inc.3-AVR produced in the 3-AV condition (M = 23.4) compared to the 2-AV condition (M = 9.8) (p = .011). No other differences reached significance. See the results in Figure 4. 5 below.

Figure 4. 5 Average proportion of incomplete 3-argument verb responses (Inc.3-AVR) produced across the conditions by Russian-speaking adults, Experiment 6.
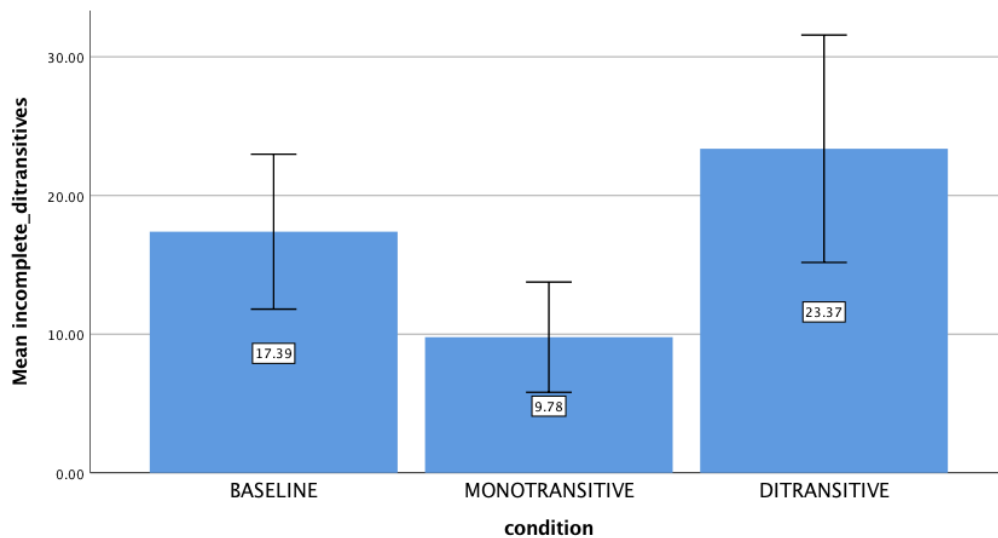
4.4.2. Discussion

One of the aims of the experiment was to test the Constituent Structure Priming hypothesis in Russian. According to this hypothesis priming functions only on the level of surface constituent order and is blind to the argument structure of a sentence. On this hypothesis (*H0*), the increase in the production of the NP-V-NP-PP targets was expected in both, the 2-AV monotransitive and 3-AV condition compared to the baseline, since the two primes followed the same constituent structure. The results from the proportion of the NP-V-NP-PP responses demonstrated that there was a statistically significant increase in the production of the NP-V-NP-PP responses in the monotransitive condition compared to the baseline. However, the analysis also showed that the participants were as likely to produce the NP-V-NP-PP constructions in the 3-AV conditions as they were in the baseline condition. The predictions for the Constituent Structure Priming were thus not fully borne out, which suggests that the evidence for such priming, if it indeed exists, is rather weak.

The results for the second measure, the proportion of 3-AVR, which incorporated any construction with a 3-argument verb and the agent in the subject position, regardless of whether the response followed a canonical or a scrambled order or whether it contained optional argument or not, showed that the participants

217

were more likely to produce these responses after hearing the 3-AV primes than after the exposure to the 2-AV primes or when no primes were heard. This is exactly what the Argument Structure Priming hypothesis predicted. The results suggest that speakers are sensitive to the prime verb's argument structure, and that any constituent order repetition observed in these data, i.e. in the monotransitive condition, is perhaps consequential to this sensitivity.

It is also important to highlight that while the 3-AV primes contained the structures with the [location] PP argument, e.g. *Devočka postavila kuvshin na stupen'ki*/ GirlNOM placed jugACC on stepsACC, the vast majority of the 3-argument verb constructions produced were those I analysed as complex motion 3-place predicates, e.g. *Mal'čik* **oto**dvinul *ložku* **ot** *tarelki*/BoyNOM **from**-moved spoonACC **from** plateGEN, where the prefix, the verb and the preposition formed a unit and the [location] NP was one of its arguments. This suggest that priming might occur even when the prime and the target are not strictly matched on their argument structure, as long as they share such properties as the number of arguments and their thematic and event-structural ranking valued as discussed in section 1.4. Indeed, both 3-place predicate structures subcategorise for two internal arguments, which are theme (ranked as iv) and location (ranked as iii), and in both cases these arguments take part in the similar sub-events which can be represented as [X CAUSE [Y BE AT Z]] for the 3-AV prime sentences and [X CAUSE [Y RELATE TO Z] for the complex predicate 3-AVR targets of the kind highlighted above.

Setting aside the above, as I suggested earlier, the proportions of 3-AVR may have been boosted by a superficial effect of the three-referent repetition – the participants heard primes where all three referents were mentioned and subsequently produced targets where they also mentioned three referents. In an attempt to separate this superficial effect[41] from possible effects of argument structure priming, further analysis was run on the incomplete 3-agument verb responses (Inc.3-AVR). As expected on the Argument Structure Priming Hypothesis, there was no difference

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[41] It is noteworthy that a tendency for the same effect was observed in Experiments 4b. In these studies, the participants were also exposed to the primes which contained three entities in both, the locative and the passive condition. Additional analysis was run on the full passive and active responses combined (those were the responses which, as primes included all three entities depicted) showed that such responses were at 63% in the baseline condition, which increased to 72% in the locative and 75% in the passive condition.

between the proportion of Inc.3-AVR targets produced in the 2-AV condition and the baseline since the verbs in the 2-AV condition were monotransitive. Importantly, after the exposure to the 3-AV primes, the participants constructed more than twice as many Inc.3-AVR target descriptions (23%) as they did after hearing the 2-AV primes (10%). There was also an increase of Inc.3-AVR targets in the 3-AV condition compared to the baseline (23% vs. 17%), albeit statistically insignificant. The above indicates that it is not only those 3-argument verb targets that happen to have three referents that brought about the significant increase of 3-AVR in the 3-AV condition.

Thus, taken together the results for the 3-AVR and Inc.3-AVR measures demonstrate that the speakers were indeed influenced by the number of arguments the verb in the prime subcategorised for. The findings could be interpreted as evidence that such priming is effective even (1) when the surface constituent structure of the prime differs from that of the target; (2) when the syntactic structure of the prime and the target do not fully match; (3) in the absence of strict argument-structural similarity between the prime and the target (although the latter should be treated with caution). The results support the Argument Structure Priming hypothesis, suggesting that syntactic priming effects are devoid from either the effects of surface constituent structure priming (if indeed priming functions on such level) or a superficial three-referent repetition.

4.5. Conclusion

The experiment reported in this chapter tested the Constituent Structure Priming hypothesis which states that priming functions on the level of linear surface constituent order only and is insensitive to the argument structure of the verbs in primes. In contrast to this proposal, the findings from Experiments 4a, 4b and 5 discussed in Chapter 3, showed that there was no indication that the constituent structure could be primed. Be that as it may, just like the data used to argue for the constituent structure repetition phenomenon (e.g. Bock, 1986; Bock & Loebell, 1990), these data were also obtained from the English speakers. Thus, the main objective of Experiment 6 was to address this hypothesis cross-linguistically, I thus turned to the evidence from Russian.

I have highlighted that there was a number of challenges in relation to identifying a suitable alternative to the English constructions Bock and Lobell (1990)

219

utilised in their study. What is more, I have shown that even after the choice of the Russian structures appropriate for testing the Constituent Structure Priming hypothesis was made, the existing argumenthood diagnostic tests available for Russian were complex and not always conclusive.

Taking into consideration the above, 3-AV construction with a [location] PP argument and monotransitive constructions with a locative PP adjunct were selected as the most suitable primes. These structures were pitted against each other and against a no-prime baseline. On the Constituent Structure Priming hypothesis, an equal increase of the NP-V-NP-PP responses in both, the 3-AV and the 2-AV conditions were expected compared to the baseline since both of the primes adhered to the NP-V-NP-PP constituent frame. The results of Experiment 6 provided unconvincing evidence for this hypothesis as the proportion of NP-V-NP-PP targets increased only in the monotransitive condition. Moreover, a statistically significant increase in the responses containing a 3-argument verb was detected only in the 3-AV condition, while in the monotransitive condition it remained the same as in the baseline. These findings offer support to the Argument Structure Priming Hypothesis, specifically, they suggest that syntactic priming is sensitive to the number of arguments a predicate takes.

Finally, the analysis on the proportions of the incomplete 3-place predicate responses where the [location] argument was omitted, showed that the production of these sentences was triggered by the 3-place predicate primes only. This pattern of responses suggests that the constituent structure is not only insufficient for priming to occur, but it is also not necessary since the target responses only contained a verb and a subject noun while the primes always followed NP-V-NP-PP structure.

5. **Conclusion**

5.1. Overview

The main aim of this dissertation has been to seek support for the hypothesis I termed *Argument Structure Priming* that priming is sensitive to abstract syntactic representations which integrate information on the argument structure of a predicate. Specifically, I argued that priming is susceptible to such argument-structural properties as (1) the number of arguments the predicate subcategorises for, (2) their prominence ranking as per the thematic and event structure hierarchy, and (3) the valence-changing operations it may undergo. This information is said to be available for the speaker at the lemma stratum as part of the predicates' lexical make-up (Levelt, 1989) and therefore, it affects the early stages of speech processing and production, specifically, the grammatical encoding phase. Points (1) and (3) were addressed experimentally in Chapters 3 and 4, while (2) was discussed in Chapter 1 in relation to the existing priming research findings.

My proposal stands in stark opposition to the claim that priming is driven by shallow syntactic representations and as such is manifested by a repetition of a mere linear surface order of constituents in a sentence. This view, which I referred to as *Constituent Structure Priming*, was first put forward by Bock (1986) and Bock and Loebell (1990) and was based on their seminal experimental work which demonstrated that subconscious structural repetition was independent from metrical (i.e. rhythmic or phonological forms of functional words or morphemes), lexical or semantic properties of the prime sentences speakers were exposed to. The account has been one of the most prominent views of syntactic priming for over thirty years and is still well-established and frequently cited in the literature.

The findings from a number of recent priming experiments have suggested however that priming reaches beyond the level of abstract constituent order repetition and is in fact susceptible to the prominence of specific thematic units of an utterance, the prominence that is defined by a linear precedence of a given thematic element. For example, it has been proposed that a passive structure is endowed with a discourse function of emphasising the [patient] argument in a sentence. Such function is argued to be shared by other, syntactically unrelated constructions, one of which is

the Russian OVS where the [patient] argument precedes the [agent] argument just as in a full Russian canonical participle passive (Vasilyeva & Waterfall, 2012). On this account, which I called the *Patient Prominence Priming* hypothesis, priming applies at the discourse functional level. This means that after being exposed to a prime, instead of reproducing its structure, speakers may generate a syntactically simpler, more frequent and/or less cognitively taxing syntactic construction that shares its discourse-functional make-up with the prime. To demonstrate, hearing an English passive would subsequently trigger the production of English passives, because there is little alternative to the passive when it comes to the patient-agent orders in English. On the other hand, hearing a Russian passive, the structure that is severely marked, would result in production of OVS amongst other frequent constructions where the patient precedes the agent.

I proposed, however, that the interpretation of the findings which were used to advocate for the Constituent Structure and the Patient Prominence hypotheses were based on the experiments that were flawed. I have suggested that the Argument Prominence Hierarchy (APH) which governs the linear order of arguments in a sentence (Titov, 2012, 2017) was not taken into account when designing the events to be described by the participants as part of a priming task. Specifically, the animacy, one of the integral features of the APH, was not controlled for, which then resulted in asymmetrical animacy distribution in the targets, e.g. the [patient] argument was animate (or human) and the [agent] argument was inanimate. As per AHP, such animacy mapping triggered the production of constructions where an animate entity preceded an inanimate, regardless of the prime structure the participants were exposed to. In addition, no baseline condition was included, meaning that other priming sentences (e.g. active) were treated by these authors as a baseline, and, as I argued, could themselves have affected the direction of priming.

The data from the six experiments conducted with native English- and Russian-speaking adults and children aged 4 to 7 years reported in Chapters 2, 3 and 4 of this thesis provides strong evidence in support of the Argument Structure Priming hypothesis and present challenges for both, the Constituent Structure and the Patient Priming accounts.

At the same time the present findings highlight the significance of animacy distribution in the target events of a priming task. The five experiments (Experiments 1-5) where the animacy distribution in the targets was controlled and manipulated,

demonstrated a strong tendency to use constructions where the patient appeared before the agent (or where the agent was omitted altogether) when the events the participants described had an [+animate] patient and an [-animate] agent. This tendency was found to be statistically highly significant in both languages, for both age groups, experiment after experiment.

Addressing the Patient Prominence in Chapter 2, I have hypothesised that from a theoretical point of view the patient prominence cannot be subject to syntactic priming as it is not encoded in syntax. As the Patient Prominence Priming effects found in Vasilyeva and Waterfall's (2012) and Fleischer et. al.'s (2012) experiments can be accounted for by the unequal animacy distribution in the targets, a possibility of such priming would be eliminated by Occam's Razor. Empirically, the present experiments offer no evidence in support of this kind of priming. Indeed, no increase in production of the so-called passive alternatives (i.e. non-passive structures claimed to emphasise the patient in a sentence just like the passive itself) was found either in the responses produced by the Russian speakers or by the English participants after the exposure to the passive participle. This is particularly important in relation to the Russian data since there is a number of constructions the Russian speakers could potentially have selected to reproduce the patient-agent order without resorting to the infrequent Russian passive. Additionally, the analysis of the OVS and agentless responses obtained in Experiment 1 allowed to hypothesise that the status of the external argument might be a factor moderating syntactic priming effects.

In Chapters 3 I have further argued that for priming to occur, the prime and the target must be syntactically alike, and by this I do not mean the similarity in their linear surface constituent structure. Rather, the syntactic similarity must be found within the lemma stratum, specifically, at the level of argument structure representations. The results from Experiments 4a, 4b and 5 were in line with the Argument Structure Priming Hypothesis and indeed demonstrated that the argument-structural representations are relevant for priming. By pitting the English full passives against the intransitive constructions with a locative adjunct and a no-prime baseline, I have shown that an increase in the proportion of passive responses only emerges after hearing passive sentences, in other words, priming is observed only when the prime and the target match in their argument structure. The exposure to a structure identical to the passive in its constituent order (i.e. NP-aux-V-PP), namely, an intransitive prime with a locative adjunct, did not promote production of passive target responses.

Further, if the unaccusivity diagnostics run on the intransitive prime sentences were correct, the differences between the primes that followed a full passive construction and the primes which contained an intransitive structure with a locative PP adjunct, went even beyond the distinction in their underlying syntax, i.e. the architecture of the movement chains within them. Indeed, the passive and the unaccusative sentences were identical in terms of the base positions of their grammatical subjects, the difference between them was in the type of the valence-changing operation applied to their external arguments. The results therefore suggest that it is the argument-structural aspects, but not the underlying syntactic representations that are subject to priming.

In Chapter 4 I have presented further evidence in support of Argument Structure Priming and against Constituent Structure Priming. The experiment reported in Chapter 4 was conducted with the Russian speakers. The participants were exposed to 3-place predicate primes with a [location] argument PP and the 2-place predicate primes with a locative adjunct, and, importantly, to a no-prime baseline. The results demonstrated that the speakers were more likely to describe the target events using a 3-argument verb construction after hearing a 3-argument vebt prime than after hearing a monotransitive 2-argument prime. Moreover, these effects were also detected in the absence of surface constituent structure similarity between the prime and the target. Indeed, the proportion of 3-place predicate target responses in which the optional [location] argument PP was not realised overtly, was higher after hearing 3-argument verb primes than in the 2-argument verb condition. This suggests that the argument-structural properties of a sentence play a significant role in syntactic priming, and that the constituent structure similarity is not only insufficient, but also to the extent that it was present at all, a weaker factor compared to the effects of the argument structure.

It is important to note that I make no specific claims regarding the exact nature of structure-building syntactic representations and the way the argument structure of a predicate entering the numeration might affect such representations per say, or how this information is conveyed through priming. These issues will be left for future work. However, if the interpretations of the present empirical enquiry are correct, they have a potential to constrain or shape the theoretical conceptualisation of the lexicon-syntax mapping.

As established in Chapter 1, in order to construct a full picture of language system or at least one of its components, it is necessary to assess the quality of changes this system undergoes during its acquisition and development. Although the research in language acquisition continues to observe differences in the way adults and children display their linguistic competence (see Lust, 2010), the question relating to the nature of these differences remains open. There are two competing nativists models of language acquisition, which take a different stance on the problem of divergence in the linguistic competence of children and adults, the *Maturation Hypothesis* (Borer & Wexler, 1987) and the *Continuity Hypothesis* (Crain, 2002; Pinker, 1984). On the Maturation account, a given linguistic property, if it has not biologically matured, would not be available to the child, and it is at this point the child's grammar differs from the adult's qualitatively. On the Continuity account, all innate grammatical universals are available to the child early on, and her grammar diverges from the adult's only with respect to the linguistics aspects that might differ between languages (Crain and Thornton, 2015).

While I have not specifically advocated for either of the approaches in this dissertation, the child data obtained as part of the present enquiry is compatible with the Continuity hypothesis, the stronger hypothesis of the two. As discussed, the present experiments run with the native Russian and English-speaking adults reported in this thesis provided little evidence to suggest that priming in adults is sensitive either to the surface constituent structure or to the thematic object prominence in a sentence. To maintain the Continuity approach, the children should have demonstrated similar linguistic behaviour with respect to the constituent structure and patient prominence representations. If the children were observed to take holistic shortcuts during their sentence production as part of a priming task, namely, to rely on such simple concepts as linear constituent structure or thematic prominence, it would have been very problematic for the Continuity model.

However, despite the general immaturity of the cognitive systems (e.g. underdeveloped short-term memory), the patterns of the responses exhibited during the experiments by the English and Russian children as young as 4 years of age were in many respects very similar to those observed in the adult's data, particularly in relation to the Constituent Structure and Patient Prominence Priming hypotheses

addressed in this thesis. No evidence for these types of priming was detected in Experiments 2, 3 or 5, which warrants us to sustain the Continuity hypothesis. Just like the adults, the children demonstrated (i) a strong sensitivity to the animacy distribution in the target events, showing a preference to the constructions where the [patient] argument appeared before the [agent] argument (or where the agent was omitted altogether) whenever the event they were describing had an [+animate] patient and an [-animate] agent; (ii) a perceptivity to argument-structural properties of the prime. The former provided a strong evidence for the Argument Prominence Hierarchy Hypothesis (Titov, 2012; 2017), and the latter supports the Argument Structure Priming Hypothesis defended in this thesis.

5.3. Limitations of the Present Work and Future Directions

The current experimental work lends support to the view that syntactic priming is sensitive to the argument structure of the prime's predicate. There is nevertheless a number of unanswered questions related first to the exact nature of the argument-structural properties that may be relevant for priming, and second, to the mechanisms underpinning the retainment and subsequent reproduction of such information. The future enquiry addressing the above must be firmly grounded in the theoretical framework that can predict and describe the precise syntactic behaviour of linguistic units entering the numeration based on their lexical features. Some of the issues outlined in this section highlight this necessity.

The results obtained in Experiments 4 and 5 suggest that there is no unaccusative-to-passive priming despite the two structures following identical underlying syntactic representations. At the same time, Experiment 6 suggested that 3-argument verb constructions with a [location] argument PP can trigger the production of sentences with distinct underlying syntax, namely, complex 3-place predicate constructions containing a predicative unit made up of a verb, a preposition, and a [location] NP. Such results suggest that priming is sensitive to the number of arguments a given predicate takes irrespective of its underlying syntax. Further, the proportion of target responses which contained complex 3-place predicates but were missing optional [location] argument, increased after hearing full 3-argument verb primes where all three arguments were overtly realised. Such pattern implies that

what is important for priming is the number of arguments the verb in a prime subcategorises for rather than how many arguments are actually overtly realised.

The issue here is that these results suggest a rather shallow conceptualisation of the argument structure, appealing to the number of arguments of the main source of priming while ignoring other argument-structural aspects such as the fact the [location] argument PP in the Russian 3-argument verb construction primes had internal thematic structure, while the PP containing the [location] NP argument in the 3-argument verb responses the Russian speakers produced after hearing the former, did not. A strong theoretical foundation which addresses the concerns of lexicon-to-syntax mapping is required to explain such results and to explore the issue further.

Another important point to make is that my interpretation of the results showing no priming from the locative intransitive sentences to the passive is based on the assumption that the unaccusivity diagnostics applied to the intransitive verbs in the primes were correct. However, not only these diagnosticts were mainly suitable for English and German rather than Russian, but they also were somewhat inconclusive. It is therefore possible that some of the verbs in locative primes were, in fact, unergative, which makes the underlying structure of such primes much less similar to the passive than assumed. If indeed the verbs tested were unergative, the passive and the locative primes were distinct not only in their argument structure, but also in their underlying syntax. This undermines my proposal that syntactic representations reflecting the identity of movement chains may be subject to priming only as a consequence of the argument structure, allowing to suggest that priming may be attributed to the underlying syntax of the priming sentences rather than the argument structure of the prime verb. Further investigation is needed here, perhaps utilising languages where the diagnostics for unaccusivity might be more robust.

Thus, future work aiming to establish whether underlying syntactic representations which include the architecture of movement chains in and of themselves may be responsible for syntactic priming effects, must be embedded in a theoretical framework which provides enough detail on the argument structural aspects highlighted above. In addition, in order to test more subtle differences in the argument structure of the primes, for example, those that go beyond the similarity in a number of internal arguments or the types of lexical operations applied to external arguments, the enquiry should also extend to other structures and other languages.

Yet another pattern observed in the current data offers an interesting avenue for further research. Experiment 1 demonstrated that the one hand, the active SVO appeared to have primed both active structures, SVO and OVS, although admittedly the effect did not reach statistical significance; but on the other, the OVS primed exclusively OVS. The results were greatly modified by the animacy distribution in the targets. Systematic investigation into this issue, might shed the light not only on the nature of the information relevant for priming, but also on the theoretical debate that relates to the derivation of the OVS construction in Russian (e.g. Bailyn, 2004; Ionin & Luchkina, 2018; Slioussar, 2007; Titov, 2013). More generally, it is an open question what type of dependencies are subject to syntactic priming. It is perhaps possible that A-bar movement and A-movement behave differently in this regard.

Experiments 1 to 5 clearly demonstrated the impact of the animacy distribution on structural selection made by Russian- and English-speaking participants in the context of a priming task. However, other interpretive features such as presupposition, humanness and referentiality (as per the Argument Prominence Hierarchy hypothesis, which may influence the syntactic choices made as part of a priming task as well as during spontaneous speech production, also require systematic testing.

The final issue which should be highlighted is the argument-structural status of Russian NPs marked with Instrumental Case. Experiment 6 failed to evaluate the impact of the transitive constructions containing these NPs. What was clear from the data, however, that they behave differently from the Accusative-marked arguments. In the literature these structures are referred to as *non-core participants* (Rákosi, 2012) or *circumstantial phrases* (Cinque, 2006), and are argued to combine the properties of arguments and adjuncts, behaving like arguments in some syntactic tests and like adjuncts in others. Such constructions present an opportunity to test the effects of argument structure priming and to establish how exactly these structures differ from true arguments.

To conclude, the empirical findings reported in this dissertation pave the way to explore the syntactic representations that stretch beyond the surface constituency. The future experimental work adopting syntactic priming methodology could potentially provide further evidence for the psychological reality of the grammatical structure of language.

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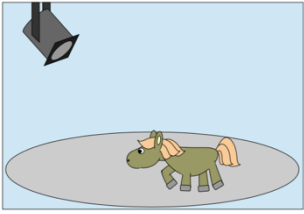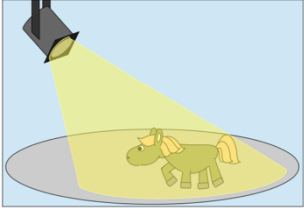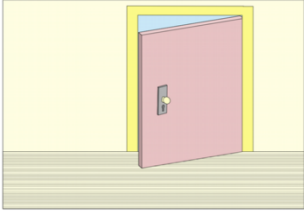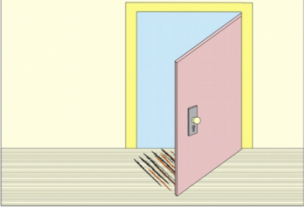
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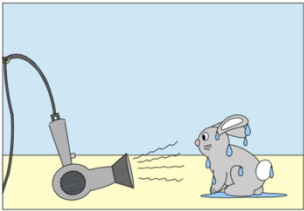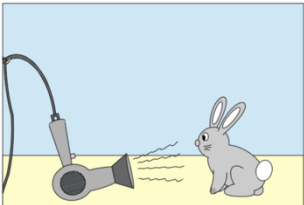
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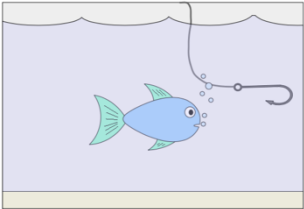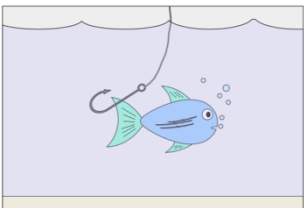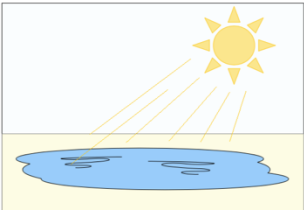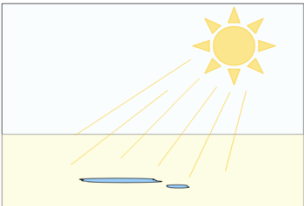
Table 4. 4 Full set of priming stimuli for Experiments 1, 2 and 3 conducted with Russian-speaking adults and children, and with English-speaking children.
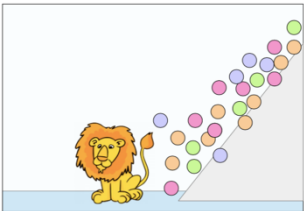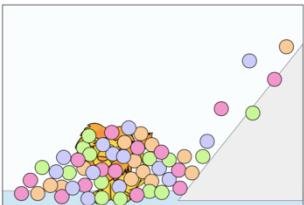
	Prime event	Prime structure
1.		Active/SVO prime: Снег засыпал холм. The snow covered the hill. Passive prime: Холм был засыпан снегом. Hill was covered by the snow. Active/OVS prime: Холм засыпал снег. The HillACC covered the snowNOM.
2.		Active/SVO prime: Прожектор отсветил лошадку. The spotlight illuminated the horse. Passive prime: Лошадка была освещена прожектором. The hose was illuminated by the spotlight. Acitve/OVS prime: Лошадку осветил прожектор. The HorseACC illuminated spotlightNOM.
3.		Active/SVO prime: Дверь поцарапала пол. The door scratched the floor. Passive prime: Пол был поцарапан дверью. The floor was scratched by the floor. Active/OVS Пол поцарапала дверь. The floorACC scratched the doorNOM.

4.
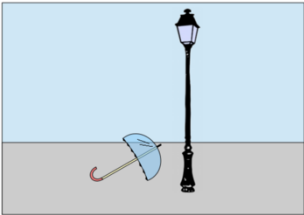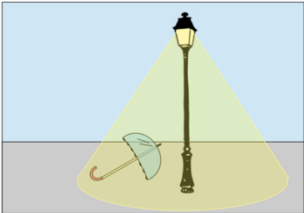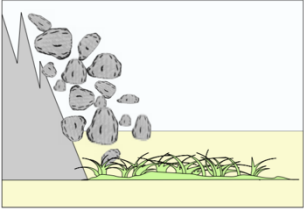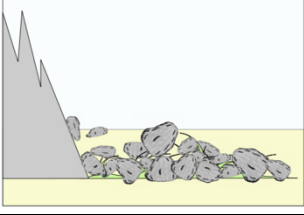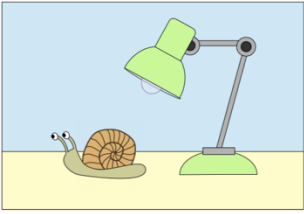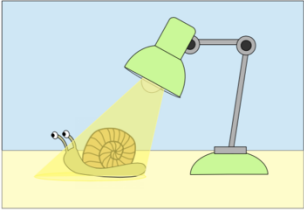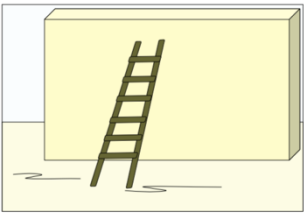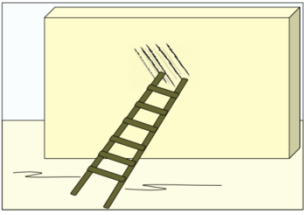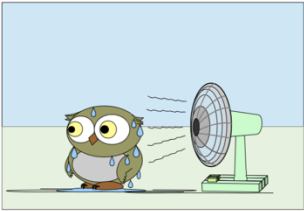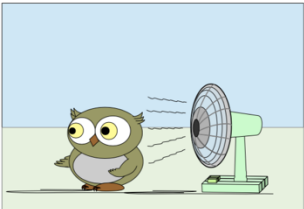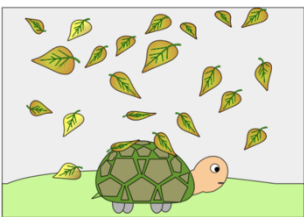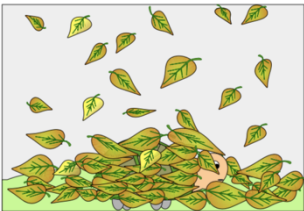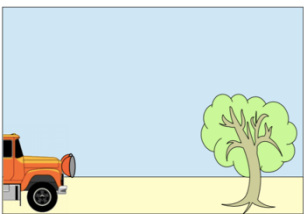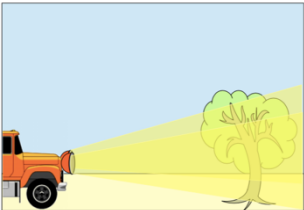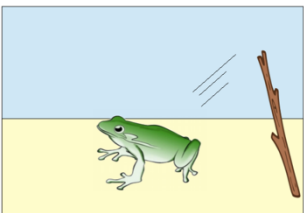
Active/SVO prime:
Фен высушил зайчика.
The hairdryer dried the rabbit.

Passive prime:
Зайчик был высушен феном.
The rabbit was dried by the hairdryer.

Avtive/OVS prime:
Зайчика высушил фен.
The rabbitACC dried the hairdryerNOM.

5.

Active/SVO prime:
Крючок поцарапал рыбу.
The fish-hook scratched the fish.

Passive prime:
Рыба была поцарапана крючком.
The fish was scratched by the fish-hook.

Active/OVS prime:
Рыбу поцарапал крючок.
The fishACC scratched the fish-hookNOM.

6.

Active/SVO prime:
Солнце высушило лужу.
The sun dried the puddle.

Passive prime:
Лужа была высушена солнцем.
The puddle was dried by the sun.

Active/OVS prime:
Лужу высушило солнце.
The puddleACC dried the sunNOM.

7.

Active/SVO prime:
Шарики засыпали льва.
The balls covered the lion.

Passive prime:
Лев был засыпан шариками.
The lion was covered by the balls.

Active/OVS prime:
Льва засыпали шарики.
The lionACC covered the ballsNOM.

8.

Active/SVO prime:
Фонарь осветил зонтик.
The street-lamp illuminated the umbrella.

Passive prime:
Зонтик был освещён фонарём.
The umbrella was illuminated by the street-lamp.

Active/OVS prime:
Зонтик осветил фонарь.
The umbrellaACC illuminated the street-lampNOM.

9.

Active/SVO prime:
Камни засыпали траву.
The rocks covered the grass.

Passive prime:
Трава была засыпана камнями.
The grass was covered by the rocks.

Active/OVS prime:
Траву засыпали камни.
The grassACC covered the rocksNOM.

10.

Active/SVO prime:
Лампа осветила улитку.
The table-lamp illuminated the snail.

Passive prime:
Улитка была освещена лампой.
The nail was illuminated by the table-lamp.

Active/OVS prime:
Улитку осветила лампа.
The snailACC illuminated the table-lampNOM.

11.

Active/SVO prime:
Лестница поцарапала стену.
The ladder scratched the wall.

Passive prime:
Стена была поцарапана лестницей.
The wall was scratched by the ladder.

Active/OVS prime:
Стену поцарапала лестница.
The wallACC scratched ladderNOM.

12.

Active/SVO prime:
Вентилятор высушил сову.
The fan dried the owl.

Passive prime:
Сова была высушена вертилятором.
The owl was dried by the fan.

Active/OVS prime:
Сову высушил вентилятор.
The owlACC dried fanNOM.

13.

Active/SVO prime:
Листья засыпали черепаху.
The leaves covered the turtle.

Passive prime:
Черепаха была засыпана листьями.
The turtle was covered by the leaves.

Active/OVS prime:
Черепаху засыпали листья.
The turtleACC covered the leavesNOM.

14.

Active/SVO prime:
Фары осветили дерево.
The headlights illuminated the tree.

Passive prime:
Дерево было освещено фарами.
The tree was illuminated by the headlights.

Active/OVS prime:
Дерево осветили фары.
The treeACC illuminated the headlightsNOM.

15.

Active/SVO prime:
Палка поцарапала лягушку.
The stick scratched the frog.

Passive prime:
Лягушка была поцарапана палкой.
The frog was scratched by the stick.

Active/OVS prime:
Лягушку поцарапала палка.
The frogACC scratched stickNOM.
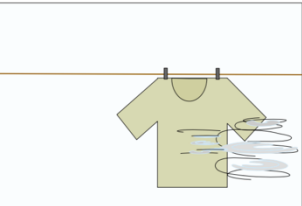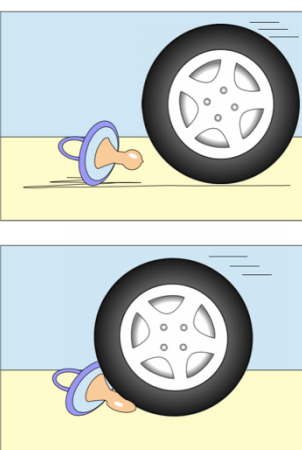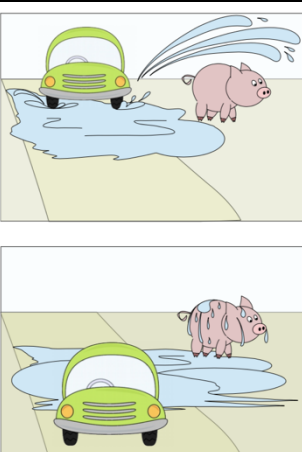
| 16 | | Active/SVO prime:
Ветер высушил футболку.
The wind dried the t-shirt.

Passive prime:
Футболка была высушена ветром.
The t-shirt was scracthed by the wind. |
| | | Active/OVS prime:
Футболку высушил ветер.
The t-shirtACC dried the windNOM. |

Table 4. 5 Full set of target stimuli for Experiments 1, 2 and 3 conducted with Russian-speaking adults and children, and with English-speaking children.

	Target event	Intended verb
1.		Раздавить Squish
2.		Обрызгать Splash

3.

Двигать
Move
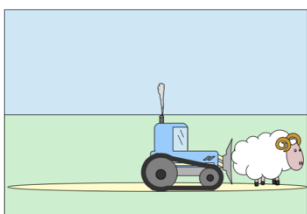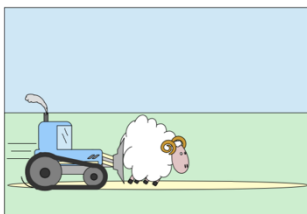
4.

Поднимать
Lift

5.

Раздавить
Squish
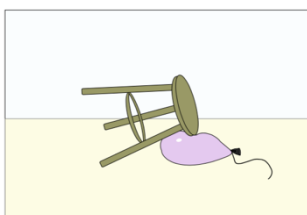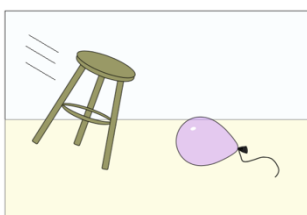
6.

Обрызгать
Splash
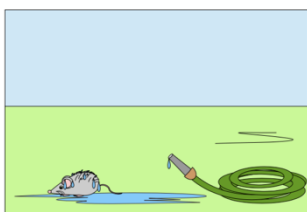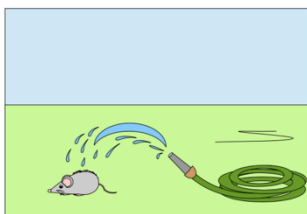
7.

Двигать
Move
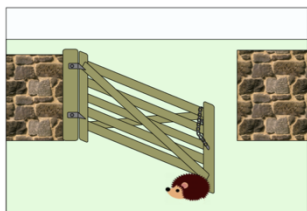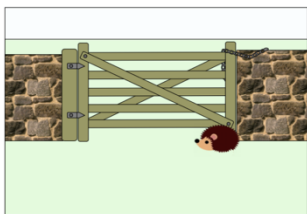
8.

Поднимать
Lift
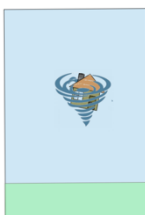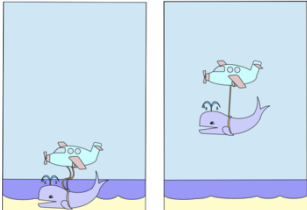
9.

Обрызгать
Splash
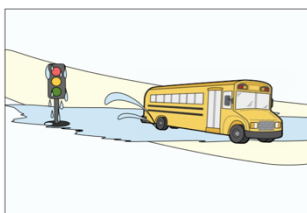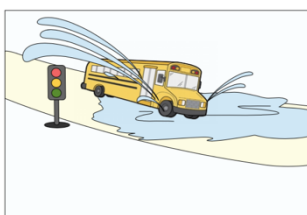
10.

Раздавить
Squish

11.

Поднимать
Lift

12.

Двигать
Move

13.

Поднимать
Lift

14.

Двигать
Move

15.

Обрызгать
Splash

16

Задавить
Squish
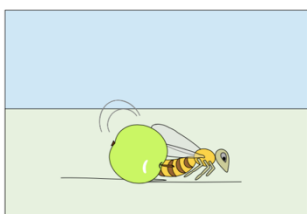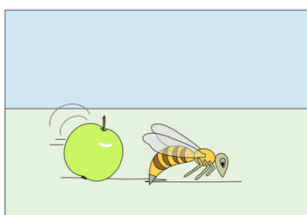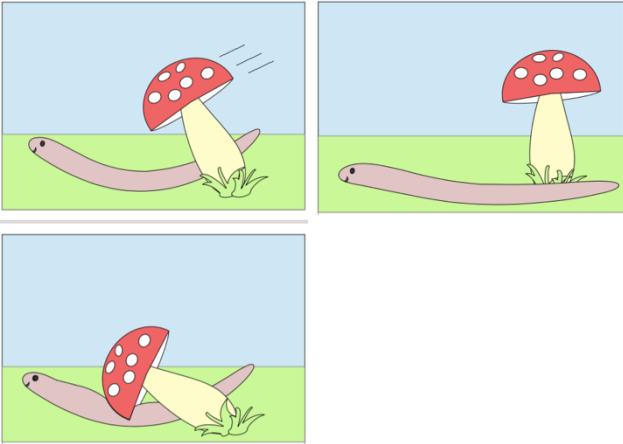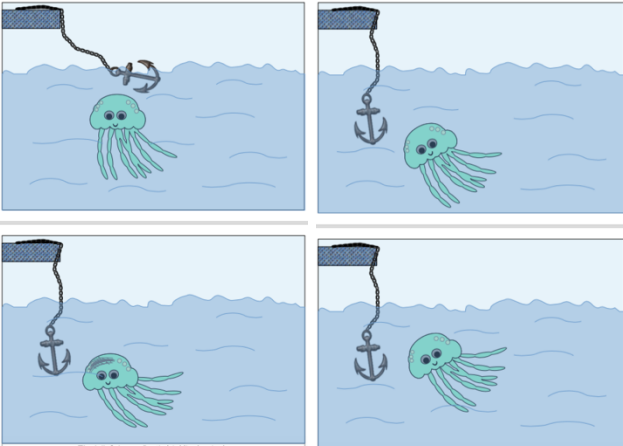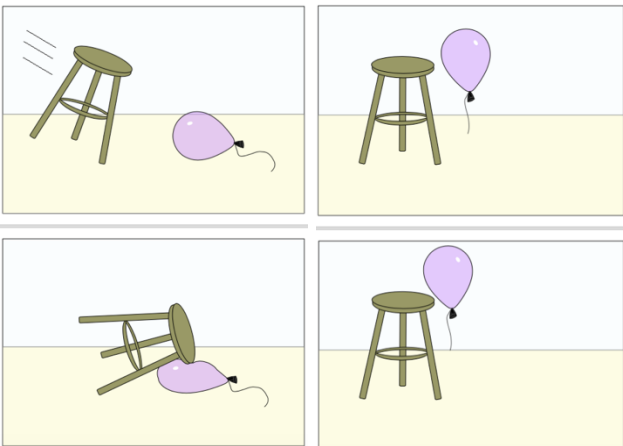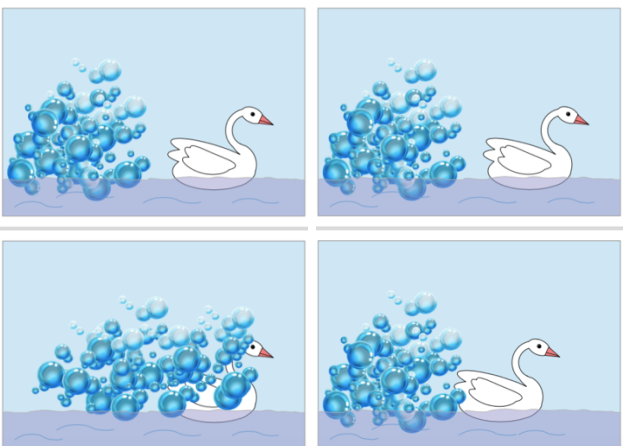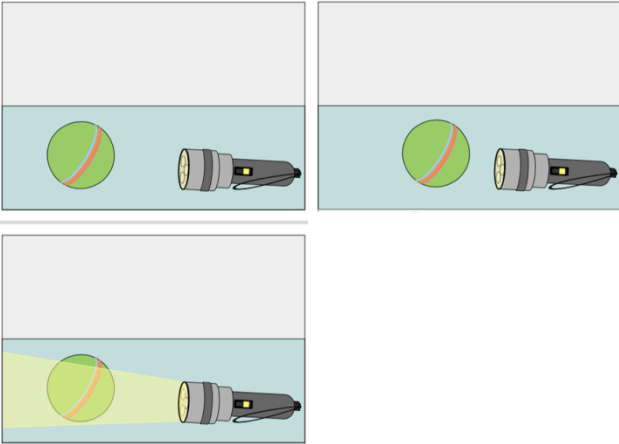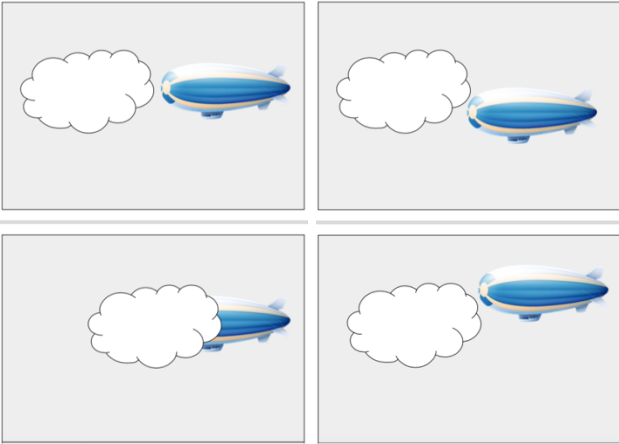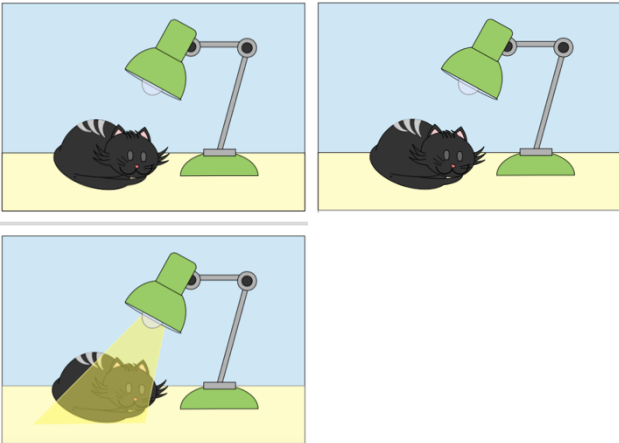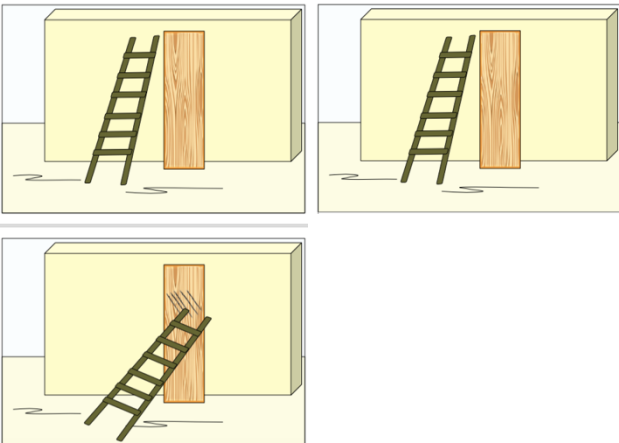
Table 4. 6 Full set of prime stimuli for Experiments 4a, 4b and 5 conducted with English-speaking adults and children.
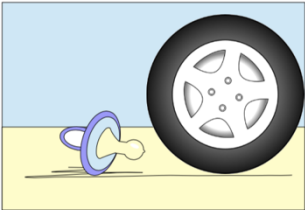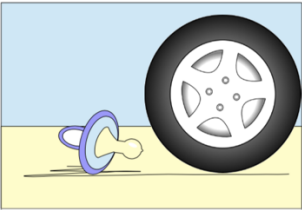
	Passive event	Locative event	Prime structure
1.			Passive prime: The bottle was covered by the rocks. Locative prime: The bottle was floating by the rocks.
2.			Passive prime: The pony was illuminating by the spotlight. Locative prime: The pony was standing by the spotlight.
3.			Passive prime: The bucket was pushed by the gate. Locative prime: The bucket was standing by the gate.

4.

Passive prime:
The worm was squished by the mushroom.

Locative prime:
The worm was laying by the mushroom.

5.

Passive prime:
The jellyfish was scratched by the anchor.

Locative prime:
The jellyfish was floating by the anchor.

6.

Passive prime:
The balloon was squished by the stool.

Locative prime:
The balloon was hovering by the stool.

7.

Passive prime:
The swan was covered by the bubbles.

Locative prime:
The swan was floating by the bubbles.

8.

Passive prime:
The ball was illuminated by the torch.

Locative prime:
The ball was laying by the torch.

9.

Passive prime:
The airship was covered by the cloud.

Locative prime:
The airship was hovering by the cloud.

10.

Passive prime:
The kitten was illuminated by the table lamp.

Locative prime:
The kitten was laying by the lamp.

11.

Passive prime:
The wooden plank was scratched by the ladder.

Locative prime:
The wood plank was standing by the ladder.

12.

Passive prime:
The wasp was squished by the apple.

Locative prime:
The wasp was hovering by the apple.

13.

Passive prime:
The turtle was covered by the heap of leaves.

Locative prime:
The turtle was standing by the heap of leaves.

14.

Passive prime:
The iceberg was illuminated by the lighthouse.

Locative prime:
The iceberg was floating by the lighthouse.

15.

Passive prime:
The spider was scratched by the branch.

Locative prime:
The spider was hovering by the branch.

16

Passive prime:
The dummy was squashed by the wheel.

Locative prime:
The dummy was laying by the wheel.
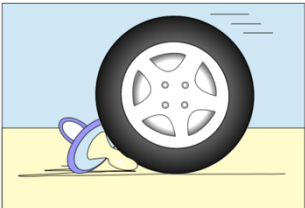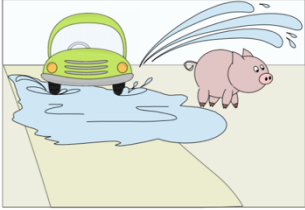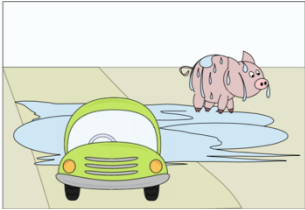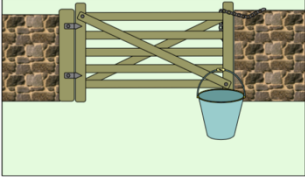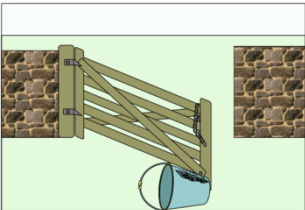
Table 4. 7 Full set of target stimuli for Experiments 4a, 4b and 5 conducted with English-speaking adults and children.

	Target event	Intended verb
1.		Splash
2.		Move

3.　Move
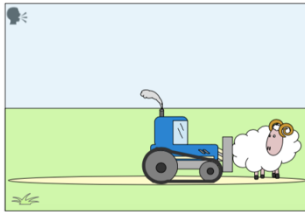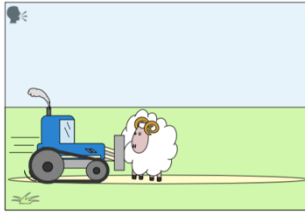
4.　Splash
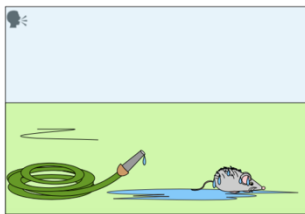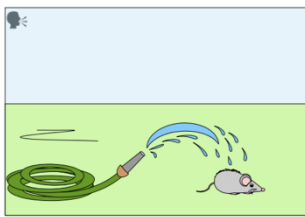
5.　Dry
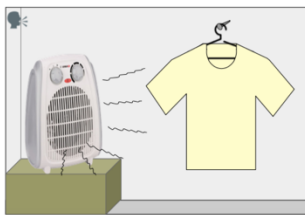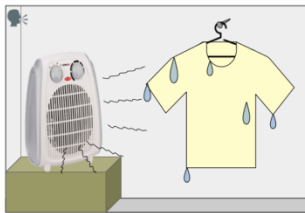
6.　Move
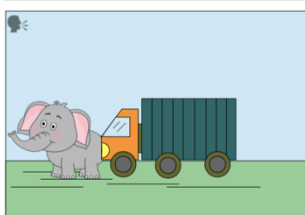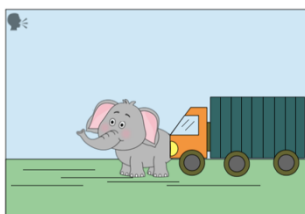
7. Lift
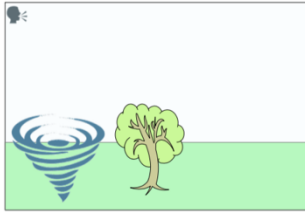
8. Splash
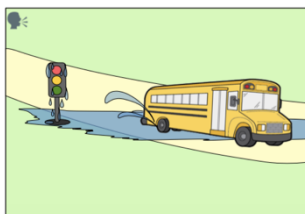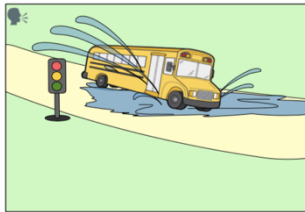
9. Dry
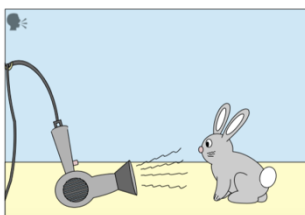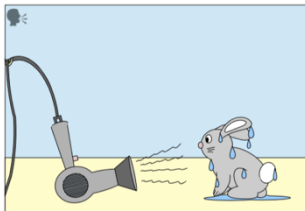
10. Move
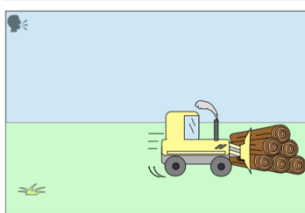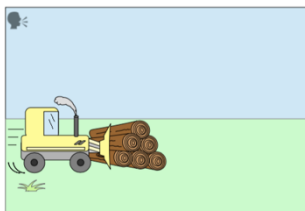
11. Lift
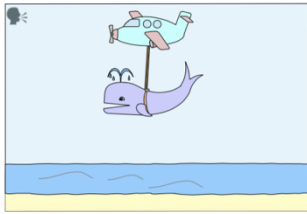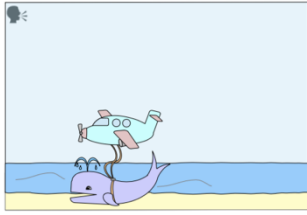
12. Lift
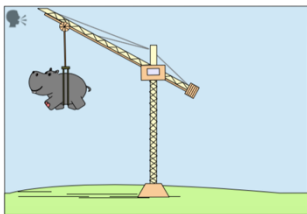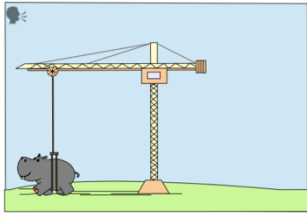
13. Move
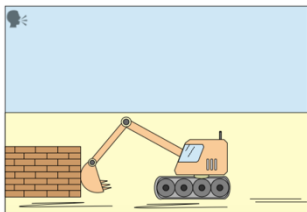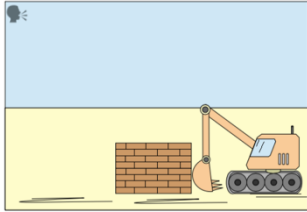
14. Dry
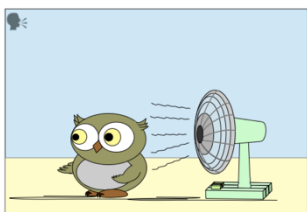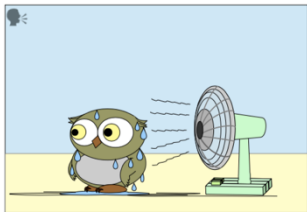
15. Splash
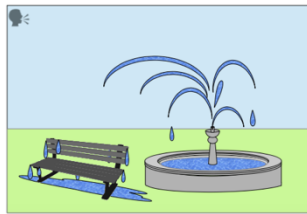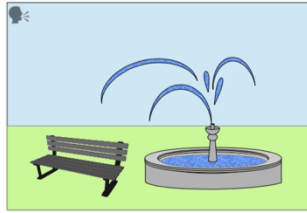
16 Dry
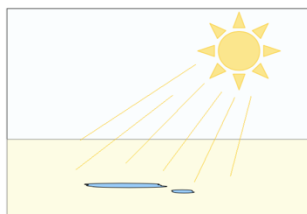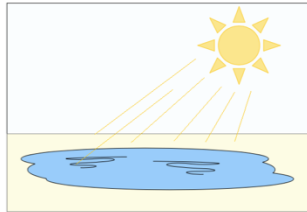
Appendix 2a: The Script for Test Instructions, Experiment 4a

Passive and Locative Conditions

Thank you for agreeing to participate. Please note that participation is completely anonymous and voluntary. Please click 'start' to begin.

In this task you will be presented with a series of images depicting simple events and objects. Some events are depicted using two images: the first image (presented on the top or on the left) displays the beginning of an event, and the second (bottom or right) displays the end of an event. Other events and all objects are depicted in a single image. You will find that some pictures will have descriptions accompanying them and others will not. Your task is as follows. Look at the images carefully, read the descriptions, verify whether they match the pictures and indicate your decision by clicking 'yes' or 'no'. For each picture without a description, make up your own simple description and type it in the box provided as quickly as possible. Some images will repeat, but you still need to respond to them as described above. Don't worry about spelling errors, typos, punctuation or capitals the main aim is to respond to the images fast, without thinking about it too much. And remember - there are no wrong answers!

Let's first try the task together. Please click 'next' to begin.

The image below is not an event, it is an object. Look at the description below, does it match the picture? Well, the picture shows some bread while the description reads "this is a breakfast". Not quite right, let us tick 'no' and press 'next' to continue.

Look at the picture of an event below. The first image (top) shows a non-active volcano, and the second (bottom) shows that this volcano has begun irrupting. So, in

the space provided underneath type something like "The volcano began erupting", then click 'next' to go to the next image.

Have a look at this last example. The picture shows some grapes, but it has no description underneath, so let us type something like "grapes" or "these are grapes". Once this is done, please press 'next' to begin the task. Remember to provide your responses as quickly as possible without worrying too much about the spelling. Note that you can save your progress at any time by clicking 'save' and return to the task at a later time.

Baseline Condition

Thank you for agreeing to participate. Please note that participation is completely anonymous and voluntary. Please click 'start' to begin.

In this task you will be presented with a series of images depicting simple events and objects. Most events are depicted using two images: the first image (on the top or on the left) displays the beginning of the event, and the second (bottom or right) displays the end of the event. Some events and all objects are depicted simply in a single image. Look at the images carefully, and, if required, verify whether the description you have seen a given images earlier in the task by clicking 'yes' or 'no'. For each picture without a description, type one in the box below as quickly as possible. Don't worry about spelling errors and typos, the main aim is to respond to the images fast, without thinking about it too much. And remember - there are no wrong answers! Let's first try the task together. Please click 'start' to begin.

The image below is not an event, it is an object. There is no space for a description and no request to verify whether it is a repeat or not, so just go ahead and click 'next' to continue.
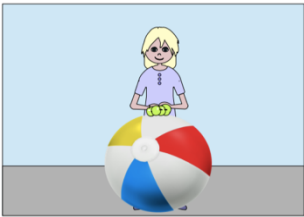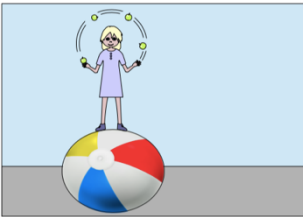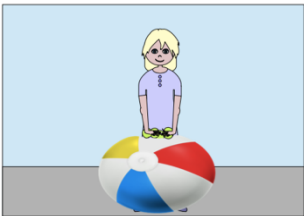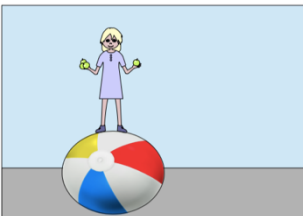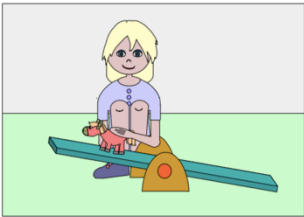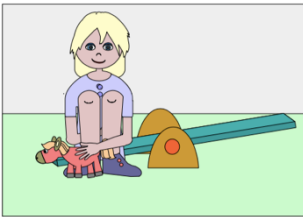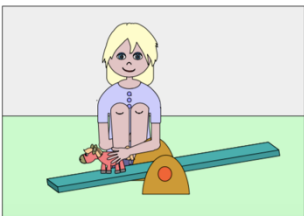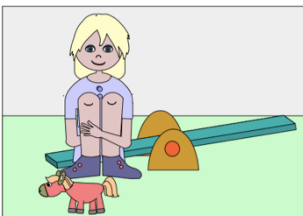
This is an example of an event: a man is jogging. There is a space to provide a description, so try typing something like "a man is jogging" in the box below, then press 'next' to continue.
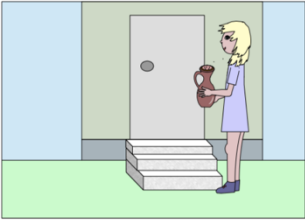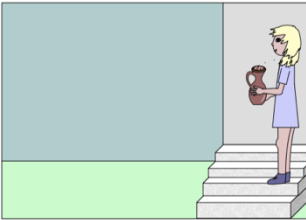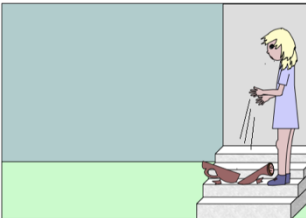
Have a look at this last example. These pictures show an event. In the first one (top) the rocket is on the ground and in the second (bottom), it took off. There is no space for a description, but there is a request to indicate whether you have seen this image before or not. Go ahead and tick 'no', then click 'next' to begin the task. Remember to provide your responses as quickly as possible without worrying too much about the spelling. Note that you can save your progress at any time by clicking 'save' and return to the task later.

Thank you very much for taking time to complete this task. For all questions relating to this project and its aims please contact the researcher directly by email: alina.konradt.13@ucl.ac.uk
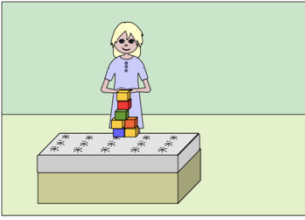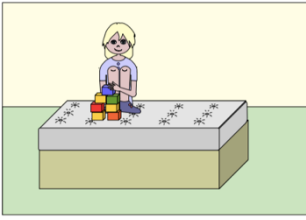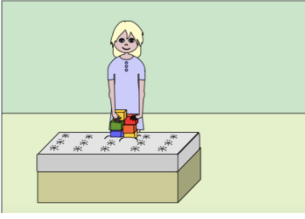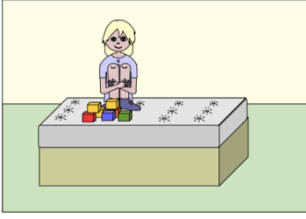
Table 4. 8 Full set of priming stimuli for Experiments 6 conducted with Russian-speaking adults.
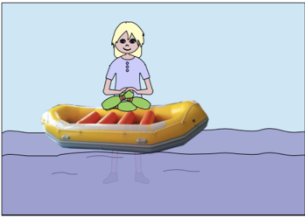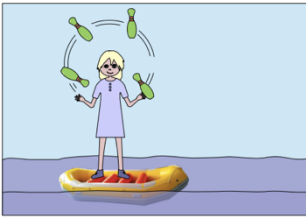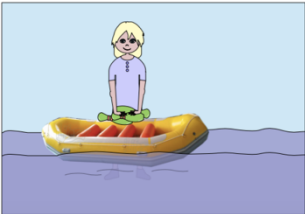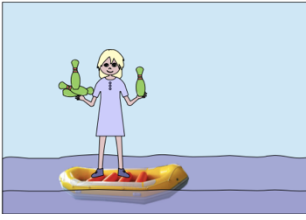
	3-place predicate event	2-place predicate event	Prime structure
1.			3-place predicate prime: Девочка нажала яблоками на шар. Girl pushed-down applesINTR on ballACC Monotransitive prime: Девочка пожонглировала яблоками на шаре. Girl juggled applesINSTR on ballPREP
2.			3-place predicate prime: Девочка надавила лошадкой на качели. Girl pressed horsieINST on swingsACC Monotransitive prime: Девочка поиграла лошадкой на качелях. Girl played housieINSTR on swingsPREP
3.			3-place predicate prime: Девочка положила письмо на ковёр. Girl put letterACC on ACC Monotransitive prime: Девочка полистала письмо на ковре. Girl leafed-through letterACC on rugPREP

4.

3-place predicate prime:
Девочка поставила кувшин на ступеньки.
Girl placed jugACC on stepsACC

Monotransitive prime:
Девочка разбила кувшин на ступеньках.
Girl broke jugACC on stepsPREP

5.
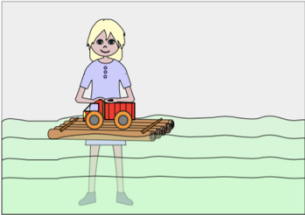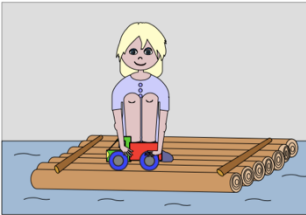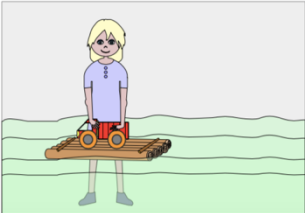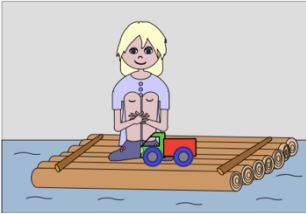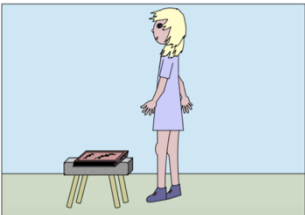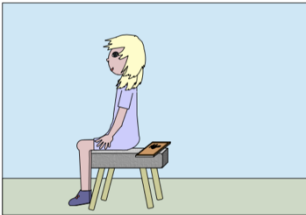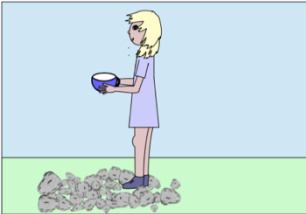
3-place predicate prime:
Девочка нажала кубиками на матрас.
Girl pushed-down blocksINSTR on mattressACC

Monotransitive prime:
Девочка поиграла кубиками на матрасе.
Girl played blocksINSTR on mattressPREP

6.

3-place predicate prime:
Девочка надавила кеглями на лодку.
Girl pressed pinsINSTR on boatACC

Monotransitive prime:
Девочка пожонглировала кеглями на лодке.
Girl juggled pinsINSTR on boatPREP

7.

3-place predicate prime:
Девочка положила газету на кресло.
Girl put newspaperACC on armchairACC

Monotransitive prime:
Девочка полистала газету на кресле.
Girl leafed-through newspaperACC on armchairPREP

8.

3-place predicate prime:
Девочка поставила бутылку на крышу.
Girl placed bottleACC on roofACC

Monotransitive prime:
Девочка разбила бутылку на крыше.
Girl broke bottleACC on roofPREP

9.

3-place predicate prime:
Девочка нажала апельсинами на подушку.
Girl pushed-down orangesINSTR on pillowACC

Monotransitive prime:
Девочка пожонглировала апельсинами на подушке.
Girl juggled orangesINSTR on pillowPREP

10.

3-place predicate prime:
Девочка надавила машинкой на плот.
Gilr pressed toy-carINSTR on floatACC

Monotransitive prime:
Девочка поиграла машинкой на плоту.
Girl played toy-carINSTR on floatPREP

11.

3-place predicate prime:
Девочка положила книгу на табуретку.
Girl put bookACC on stoolACC

Monotransitive prime:
Девочка полистала книгу на табуретке.
Girl leafed-though bookACC on stoolPREP

12.

3-place predicate prime:
Девочка поставила чашку на камни.
Girl placed cupACC on rocksACC

Monotransitive prime:
Девочка разбила чашку на камнях.
Girl broke cupACC on rocksPREP

13.

3-place predicate prime:
Девочка нажала обручами на батут.
Girl pushed-down hoola-hoopsINSTR on trampolineACC

Monotransitive prime:
Девочка пожонглировала обручами на батуте.
Girl juggled hoola-hoopsINSTR on trampolinePREP

14.

3-place predicate prime:
Девочка положила журнал на кровать.
Girl put magazineACC on bedACC

Monotransitive prime:
Девочка полистала журнал на кровати.
Girl leafed-through magazineACC on bedPREP

15.

3-place predicate prime:
Девочка поставила банку на мост.
Girl placed jarACC on bridgeACC.

Monotransitive prime:
Девочка разбила банку на мосту.
Girl broke jarACC on bridgePREP

16
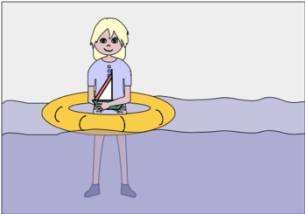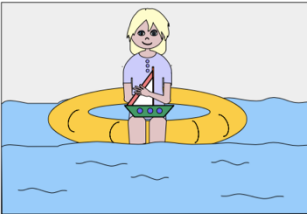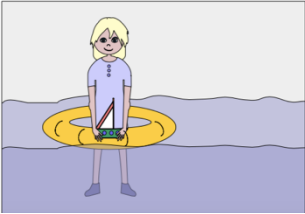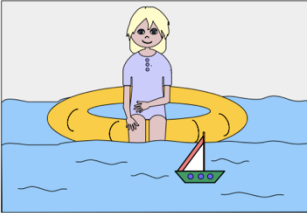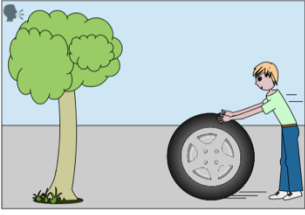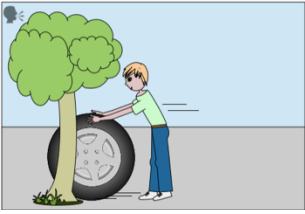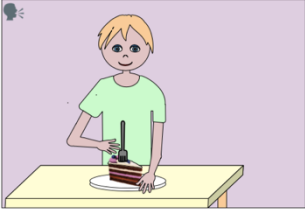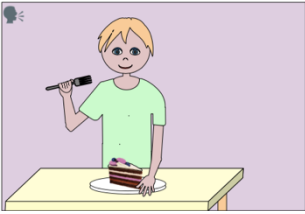
3-place predicate prime:
Девочка надавила лодочкой на круг.
Girl pressed toy-boatINSTR on life-buoyACC

Monotransitive prime:
Девочка поиграла лодочкой на круге.
Girl played toy-boatINSTR on life-buoyPREP

Table 4. 9 Full set of target stimuli for Experiments 6 conducted with Russian-speaking adults.

	Target event	Intended verb
1.		3-place predicate: Закатить за Behind-roll behind Monotransitive: Катать Roll
2.		3-place predicate: Извлекать из Out-take out Monotransitive: Поднять/держать Lift/hold

3.

3-place predicate:
Перебросить через
Over-though over
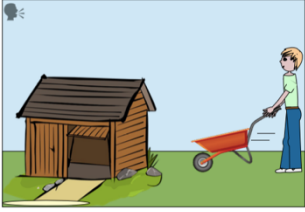
Monotransitive:
Швырнуть
Toss

4.
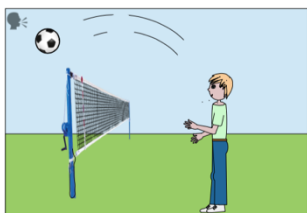
3-place predicate:
Отодвинуть от
Away-move away

Monotransitive:
Подвинуть/двигать
Move-a-little-bit/move

5.
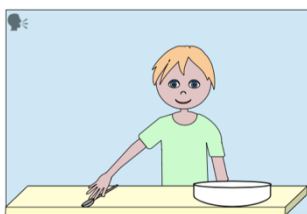
3-place predicate:
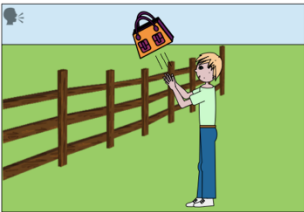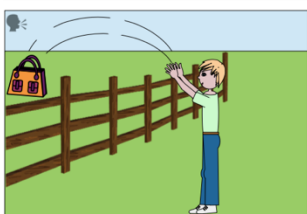Завозить за
Behind-move behind

Monotransitive:
Катать
Roll

6.
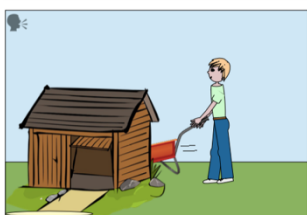
3-place predicate:
Отодвинуть от
Away-move away

Monotransitive:
Двигать
Move

7.

3-place predicate:
Извлекать из
Out-take out

Monotransitive:
Поднять/держать
Lift/hold

8.
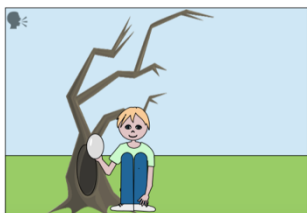
3-place predicate:
Перекинуть через
Over-throw over

Monotransitive:
Вышвырнуть
Toss

9.
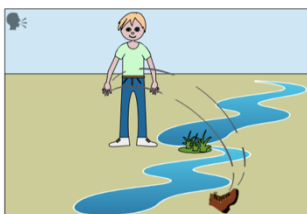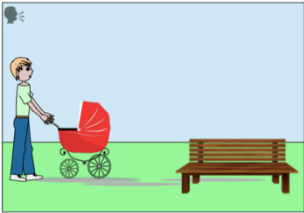
3-place predicate:
Извлекать из
Out-take out

Monotransitive:
Поднять/держать
Lift/hold

10.

3-place predicate:
Отодвинуть от
Away-move away

Monotransitive:
Двигать
Move
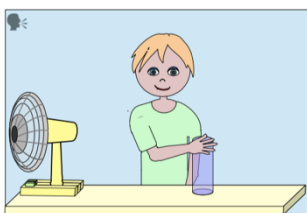
11.
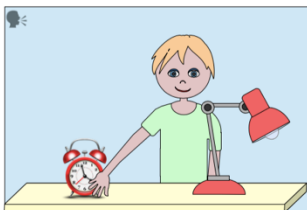
3-place predicate:
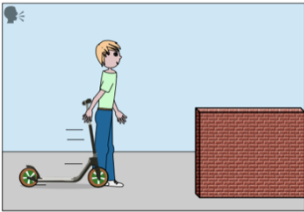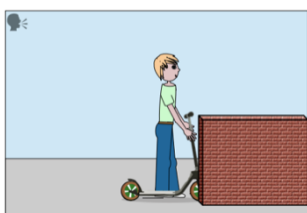Закатить за
Behind-roll behind

Monotransitive:
Катать
Roll

12.
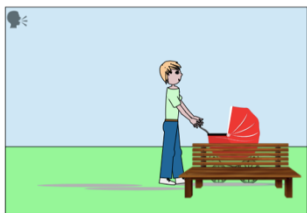
3-place predicate:
Перебросить через
Over-throw over

Monotransitive:
Швырнуть
Toss

13.

3-place predicate:
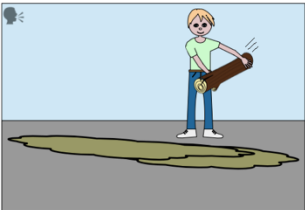Отодвинуть
Away-move away

Monotransitive:
Двигать
Move

14.

3-place predicate:
Двигать
Move

Monotransitive:
Катать
Roll

15.

3-place predicate:
Извлекать из
Out-take out

Monotransitive:
Поднять/держать
Lift/hold

16

3-place predicate:
Перебросить через
Over-throw over

Monotransitive:
Швырнуть
Toss