

Verbs and Participants: Nonlinguists' Intuitions

by

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Abstract

Arguments and adjuncts play a crucial role in linguistic theories. Despite the vast body of research that assumes a distinction between arguments and adjuncts, not only in linguistics, but also in philosophy of language, psycholinguistics and neurolinguistics, there are no universally agreed-upon definitions distinguishing the two. The modest aim of this thesis is to investigate English speakers' intuitions with respect to verbs and their arguments. To do so, the study makes use of the Core Participants Test, disguised in four different tasks, with each task eliciting, arguably, the same kind of intuitions. The results indicate that different tasks tap into either semantic or syntactic intuitions, or sometimes both. Overall, speakers' intuitions often matched linguists' views.

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Chapter 1

Introduction

The argument-adjunct distinction is crucial to linguistics. Let us consider the following example:

- (1) Jim gave a cookie to the boy yesterday in class.

When thinking of a *giving* event, we somehow understand that there is a *giver* (Jim), a *receiver* (the boy), and *something being given* (a cookie). However, the *time* (yesterday) and *place* (in class) seem less crucial components to a *giving* event.

A simplified way of thinking of arguments and adjuncts is that arguments are the core participants involved in the event described by the verb, while adjuncts provide some sort of additional information. The argument-adjunct distinction is clearly more complex than that, but this simple distinction has been made even before the terms arguments and adjuncts were coined. An early reference to the argument-adjunct distinction can be traced back to Dakshinaputra Pānini, a linguist who is believed to have lived in northwest India, during the 5th or 6th century B.C (Kak, 1987). Pānini has been called the greatest linguist of antiquity, if not of all time (Staal and Staal, 1972), and his grammar book on the Sanskrit language is considered to be one of the greatest monuments of human intelligence (Bloomfield, 2005). In this book, Pānini introduces the *karaka* theory, in which he discusses six *karakas* which represent semantic partic-

ipants necessary to capture the action expressed by verbs. The karakas discussed by Pānini are: Apadana, Sampradana, Karana, Adhikarana, Karman, and Kartr. According to Kak’s characterization of Pānini’s original text, Apadana represents *that which is fixed when departure takes place*, Sapradaṇa represents *the recipient of the object*; Karana represents *the main cause of the effect; instrument*; Adhikarana represents *the basis, location*; Karman represents *what the agent seems to attain; deed, object*; and Kartr represents *one who is independent; the agent*. Pānini’s system is based on the meaning of the verb, and is clearly related to the semantic arguments discussed in more recent literature.

A more recent reference to the argument-adjunct distinction can be traced back to Tesnière (1959) who discusses this distinction using a different terminology. He states that constituents of a phrase can be divided in two types: *actants* and *circonstants*, where actants represent participants playing an important role in describing the verbs, *les actants sont les personnes ou choses qui participent à un degré quelconque au procès* (Tesnière, 1959, p.105), and the *circonstants* represent the circumstances in which the process is taking place, *les circonstances expriment les circonstances de temps, lieu, manière, etc... dans lesquelles se déroule le procès* (Tesnière, 1959, p. 102). Tesnière (1959) talks about actants and *circonstants* in the context of Valency Theory, where valency refers to a verb’s potential of occurring in various sentence structures. In other words, the valency of a verb is similar to the valency of a chemical element: the valency of a verb dictates the verb’s elaborators in the same way the valency of a chemical element dictates the atoms the element can combine with (Allerton, 1982). Despite terminology differences, a concept which remains consistent over time is that arguments are in a close relationship to the verb, while adjuncts are not required by the verb (Kroeger, 2004; Tallerman, 2005). However, there is no consensus on exact definitions. The following extracts provide a brief sample of definitions capturing the distinction between arguments and adjuncts:

‘Adjuncts are always optional, whereas complements are frequently obligatory. The difference between them is that a complement is a phrase which is selected by the head, and therefore has an especially close relationship with the head; adjuncts, on the other hand, provide optional, extra information, and don’t have a particularly close relationship with the head.’ (Tallerman, 2005, p.98)

According to Tallerman (2005), the difference between arguments and adjuncts is that arguments/complements are often obligatory, and are closely related to the verb, while adjuncts are optional, and are not closely related to the verb.

‘This distinction between arguments and adjuncts is important, but not always easy to make. The basic difference is that arguments are closely associated with the meaning of the predicate itself, while adjuncts are not.’ (Kroeger, 2004, p.10)

Similarly, Kroeger (2004) also distinguishes arguments and adjuncts on the basis of their relationship with the predicate: arguments are closely related to the predicate, while adjuncts are not.

‘The arguments are the participants minimally involved in the activity or state expressed by the predicate.’ (Haegeman, 1994, p.44)

‘The entities (which can be abstract) participating in the [predicate] relation are called arguments.’ (Carnie, 2006, p.51)

‘From a semantic perspective, subjects and complements share in common the fact that they generally represent entities directly involved in the particular action or event described by the predicate: to use the relevant semantic terminology, we can say that subjects and complements are arguments of the predicate with which they are associated. [...] An expression which serves to provide (optional) additional information about the time or place (or manner, or purpose etc.) of an activity or event is said to serve as an adjunct.’ (Radford, 2004, p.3-4)

Haegeman (1994), Carnie (2006), and Radford (2004), all define arguments as essential participants/entities involved in the event/situation described by the verb;

and, although using a slightly different terminology, they reiterate the idea that arguments are phrases involved in some sort of special or close relationship to the verb.

‘Verbs and adjectives, and some nouns, express properties of things [...] or relationship between things [...]. The arguments are the phrases that denote the things that have such properties or are involved in such relationship.’ (Culicover, 1997, p.16)

Culicover (1997) again refers to arguments as phrases, or participants, having certain properties or involved in certain relationships.

Even though the distinction between arguments and adjuncts is not clear, several concepts recur across definitions. Arguments are selected by the verb and are closely related to the meaning of the verb. On the contrary, adjuncts are not specifically selected by the verb, and therefore are not closely related to the meaning of the verb itself. Instead, adjuncts provide optional information that is not crucial to the meaning of the verb.

This study aims to investigate whether nonlinguists intuitively distinguish between adjuncts and arguments of a given verb. As part of the study, speakers are exposed to both verbs where there is little disagreement with respect to the number of arguments (e.g., ditransitives), and verbs where there is little agreement with respect to the number of arguments (e.g., verbs requiring instruments). To capture speakers’ intuitions with respect to how many arguments and what those are for various verb classes, we make use of the notion of ‘core participants’ (see the definitions above and Needham and Toivonen’ (2011) core participants test) which relies on speakers’ intuitions based on the semantic meaning of a given verb.

This thesis specifically focuses on the following questions:

- When presented with so called unaccusative verbs such as *dry* and *freeze*, do speakers interpret the verb as transitive or as intransitive?
- Do speakers spontaneously report that ditransitive verbs have exactly three arguments?

- In verbs that arguably involve more than three participants, are those participants regarded as arguments?

In an attempt to capture speakers' intuitions with respect to how many participants certain verbs require, and how many and which of those participants are potential arguments, two distinct tasks were used. In task 1, participants are given a verb and asked to name the crucial participants for the event denoted by the verb to take place. In task 2, participants are given the beginning of a sentence and are asked to complete the sentence as they find appropriate. While both tasks tapped into speakers' intuitions about verbs and their participants, one potential interpretation is that task 1 captures the speakers' semantic intuitions, and task 2 captures the speakers' syntactic intuitions.

This thesis is organized as follows: Chapter 2 discusses the concept of semantic and syntactic arguments, specific verb categories and their argument requirements, and briefly touches on different approaches to investigate the argument-adjunct distinction. Chapter 3 provides a very brief overview of what autism is, its possible relation to language, and it explains the motivation behind investigating autism in the context of arguments and adjuncts. Chapter 4 provides information about participants, stimuli and procedure. Chapter 5 presents the results and analysis organized by verb categories. Finally, Chapter 6 concludes the thesis with an overview of the results and suggestions for future work.

Chapter 2

Arguments and Adjuncts

2.1 Semantic and Syntactic Arguments

As stated by Fernandes et al. (2006), “An essential part of the human capacity for language is the ability to link conceptual or semantic representations with syntactic representations.” This aspect of language is of great interest, as it is unique to human language. However, this mapping has proven difficult to capture, although a number of theories have been proposed such as the Lexical Mapping Theory (Levin, 1985; Bresnan and Kanerva, 1989; Alsina, 1996; Butt, 1995) or the Uniformity Theta Assignment Hypothesis (Baker, 1988). At the heart of such mappings lies the argument-adjunct distinction, which is not always clear. The interconnected issues of syntax-semantics mapping and the argument-adjunct distinction are a challenge to theories of language in part because the difference between syntax and semantics is itself difficult to pinpoint.

In what follows, we will introduce the concepts of semantic arguments, syntactic arguments, and optionality as discussed in Jackendoff (2002, p.132-134).¹ Let us consider the verb *to devour*. For a *devouring* event to occur, two participants are

¹Many of the examples and points in this subsection are adapted from Jackendoff (2002, p.132-134).

necessary: one participant doing the devouring, and one participant being devoured.

For the purpose of this thesis, the term(s) *participant(s)* will be used to reflect both animate or inanimate entities. The participants necessary for the event described by the verb to occur are referred to as semantic arguments. Therefore, since both a *devourer* and a *devouree* are necessary for a *devouring* event to take place, it can be said that *devouring* ‘requires’, ‘licenses’, or simply, ‘takes’ two semantic arguments.

While the notion of semantic arguments has to do solely with the meaning of the verb, syntactic arguments have to be syntactically expressed in a simple active use of the verb. For a better understanding of semantic and syntactic obligatoriness, consider (1) and (2):

(1) The wolf devoured the sheep.

(2) *The wolf devoured.

Example (1) illustrates the verb *to devour*, accompanied by both the *devourer* and the *devouree*, which gives rise to a grammatically acceptable sentence. On the other hand, (2) illustrates the verb *to devour* accompanied only by the *devourer*, as the *devouree* (the sheep) is not syntactically expressed. Omitting one of the semantic arguments leads to a grammatically unacceptable sentence. Simply put, syntactic arguments are the arguments which need to be syntactically realized. Since both *devourer* and *devouree* are necessary for a *devouring* event, it can be concluded that *to devour* licenses two semantic arguments. Since both arguments need to be syntactically realized as illustrated above, it can be concluded that *to devour* licenses two syntactic arguments.

The verb *to devour* has the same number of semantic and syntactic arguments; however, that is by no means always the case. Let us consider the verb *to eat*, which in meaning is very similar to the verb *to devour*. The verb *to eat* also requires two participants, a participant doing the eating and a participant being eaten. Because

two participants are required for *eating* to occur, it can be said that it licenses two semantic arguments, similar to the verb *to devour*. In order to determine the number of syntactic arguments, let us consider (3) and (4):

(3) Emma ate a pizza.

(4) Emma ate.

Compared to the verb *to devour*, omitting the participant being eaten still gives rise to a grammatical sentence. Because *pizza* is a semantic argument of the verb *to eat*, but it does not have to be syntactically expressed, it is said that *to eat* takes an optional argument.

A third case includes verbs such as *to swallow*, which at first sight seem to mimic the behaviour of the verb *to eat*. Let us consider (5) and (6):

(5) Anna swallowed the food.

(6) Anna swallowed.

As suggested by (5), the verb *to swallow* requires a participant doing the swallowing, and something being swallowed. However, thinking of the meaning of the verb *to swallow*, two cases come to mind: one can swallow something, such as food, and secondly, one can swallow without swallowing something. Because the participant being swallowed is not crucial for swallowing to take place, it can be said that *to swallow* licenses one semantic argument (the participant doing the swallowing), while the second is an optional semantic argument.

To understand the argument-adjunct distinction we require information about how many arguments a verb takes, which types of arguments, and whether they are optional. This information is often referred to as a verb's argument structure.

2.2 Verbs and Their Semantic Argument Requirements

2.2.1 Zero-Argument Verbs

Zero-argument verbs refer to verbs in which the process happens on its own, with no participants being involved. Examples include impersonal verbs describing meteorological phenomena (e.g., *to rain*, *to snow*) (Jackendoff, 2002; Tesnière, 1959). Consider examples (7), (8) and (9):

(7) It snows.

(8) It rains.

(9) It is cold.

Examples (7), (8) and (9) illustrate cases in which the verb does not require any participants. Even though at first sight one might think the subject *it* represents an argument by being the subject of the sentence, by looking at the meaning of the sentence, it becomes clear that *it* is only a place holder. In impersonal sentences, *it* plays the role of a dummy *it*, or a *sujet apparent* (Tesnière, 1959). Based on English, it seems that even though impersonal verbs related to meteorological phenomena do not require an argument, they are still accompanied by a subject, albeit, a ‘dummy’ subject. According to Allen (2009), all verbs in a language require at least one argument. However, not all languages require a ‘dummy’ subject in weather verbs (Bleotu, 2012). Consider the verb *to rain* in English (10), Italian (10-a), Romanian (10-b), and Spanish (10-c):

(10) It rains.

a. Piove. Rains

- b. Plouă. Rains
- c. Llueve. Rains

As illustrated by the examples in (10), more often than not, in Romance languages, impersonal verbs related to weather stand alone, without being accompanied by a ‘dummy’ subject. An exception is French (see (11)), where impersonal weather verbs follow the same structure as English.

- (11) Il pleut. It rains

2.2.2 One-Argument Verbs

One-argument verbs refer to verbs requiring only one participant. Consider the following examples:

- (12) He slept.

- (13) He died.

- (14) He laughed.

- (15) He fell.

- (16) He sneezed.

The above examples illustrate one argument verbs as you cannot ‘sleep something,’ ‘die something,’ and so forth.

Many verbs alternate between one-argument verbs and two-argument verbs. Examples include verbs such as *to eat* (see (3) and (4)) and *to read*, where the object is option. Other examples of verbs that can alternate between transitive and intransitive are unaccusative verbs such as *to dry* and *to melt*, where the object of the transitive verb corresponds to the subject of the intransitive verb.

2.2.3 Two-Argument Verbs

Two-argument verbs require two core participants, and include verbs requiring an agent and a plain noun phrase (NP), an agent and a prepositional phrases (PP), an agent and a clause complement (CP). Examples (3), (18) and (19) illustrate verbs licensing an agent and a plain NP:

(17) I passed the test.

(18) Juan kicked the ball.

(19) The boy wants ice cream.

Examples (20), (21), and (22) illustrate verbs licensing an agent and a PP:

(20) Krista believed in her mentor.

(21) Sandy relied on her assistant.

(22) Duong invested in real estate property.

Examples (23), (24), and (25) illustrate verbs licensing an agent and a clause:

(23) The parent thinks that the boy is asleep.

(24) Marly said that we will have a sleepover this weekend.

(25) The teacher agreed to leave.

What the above examples have in common is that, despite of the nature of the second participant, all verbs require two participants to express their intended meaning.

2.2.4 Three-Argument Verbs

Three-argument verbs typically require a direct object and an indirect object. Consider examples (26) and (27):

(26) Chris gave a book to Krista.

(27) The boy gave the toy to the puppy.

Examples (26) and (27) illustrate that *to give* licenses three arguments: a giver, a receiver, and the object being given. As Quine (1960) puts it, to give requires three arguments because ‘a gives b to c.’ Other examples of verbs requiring three arguments include: *to tell*, *to ask*, *to order*, *to call* (with the meaning of calling someone something, not calling someones name, or calling someone on the phone), as illustrated below:

(28) Don told the girl a story.

(29) Teachers asked students to do their homework.

(30) The food inspector ordered the owner to shut down the restaurant.

(31) Josh called Jimmy a tattletale.

Three-argument verbs are very common, as are one-argument and two-argument verbs, and it has been suggested in the literature that verbs never take more than three arguments (Tesnière, 1959; Jackendoff, 2002; Kearns, 2011). However, there are some potential cases of verbs that take more than three arguments, and they will be discussed in the following three subsections (four-argument verbs, five-argument verbs, and six-argument verbs).

2.2.5 Four-Argument Verbs

Some argue that the maximum number of arguments elicited by a verb is four (Traxler, 2011). Consider example (32):

(32) Donny paid Sam \$25 for the textbook.

Example (32) illustrates that the verb *to pay* requires, arguably, at least four arguments (Allerton, 1982; Quine, 1960): the person paying, the item being bought, the person receiving the money, as well as the price. Similarly, the verbs *to charge* and *to transfer* also require at least four arguments as suggested by examples (33) and (34):

(33) The police officer charged the driver \$200 for not wearing a seatbelt.

(34) Dana transferred the money from a chequing account to a savings account.

Other examples include verbs that denote *traveling* (e.g., (35)) or *communicating in writing* (e.g., (36)):

(35) Ahmed is traveling from Ottawa to Toronto by bus.

Even though at a first sight it might seem irrelevant to include the medium of transportation, it can be viewed as a crucial aspect of the situation of *traveling*: Ahmed is on the bus, and the bus is the one moving from a location to another. If the medium of transportation would be omitted, then a situation of *moving* would be described instead (Apresjan, 1992).

(36) The girl wrote a poem on sand with a stick.

According to Apresjan (1992), there are differences between the verbs *to communicate*, and *to write*. While the former requires two individuals and some kind of information transmitted between the two, the latter requires different participants, and the only participant shared between the two being the person doing the writing. More specifically, *to write*, requires the person writing, what is being written, on what (paper, sand), as well as the instrument used (such as a pen).

2.2.6 Five-Argument Verbs

On occasion, some verbs have been argued to require five arguments. An example is the verb *to rent*. Apresjan (1992) argues that *to rent* licenses the renter, the tenant, the property or item being rented, the payment involved, and a specified period of time. Consider the following example:

(37) Corina rented a condo from Mr. Guy for \$600/month for a year.

Apresjan (1992) argues that all five elements are essential to understand a *renting* event. In order to justify his claim, he argues that if the time element would be excluded, then the situation of *buying* would be described instead. Moreover, if both the time and the pay elements would be excluded, a *transferring* situation would be described. It has to be noted that while Apresjan (1992) argues that all five elements are essential for understanding the situation of *renting*, he makes it clear that these participants are semantically necessary, and he does not suggest that they must be expressed overtly. Similar examples are the verbs *to loan* (see (38)) and *to sweep* (see (39)):

(38) I loaned \$300 to a friend for 2 months with no interest.

(39) I swept the dust with a broom out of the kitchen into the hallway.

Apresjan (1992) argues that in order to describe the situation of *sweeping*, both the subject (sweeper) and the object (dust, dirt, etc.) are necessary. Additionally, he includes the instrument as well as the area being swept, from where to where.

Another category of verbs requiring five arguments is comprised of verbs of non-autonomous motion such as *to transport*, *to carry*, *to roll*, *to drag* and their derivatives. Please refer to (40):

(40) Sabrina carried a backpack on her shoulders from the bus stop to the apart-

ment.

Apresjan (1992) argues that in examples such as (40), all five participants are essential to the meaning of the verb: the person doing the action (Sabrina), the object/item (backpack), two locations (the bus stop, and the apartment), as well as an instrument or means (shoulders).

2.2.7 Six-Argument Verbs

Even though less common, claims that some verbs take six arguments are also found in the literature. Consider the verb *to dispatch* (or to send someone on a trip). Starting from the meaning of the verb *to send*, *to dispatch* requires a sender, the object/person (in the case of dispatch) being sent, and two locations, from where to where, as well as a reason. Even though at a first sight the goal might seem irrelevant, it is essential to describe the verb *to dispatch* (or send on a trip), as the verb *to dispatch* is only used for trips that have a specific purpose (e.g., business trip, military mission) where the traveller has a mission to accomplish/or a task to complete at the destination. Despite the fact that time is usually an adjunct, verbs such as *to dispatch* require a time component because any person going on a business trip is going for a predetermined period of time. Example (41) illustrates the verb *to dispatch* accompanied by its semantic arguments:

- (41) The European Commission dispatched a rescue team from Germany to Iraq for an undetermined time to provide medical assistance to those injured.

Despite verbs such as *to dispatch*, it is rarely claimed in the literature that verbs require six arguments. Based on my literature review, the only reference to verbs requiring six arguments that I am aware of is Apresjan (1992). One of the aims of this thesis is to investigate whether speakers intuitively judge that verbs can have as many as five or six arguments.

2.3 Psycholinguistic and Neurolinguistic Evidence

Previously, we saw that there is a general agreement that the argument-adjunct distinction is real. However, there is often disagreement as to exactly how many and which arguments a specific verb takes. Such debates raise the question of whether the argument-adjunct distinction is, in fact, psychologically real. The aim of this section is to illustrate that psycholinguistic and neurolinguistic evidence supports the distinction between arguments and adjuncts.

Boland and Blodgett (2006) conducted an eye-tracking experiment with the precise aim of investigating whether the argument-adjunct distinction is psycholinguistically real. For this purpose, the stimuli used reflected their intention, as the sentences chosen illustrated clear examples of arguments or adjuncts, as follows:

- (42) The environmental agency offered some exemptions to the business this year.
(VP argument)
- (43) The environmental agency offered some exemptions from the start this year.
(VP adjunct)

The results show that VP arguments were processed faster than VP adjuncts, suggesting, first that there is a psycholinguistic difference between arguments and adjuncts, and secondly, that arguments are processed faster than adjuncts (Boland and Blodgett, 2006).

Lee and Thompson (2011) provide another clear eye-tracking experiment illustrating that the argument-adjunct distinction is psycholinguistically real. What differentiates the Lee and Thompson (2011) study from most psycholinguistic studies is that it is a production study, rather than a comprehension study. Their stimuli consisted of sentences containing a goal argument, and sentences containing a beneficiary adjunct phrase:

(44) The mother is applying lotion to the baby.

(45) The mother is choosing lotion for the baby.

The experimental results show that participants showed a greater gaze duration when looking at adjuncts compared to when looking at arguments, suggesting that producing adjuncts requires a greater processing cost compared to producing arguments.

Even though psycholinguistic studies provide evidence for the argument-adjunct distinction, they also stumble upon less clear cases, where the boundaries between arguments and adjuncts are not as obvious. For example, Boland (2005) conducted an eye-tracking experiment to investigate whether instruments are adjuncts or arguments, but instead, the results suggest that instruments fall between arguments and adjuncts. Experiment 1 in Boland (2005) included 3 types of sentence stimuli, including locations, instruments or recipients, as illustrated below:

(46) The girl slept for a while on the bed.

(47) The farmer would not move, so the farmer beat it vigorously with a stick.

(48) The newspaper was difficult to read, but the mother suggested it anyway to her teenager.

Boland (2005) found that instruments receive more looks than locations, and less looks than recipients, suggesting that instruments are not typical adjuncts or typical arguments, rather, they fall between arguments and adjuncts.

Other psycholinguistic studies discussing arguments and adjuncts are Shapiro et al. (1989), Britt (1994), Spivey-Knowlton and Sedivy (1995), Schütze and Gibson (1999), and Tutunjian and Boland (2008) among others.

Aside from psycholinguistic evidence, there is also neurolinguistic evidence for arguments. Studies often presuppose that the argument-adjunct distinction is real. In an ERP study looking at phrase structure violations versus argument structure

violations, Frisch et al. (2004) show that in on-line processing, argument structure violations elicit different Event Related Potential responses. The stimuli consisted of 4 conditions, as follows:²

Control sentence:

- (49) Im Garten wurde oft gearbeitet
in the garden was often worked

(Work was often going on in the garden.)

Phrase structure violation:

- (50) *Im Garten wurde am gearbeitet
in the garden was on-the worked

Argument structure violation:

- (51) *Der Garten wurde oft gearbeitet
the garden was often worked

Phrase structure and argument structure violation:

- (52) *Der Garten wurde am gearbeitet
the garden was on-the worked

The ERP experiment resulted in similar brain patterns in the case of the phrase structure violation and the double violation followed by P600), and different brain

²Example (49) is the control sentence as it contains no violation. Example (50) illustrates a phrase structure violation because in German a preposition cannot be followed by a determiner. Example (51) illustrates an argument structure violation because when dealing with passivized intransitive verbs such as was worked the sentence-initial position cannot be filled by an NP. Example (52) illustrates a double violation: a phrase structure violation and an argument structure violation illustrated in (51).

patterns in the case of the argument structure alone (N400 followed by P600) (Frisch et al., 2004). This suggests that the argument structure violation relies on different processing mechanisms than the phrase structure violation alone. However, when combined with a phrase structure violation, the ERP peak corresponding to the argument structure violation is suppressed, suggesting that phrase structure violations are processed before argument structure violations (Frisch et al., 2004). While Frisch et al. (2004) does not necessarily show that the argument-adjunct distinction is neurolinguistically real, it does show that argument-related violations elicit neurologically distinct behaviours compared to other violations.

The results of Frisch et al. (2004) indicate that arguments are neurolinguistically real by eliciting distinct ERP responses, and other studies provide evidence for verbs differing in their argument structure. More specifically, Thompson et al. (2007) conducted an fMRI study investigating whether or not verbs licensing different numbers of arguments differ in complexity. The study looked at one-argument verbs (e.g. *to die*, *to sit*, *to sneeze*, among others), two-argument verbs (*to cut*, *to hold*, *to inspect*, among others), and three-argument verbs (*to put*, *to sell*, *to teach*, among others). The results of the fMRI study show that one-argument verbs elicit less activation than two and three-argument verbs. This study was later conducted with older participants (ranging between 48 and 68 years old) with both healthy and aphasic participants (Thompson et al., 2010). Overall, both the healthy and the aphasic participants showed greater activation in three-argument verbs compared to one-argument verbs; however, they did not show a greater activation in two-argument verbs compared to one-argument verbs, while the younger participants in Thompson et al. (2007) did.

Even though the neurolinguistic research on arguments and adjuncts is currently scarce, and to the best of my knowledge there is no neurolinguistic research comparing arguments and adjuncts *per se*, the current studies suggest that the notion of arguments is neurolinguistically real, and that verbs with different argument structures

elicit neural behaviours differing in complexity.

Chapter 3

Autism

3.1 Motivation

Even though there is no universally agreed upon definition of autism, most researchers seem to agree that there is a correlation between language difficulties and autism. Often times victims suffering from autism appeal to speech pathologists and language therapists to help diminish their language difficulties; however, the linguistic research done on language and autism is still limited. Moreover, because autism became common only recently, most previous research looks at broad questions such as whether the difficulties associated with autism are pragmatic, semantic and/or syntactic in nature. To the best of my knowledge, there is no research looking at correlations between autism and specific language aspects. This study presents a modest attempt to look at how autistic-like traits in undergraduate student population affect their language use. Specifically, the study looks at how different degrees of autistic-like traits influence speakers intuitions about arguments and adjuncts.

3.2 Autism and Specific Language Impairments

Autism Spectrum Disorder (ASD) and Specific Language Impairments (SLI) are conditions often characterized by deficits in language and communication (Loucas et al., 2008). Autism is often associated with pragmatics, or language use in context (Bishop, 2010). Conversely, specific language impairment is associated with difficulties in mastering structural aspects of language, in particular syntax (e.g. word order, inflectional endings) and phonological skills (identification and production of speech sounds). Traditionally, ASD and SLI have been regarded as two distinct conditions. However, in recent years there has been a shift from treating ASD and SLI as two independent conditions to treating them as interconnected (Bishop, 2010). Reasons for this shift include above chance levels of comorbidity between SLI and ASD, accompanied by molecular genetic findings of shared genetic risk factors for ASD and SLI (Bishop, 2010; Folstein and Mankoski, 2000).

Understanding whether ASD and SLI are indeed two different conditions is very challenging at the behavioural level, and this might be because standardized tests are not sensitive enough to detect similarities and differences accurately (Manolitsi and Botting, 2011). Different testing methods result in different degrees of overlap between the two conditions. For example, Botting and Adams (2005) found only negligible differences between SLI and pragmatic language impairments (PLI, where PLI is often associated with autism). Similarly, Bishop and Norbury (2002) found negligible differences between ASD, SLI and PLI. Behavioural methods of testing for ASD, SLI and PLI include, but are not limited to story comprehension task (Norbury and Bishop, 2002); British Picture Vocabulary Scale (Dunn and Dunn, 2009); and narrative task (Manolitsi and Botting, 2011). It is worth noting that the focus of this thesis is to look at autistic-like traits, and not at SLI; however, I mention both here since there is a debate whether or not the two conditions should be treated as one. For the purpose of this study none of the participants are expected to suffer of SLI.

Instead, we are looking at their autistic-like characteristics as a behavioral measure rather than diagnostic.

3.3 Autism-Spectrum Quotient

In order to assess the students' autistic-like traits, the Autism-Spectrum Quotient test, commonly known as AQ, was selected.¹ The AQ test is a self-administered test designed by Baron-Cohen et al. (2001) intended to determine the degree to which adults of normal intelligence demonstrate autistic-like traits. The test is comprised of 50 multiple choice questions, with each question having the exact same possible answers: strongly agree, slightly agree, slightly disagree, strongly disagree. Based on individual scores, test takers are placed on a continuum from autism to normality. It has to be noted that the Autism-Spectrum Quotient test is not a diagnostic test; it should only be seen as a tool for identifying autistic-like traits in adults of normal intelligence.

¹For the purpose of this study, autistic-like traits refer to the speakers' personality traits, such as whether they are introverts or extroverts, whether they have a preference for numbers, whether they look at a system as a whole or think of its individual components. Autistic-like traits, in this context, do not refer to typical symptoms of autism, but rather to personality traits associated with autism.

Chapter 4

Method

4.1 Participants

For the purpose of this study, a group of 79 participants with no background in Linguistics was recruited. Participants were recruited using Carleton's psychology recruitment system (SONA). As reimbursement for their participation, participants received 0.75 % towards a psychology or neuroscience course. Since the aim of the study is to investigate speakers' intuitions with respect to verbs and their argument requirements, it is crucial that the participants have not been instructed with respect to the argument-adjunct distinction. The eligibility requirements stated that participants should not have taken a Linguistics course because in a Linguistics course students might have been taught how to judge arguments and adjuncts. Instead, for the purpose of this study, we are interested in the judgements of naive speakers. The age range of the students was between 18 and 24.

4.2 Measures

Participants were administered a Language Questionnaire (see Appendix A), a Language Background Questionnaire (see Appendix B) and an Autistic Quotient test (see

Appendix C).

The Language Background Questionnaire was administered to determine whether the participants were first language speakers of English, and if not, at what age they were first exposed to English. A secondary purpose of the questionnaire was to determine what languages they have been exposed to in their childhood.

The Autistic Quotient test was adapted from Baron-Cohen et al. (2001), and it consists of 50 questions such as ‘New situations make me anxious.’ The questions are scored on a four-point scale with the following options: definitely disagree, slightly disagree, slightly agree, and definitely agree. The individuals’ scores are used to place participants on a spectrum ranging from autism to normality.

4.3 Stimuli

The main experiment consisted of a language questionnaire comprised of four tasks. Each task consisted of 12 questions, with the complete language questionnaire containing 48 questions. Each task aimed to elicit, arguably, similar intuitions from the participants; however, with each task the participants’ freedom was restricted. Specifically, with each task participants were indirectly directed towards the knowledge of interest, by manipulating the instructions.

In task 1, participants were asked to imagine what (people, places, objects, etc.) is needed for an event to take place. For example, given an event such as *eating*, what is needed for the *eating* event to take place. By using the verb *to imagine* in the instructions, and by structuring the questions as free answers, in this section participants can answer freely any number and type of participants, with no restrictions.

In task 2, participants were given the beginning of a sentence such as ‘The man ate ...,’ and their task consists in completing the sentence. Compared to the first task, in this task participants’ freedom is somewhat restricted because the subject of

the sentence is already selected for them. Additionally, instead of simply imagining, in task two participants are instructed to include only information necessary for the sentence to make sense to them. In other words, in the second task participants are instructed to refrain from anything they would consider to be additional information.

In task 3, participants were again given an event such as *eating*; however, this time they are also provided a list of items (people, things, places, etc.), and their task consists in selecting only the items needed for the event to take place.

Task 4 consisted of twelve multiple choice questions. Participants were presented with an event such as *eating*, and four sentences describing the *eating* event (e.g. The girl ate; The girl ate an ice cream; The girl ate an ice cream with a spoon; The girl ate an ice cream with a spoon from Vito's Gelateria). The participants' task consists in selecting the sentence providing only the necessary (no more, no less) information for the event to take place.

The verbs used in this study can be classified in six categories: verbs requiring either one or two arguments, ditransitive verbs, verbs requiring three or four arguments, verbs requiring many arguments, motion verbs, and verbs requiring instruments. Each verb category consists of eight verbs. For a complete list of the verbs used and their classification, please refer to Appendix D.

Four different versions were created for this study. Each version consists of four different tasks, as previously discussed. In each version, for each task, there are two distinct verbs from each category mentioned above. Simply put, each participant is given one of the four versions, and therefore, he/she is exposed to two verbs from each category in each task. The verbs are rotated across versions and across tasks. For example, the list of verbs used in version 1, task 1, is used in version 2, task 2, version 3, task 3, and version 4, task 4. This design exposes all participants to verbs from each category, in each task, without repeating verbs across tasks. The reasoning behind this design was to avoid speakers seeing the same verbs in different

tasks because their responses from one task might have influenced their responses to other tasks. For a detailed description of the verbs used in each task across versions, please refer to Appendix E.

4.4 Procedure

Participants registered on SONA and were provided with a link directing them to the study. First, they read the informed consent form after which they proceeded to the language background questionnaire. Next, they proceeded to the language questionnaire, followed by the Autistic Quotient test. Once the study was complete, participants were prompted to the debriefing form which provided them with further information about the study. The complete experiment lasted approximately one and a half hour.

Chapter 5

Results and Discussion

This chapter will cover the results of the study and the analysis and possible interpretations. The verbs used in this study can be classified as follows: verbs requiring one or two arguments, ditransitive verbs, four-argument verbs, verbs requiring many arguments, verbs requiring instruments, and motion verbs.

In what follows, the results and discussion are based on the assumption that speakers' responses to task 1 reflect their semantic intuitions, and their responses to task 2 reflect their syntactic intuitions. In task 1, speakers are provided an event such as a *kicking* event. Their task consists in imagining the given event and stating the participants required for the event to take place. For something to be an act of *kicking* there has to be a participant doing the kicking and a participant being kicked. According to Jackendoff (2002), these two participants are the semantic arguments of the verb. In other words, the verb *to kick* requires two semantic arguments. Even though task 1 is disguised as an imagining task, presumably, that should not influence the fact that it is a linguistic task as well. Rappaport and Levin (as discussed in Ahrens (2003)) suggest that when speakers are exposed to a verb, the verb leads to the activation of its semantic class, which in turn reveals a list of lexical concepts and their associated arguments. Despite the fact that the speakers are asked to imagine

the event, their input is nevertheless a verb, and their output is a list of potential participants.

In task 2, participants are provided the beginning of a sentence such as *The boy kicked*. Their task consists in completing the sentence with the information necessary for the sentence to make sense according to their intuitions. Jackendoff (2002) argues that forming a sentence taps into speakers syntactic intuitions; more specifically, forming a sentence in simple active tense is ‘the best criterion for determining syntactic arguments’ (p.133).

In sum, following Jackendoff (2002), task 1 is interpreted as revealing speakers’ intuitions with respect to semantic arguments, and task 2 is interpreted as revealing speakers intuitions with respect to syntactic arguments, as suggested in Jackendoff (2002). In what follows, each verb category is presented as an individual section, which includes results and analysis.

5.1 Verbs Requiring One or Two Arguments

Verbs requiring one or two arguments can be classified as two types: verbs licensing an optional object (e.g. *to eat*), and verbs where a transitive object alternates with an intransitive subject. This study specifically focuses on the latter, where the intransitive verb is unaccusative. An example of such a verb is *to burst*. Examples (1) and (2) illustrate how the theme (the balloon) changes roles from subject as seen in (1) to object as seen in (2):

- (1) The balloon bursts.
- (2) The child bursts the balloon.

In task 1, participants were given events such as a *bursting* event, and they had to mention the participants necessary for the event to take place. In the case of unac-

cusative verbs, participants could interpret the verb as either transitive or intransitive; or, in other words, as having either one or two arguments.¹ The verbs included in this experiment were *to break*, *to dry*, *to flip*, *to freeze*, *to hang*, *to melt*, *to open*, and *to sink*.² The reasoning behind this section is to investigate speakers' intuitions with respect to unaccusative verbs, whether their responses suggest one potential argument, two potential arguments or more. More specifically, we were interested in whether speakers show a clear preference for interpreting unaccusative verbs as either intransitive or transitive only, or their interpretation is verb-dependent. Thompson et al. (2007) showed that verbs which take a higher number of arguments demonstrate a greater complexity than verbs which take a lower number of arguments. Based on this, one can arguably assume that when interpreted as intransitive verbs, unaccusative verbs are less complex than when interpreted as transitive. If speakers were to interpret all verbs as intransitive, it could presumably suggest a preference for the simplest argument structure, when given a choice, and vice versa. If speakers were to interpret some verbs as transitive, and some as intransitive it would suggest that verb complexity is not the deciding factor in making the choice between the intransitive and transitive interpretation.

Table 5.1 illustrates whether the speakers interpreted the verb as transitive or intransitive. Aside from transitivity, Table 5.1 also presents the percentage of the speakers who mentioned an instrument. For example, let us consider the verb *to break*: the majority of the speakers (75%) interpreted the verb as transitive, while the rest (25%) interpreted the verb as intransitive. Some of the participants (19%) mentioned an instrument. In task 2, participants were given a sentence such as 'The woman dried...' where it was already determined whether the verb is used as transi-

¹We will refer to these alternating verbs as unaccusative here; although, technically only the intransitive version is normally classified as unaccusative.

²The verbs *to break*, *to dry*, *to freeze*, *to melt*, *to hang*, *to open* and *to sink* were adapted from Kuno et al. (2004).

tive or intransitive.³

Table 5.1: Speakers' Intuitions about Unaccusative Verbs, and Their Transitive Correspondants

Verb	Transitive	Intransitive	Instrument/Cause
freeze	0%	100%	39%
melt	6%	94%	72%
sink	0%	94%	0%
flip	56%	44%	28%
open	60%	40%	0%
break	75%	25%	19%
hang	22%	39%	100%
dry	22%	39%	100%

Based on the speakers responses, the verbs *to freeze*, *to melt*, and *to sink* were interpreted as intransitive most of the times, and the verbs *to open* and *to break* were interpreted as transitive by the majority. The verb *to flip* was somewhere in between transitive and intransitive, being interpreted as transitive by slightly over half of the participants (56%) and as intransitive by short of half of the participants (44%). The verbs *to hang* and *to dry* are difficult to interpret, as many of the responses were unclear with regards to whether the speakers interpreted the verb as transitive or intransitive. By looking at the verbs *to freeze*, *to melt*, *to sink*, *to break*, and *to open*, it seems that verbs' frequency did not influence whether or not the verbs were interpreted as transitive or intransitive.⁴ The verbs *to freeze* and *to melt* are high frequency, while the verb *to sink* is low frequency. Similarly, looking at verbs that were interpreted as transitive suggests as well that verb frequency does not influence how verbs are interpreted. The verb *to flip* has the lowest frequency from this category, while the verbs *to break* and *to open* have the highest frequencies. Overall, results suggest that verb frequency does not influence whether unaccusative verbs are interpreted as transitive or intransitive. This might be because the frequencies considered in this study

³Since the decision with respect to whether the verb is used as transitive or intransitive is already made for the participants, the results for task 2 are not included in Table 5.1.

⁴The frequency of the verbs was measured by using the WebCelex database. WebCelex is an online tool created by Max Planck Institute which includes orthographic, phonological, morphological, syntactic, and frequency information for several languages, including English (Baayen et al., 1995).

are overall verb frequencies (see Appendix D). For the frequencies to be relevant to the two possible interpretations of the unaccusative verbs, a corpus analysis should be conducted to determine verb frequency for both the transitive and intransitive interpretations.

Overall, the speakers treated unaccusative verbs either as transitive or intransitive as expected; however, some of the verbs might have other potential semantic arguments. For example, in the case of the verb *to hang*, *to dry*, *to flip*, and *to break* speakers mentioned an instrument (e.g. nails, ropes, hangers, something to hang with, for the verb *to hang*; drier, hairdryer, air drying machines, for the verb *to dry*; pan, spatula, trampoline, diving boards, for the verb *to flip*).⁵ In the case of the verbs *to freeze* and *to melt*, speakers' responses suggest that reason/cause might be a potential semantic argument (e.g. cold temperature, cold, below zero temperatures, for the verb *to freeze*; adequate temperature, heat, something that causes melting, for the verb *to melt*).

5.2 Ditransitive Verbs

Ditransitive verbs are verbs which license three arguments: usually a subject, and two objects, commonly referred to as direct and indirect objects, or a theme and recipient. An example of such a verb is *to pass*. Let us consider example (3):

(3) Krista passed the ball to Chris.

⁵In the case of the verbs *to dry* and *to hang* the percentage of speakers who reported an instrument must be interpreted with caution, as in some cases the nature of the instruments was questionable. For example, in the case of the verb *to dry*, instruments mentioned included *hairdryer*, *drier*, *warm wind*, *heat*; while examples such as *hairdryer* are clear instruments, *warm wind* might be a reason rather than an instrument. The reasoning behind interpreting *warm wind* as an instrument here is because the other participants mentioned were *people* and *articles of clothing*; therefore, arguably, the people hung the clothes outside to dry in the wind. Similarly, in the case of the verb *to hang*, instruments mentioned included things such as *rope* or *tree*. While *rope* seems to be a clear instrument, *tree* could potentially be interpreted as a place as well.

Example (3) describes a *passing* event, where someone is passing something to someone. In task 1, participants were given events such as a *passing* event, and they had to mention the participants necessary for the event to take place. In the case of ditransitive verbs, the expected answer would be the agent, and two objects. The verbs included in this section are *to bring*, *to deny*, *to feed*, *to give*, *to hand*, *to promise*, *to send*, and *to show*.⁶ The reasoning behind this section is to investigate the speakers' intuitions with respect to ditransitive verbs: whether their responses suggest three potential semantic arguments, as expected, more than three potential semantic arguments, or less. One way to think of this category is as a control group, as there is no disagreement in the literature with respect to the number of semantic arguments licensed by a ditransitive verb.

Table 5.2 illustrates speakers' intuitions with respect to the potential semantic arguments licensed by ditransitive verbs. More specifically, it provides the percentage of participants who mentioned the agent, the theme, and/or the recipient. For the purpose of Table 5.2, recipient refers to the secondary animate participant (e.g. the person being showed or promised something in the case of the verbs *to show* and *to promise*; the receiver in the case of the verbs *to send*, *to hand* and *to give*, and so forth). Because of the nature of task 1 and the participants' freedom, it was not always clear whether the participants referred to the agent, theme, recipient, or any combination. To account for all responses, one category provides the percentage of the participants who mentioned people, without any further clarification. For example, let us consider the verb *to bring*.⁷ In task 1, 63% of the participants mentioned people, with 16% mentioning the agent, and 5% mentioning the recipient, while the rest did not specify whether they are referring to the agent or the recipient. The

⁶The verbs *to give*, *to show*, *to send*, *to promise*, *to deny*, *to bring*, *to hand* and *to feed* were extracted from Mukherjee (2005).

⁷In Table 5.2, '-' is used to indicate sections that are irrelevant to the verb or task in question, and 'Given' is used to indicate information provided to the participants (for example, in task 2, participants are given the beginning of a sentence, such as 'The wife promised...')

majority of the participants (79%) mentioned the theme. In task 2, the agent was given, all participants mentioned the theme, and 42% of the participants mentioned the recipient.

Table 5.2: Speakers' Intuitions about Ditransitive Verbs

Verb	People	2 People	Giver	Theme	Recipient
show	90%	70%	70%	90%	90%
	-	-	Given	100%	83%
give	89%	78%	78%	94%	78%
	-	-	Given	100%	50%
hand	75%	67%	67%	83%	67%
	-	-	Given	100%	79%
promise	73%	60%	73%	33%	60%
	-	-	Given	100%	28%
deny	100%	60%	6%	10%	40%
	-	-	Given	100%	5%
feed	78%	22%	28%	94%	33%
	-	-	Given	50%	85%
send	47%	21%	32%	84%	21%
	-	-	Given	100%	84%
bring	63%	53%	16%	79%	5%
	-	-	Given	100%	42%

In the case of ditransitive verbs, both theme and recipient were mentioned both in task 1 and task 2. However, the theme was mentioned by more participants in task 2 compared to task 1, in all verbs except *to feed*. A similar difference between tasks 1 and 2 can be observed in the case of the recipient, however, only in half of the verbs (*to hand*, *to feed*, *to send*, and *to bring*). Assuming task 1 suggests potential semantic arguments and task 2 suggests potential syntactic arguments, these results illustrate a mismatch between semantics and syntax. Specifically, the results suggest that sometimes both theme and recipient (for the verbs *to hand*, *to send*, and *to bring*) play a more crucial role as syntactic arguments than as semantic arguments. Looking at the recipient response only, there is a great variability across verbs in the percentage of speakers who mentioned the recipient as a potential semantic argument. One potential interpretation is that this variability reflects a change in verbs' transitivity over time. More specifically, verbs that were previously used as ditransitive might be

reduced to transitive over time.

As illustrated above, overall, speakers intuitions suggest that ditransitive verbs license three potential semantic and syntactic arguments, specifically the agent, theme, and recipient, which is consistent with the expected number of semantic arguments licensed by ditransitive verbs.

5.3 Four-Argument Verbs

Verbs requiring four arguments are verbs that arguably require four arguments to describe the event corresponding to the verb. An example of such a verb is *to bet*. Let us consider example (4):

(4) Dave bet Jeff \$10 that Messi will score.

Example (4) describes the verb *to bet*, where someone is betting with someone something if something happens. Another example is the verb *to sell*, as illustrated in example (5):

(5) The seller sold a bike to a student for \$50.

Example (5) describes the verb *to sell*, which requires two animate participants, an object, and a price. The reason why the price can be considered an essential semantic argument (Apresjan, 1992) is because without the price, there would be no difference between the verbs *to sell* and *to give*.

In task 1, participants were given events such as a *betting* event, and they had to mention the participants necessary for the event to take place. In the case of verbs requiring four arguments, possible answers included two animate participants, and possibly two inanimate participants.

In task 2, participants were given the beginning of a sentence, such as ‘Dave bet...’, and their task consists in completing the sentence in a way that makes most sense to

them. The verbs included in this section are *to sell*, *to buy*, *to purchase*, *to fire*, *to hire*, *to lend*, *to trade*, and *to translate*.⁸

The aim of this section is to investigate speakers' intuitions with respect to verbs requiring four arguments, specifically, whether speakers' responses suggest four potential arguments, more than four, or less than four. Table 5.3 illustrates the percentage of the participants who mentioned the agent, the recipient or beneficiary, theme(s), and a method of payment. Because some of the participants did not specify whether they are referring to the agent, the recipient, or both, Table 5.3 includes a category for 'people'.

For example, let us consider the verb *to sell*. In task 1, the majority of the speakers (79%) mentioned people, with 58% specifying the seller and 37% specifying the buyer. The theme was selected by the majority of the speakers (68%), and the payment method was selected by 26% of the participants. In task 2, the seller was given, and the theme (the object sold) was mentioned by 95% of the participants. In task 2, none of the participants mentioned the buyer.

Speakers' intuitions about three of the verbs (*to fire*, *to hire*, and *to lend*) fell outside of our expectations. In the case of the verbs *to fire* and *to hire*, we predicted four semantic arguments: the employer, employee, a purpose (e.g., a job), and a period of time. Similarly, for the verb *fire* we predicted an employer, an employee, a reason, and from what position. Speakers' intuitions suggest that both *to fire* and *to hire* take three potential arguments: an employer, an employee, and a purpose or reason, with the purpose and reason being mentioned by less than a quarter of the participants. In the case of the verb *to lend*, we predicted four semantic arguments, and speakers' intuitions suggest only three potential semantic arguments. The expected semantic arguments were two animate participants (e.g., banker and client), item lent (e.g., money), and a period of time. Arguably, the period of time is a semantic argument of

⁸According to Apresjan [p.117](1973), verbs such as *to buy* and *to sell* take four semantic arguments.

Table 5.3: Speakers' Intuitions on Four-Argument Verbs

Verb	People	Agent	Recipient	Theme(s)	Payment	Place	Reason
purchase	83%	39%	33%	56%	78%	-	-
	-	Given	0%	100%	0%	-	-
buy	74%	32%	32%	74%	47%	-	-
	-	Given	0%	95%	0%	-	-
sell	79%	58%	37%	68%	26%	-	-
	-	Given	-	95%	0%	-	-
lend	94%	39%	33%	100%	-	-	-
	-	Given	63%	95%	-	-	-
translate	85%	80%	25%	25%	-	-	-
	-	Given	33%	72%	-	-	-
trade	58%	21%	21%	21%	21%	-	-
	-	Given	11%	100%	32%	-	-
fire	110%	77%	100%	-	-	54%	0%
	-	Given	95%	-	-	-	11%
hire	89%	68%	47%	-	-	-	0%
	-	Given	100%	-	-	-	21%

the verb *to lend* because otherwise there would be no conceptual difference between the verbs *to lend* and *to give*. However, no one mentioned time in task 1 or 2.⁹ In the case of the verb *to trade*, compared to the other verbs in this category, the speakers mentioned two objects, the object traded, and the object traded with. In the case of the verb *to trade*, the percentage of speakers who mentioned a secondary object is included under payment. Therefore, according to speakers' intuitions, the verb *to trade* has four potential semantic arguments: the giver, the receiver, the object traded, and the object received as a result of the trade.

As illustrated above, overall, speakers' intuitions with respect to the number of potential semantic arguments ranged between two (as suggested by the verbs *to hire*) and four (as suggested by the verbs *to buy*, *to sell*, *to purchase* and *to trade*). The average number of semantic arguments according to speakers' intuitions was 3.25, which falls in the predicted range, between three and four. The number of potential syntactic arguments ranged between two and three, with an average of 2.63.

⁹Even though time was a predicted potential argument, since none of the participants mentioned time in task 1 or 2, it was not included in Table 5.3.

5.4 Verbs Requiring Many Arguments

Verbs requiring many arguments are somewhat controversial in the literature, as some argue that verbs license a maximum of three or four arguments (Tesnière, 1959; Kearns, 2011), while some suggest that certain verbs can have up to six arguments (Apresjan, 1992). Let us consider example (6):

- (6) The US government dispatched a military troop from US soil to Vietnam to rescue the lieutenant held hostage.

Example (6) illustrates someone dispatching someone from a primary location to a secondary location for a reason.

In task 1, participants were given events such as a *dispatching* event, and they had to mention the participants necessary for the event to take place. Potential answers include one or two people, a source (primary location), a goal (secondary location), a reason, an object/real estate property, or a method of payment, among others.

The verbs included in this section are *to expatriate*, *to deport*, *to dismiss*, *to evacuate*, *to exile*, *to expel*, *to extradite*, and *to rent*.¹⁰ The aim of this section is to investigate whether speakers' intuitions are consistent with the view that verbs license a maximum of three or four arguments, or with the view that sometimes, four arguments are not sufficient to understand the event described by a verb. Additionally, the section aims to investigate whether there is a maximum limit to the number of arguments. To the best of my knowledge, the maximum number of arguments that has been proposed in the literature is six, as mentioned in Apresjan (1992), however, even though his examples are limited to verbs taking up to six arguments, he does not explicitly state that six might be the maximum limit to the the number of semantic arguments, or whether there is a maximum limit at all.

¹⁰The verbs *to deport*, *to dismiss*, *to evacuate*, *to exile*, *to expatriate*, *to extradite* and *to fire* are from Goldberg (2010), and the verb *to rent* is from Apresjan (1992).

In what follows, Table 5.4 illustrates the percentage of the participants that selected a certain potential argument. For example, let us consider the verb *to extradite*. In task 1, all speakers mentioned people (100%), with 36% specifically mentioning the agent and 18% mentioning the experiencer. Overall, the location was mentioned by 27% of the participants, with the source and the goal each being mentioned by 9% of the participants. In task 2, the agent was given. The experiencer (the person being extradited) was mentioned by 94% of the participants. The goal was mentioned by 31% of the participants, while no participants mentioned the source. Overall, in the case of the verb *to extradite*, participants mentioned four potential semantic arguments.

The results presented in this section in particular must be interpreted with a grain of salt because, overall, the speakers' responses demonstrated little understanding of the verbs included, with the verbs *to expatriate* and *to extradite* demonstrating the least understanding of the verbs' meaning. For example, in the case of the verb *to expatriate*, many speakers showed little or no understanding of the verb (e.g., *home country, individual, foreign country* demonstrate some understanding; *someone that lives in the country, someone that lives outside it* demonstrates very little understanding; *picture of home, diverse* demonstrates no understanding). Similar responses were observed in the case of the verb *to extradite* (e.g., *a person, place to be extradited from, a place to be extradited to* show adequate understanding; *politician, citizen* show some understanding; *i donno* shows no understanding). Moreover, even though the intention was to have a group of low frequency verbs and a group of high frequency verbs, this was particularly challenging for this task, as most verbs which potentially require many arguments are low frequency. For example, *to expatriate* has a frequency of zero, suggesting no use at all, *to extradite* has a frequency of two, *to exile, to deport* and *to evacuate* have a frequency of three, while only three verbs (less than half) *to expel, to rent* and *to dismiss* have somewhat higher frequencies: eleven, twenty-nine,

and thirsty-five, respectively. However, even though these frequencies are higher than zero, two, or three, they are still on the low end compared to verbs such as *to give* which has a frequency of over a thousand (for frequency values, please see Appendix D, which reports frequencies as per WebCelex database).

Table 5.4: Speakers' Intuitions on Verbs Requiring Many Arguments

Verb	People	Agent	Experiencer	Places	Source	Goal	Means	Reason
expatriate	67%	0%	8%	25%	17%	17%	25%	0%
	-	Given	100%	9%	0%	9%	0%	0%
deport	88%	18%	18%	24%	6%	12%	47%	0%
	-	Given	100%	6%	0%	6%	6%	0%
dismiss	100%	57%	71%	-	-	-	-	0%
	-	Given	100%	-	-	-	-	0%
evacuate	53%	16%	11%	26%	26%	5%	0%	0%
	-	Given	32%	84%	84%	0%	-%	0%
exile	0%	3%	3%	23%	6%	12%	0%	0%
	-	Given	100%	6%	0%	6%	0%	0%
expel	92%	46%	46%	31%	8%	0%	0%	3%
	-	Given	100%	0%	0%	6%	0%	39%
extradite	100%	36%	18%	27%	9%	9%	0%	0%
	-	Given	94%	31%	0%	31%	0%	0%
rent	74%	16%	11%	-	-	-	-	0%
	-	Given	0%	-	-	-	-	11%

As illustrated above, overall, speakers' intuitions with respect to the number of potential arguments ranged between two (as suggested by the verb *to dismiss*) and five (as suggested by the verb *to deport*), with an average of 3.87. Overall, only the verbs *to expatriate* and *to deport* seem to have five potential semantic arguments, while all other verbs have less than five potential semantic arguments according to speakers' intuitions. Speakers' intuitions suggest that none of the verbs included here require six potential semantic arguments, and only two of the verbs require five potential semantic arguments, contrary to Apresjan (1992), who predicts six arguments. Rather, the results are consistent with views suggesting that verbs takes a maximum of three or four arguments (Tesnière, 1959; Kearns, 2011).

5.5 Verbs Requiring Instruments

While in some cases it is clear whether we are dealing with arguments or adjuncts (e.g. agents and patients are typically arguments, while time or space expressions are typically adjuncts), instruments have proven more difficult to classify. Previous research proposes at least three different views regarding the argument-adjunct distinction for instruments: instruments as adjuncts (Levin and Rappaport, 1988; Jackendoff, 1992), instruments as arguments (Schütze, 1995), instruments as arguments or adjuncts depending on the verbal head (Koenig et al., 2008), or instruments as a gradient property (Manning, 2003). An example of such verbs is *to sew*. Let us consider example (7):

(7) The granny sewed the pillow case with a needle.

Example (7) illustrates that *to sew* requires someone sewing something with something.

In task 1, participants were given events such as a *sewing* event, and they had to mention the participants necessary for the event to take place. The verbs included in this section were *to cut*, *to draw*, *to paint*, *to scrape*, *to scratch*, *to scrub*, *to sketch*, and *to write*.¹¹

Koenig et al. (2008) argues that verbs associated with instruments can be further more classified as verbs which require an instrument and verbs which allow an instrument, but the instrument is not semantically obligatory. With these two categories in mind, arguably, the verbs *to cut*, *to draw*, *to paint*, *to sketch* and *to write* require an instrument, while the verbs *to scrape*, *to scratch*, *to scrub* allow an instrument, but do not require it.

The aim of this section was to investigate speakers intuitions with respect to in-

¹¹The verbs *to cut*, *to scrape*, *to scratch*, *to draw*, *to paint*, *to sketch* and *to write* are from Levin (1993).

struments: whether they consider instruments as adjuncts, as arguments, or as a gradient ranging from adjuncts to arguments. Table 5.5 illustrates the percentage of the participants who selected the agent, the theme, and the instrument across verbs. For example, let us consider the verb *to cut*. In task 1, the agent was the least mentioned (selected by 55%), followed by the theme (selected by 70% of the participants). The instrument was selected by the most participants (75%), suggesting that it is a strong potential semantic argument. Overall, according to speakers' intuitions, the verb *to cut* has three potential semantic arguments. In task 2, the agent was given, the theme was mentioned by 95% of the participants, and the instrument was not mentioned by any of the participants.

Table 5.5: Speakers' Intuitions on Verbs Requiring Instruments

Verb	Agent	Theme	Instrument
cut	55%	70%	75%
	Given	95%	0%
draw	65%	0%	100%
	Given	90%	5%
paint	45%	15%	70%
	Given	100%	0%
scrape	44%	39%	44%
	Given	90%	0%
scratch	67%	50%	44%
	Given	95%	17%
scrub	30%	30%	85%
	Given	100%	0%
sketch	45%	25%	85%
	Given	100%	0%
write	50%	15%	90%
	Given	80%	0%

As illustrated in 5.5, overall, speakers' intuitions with respect to the number of potential semantic arguments ranges between two (as suggested by the verb *to draw*) and three (as suggested by the verbs *to cut*, *to paint*, *to scrape*, *to scratch*, *to scrub*, *to sketch*, and *to write*), with an average of 2.87. As illustrated in (4), the percentage of speakers mentioning an instrument varied across verbs, suggesting that instruments fall in between arguments and adjuncts, which is consistent with the the view pre-

sented in Boland (2005).

To illustrate the role of the instruments, 5.6 illustrates a hierarchy starting with verbs that least require an instrument to verbs for which instruments are crucial, according to the speakers' intuitions.

Table 5.6: Hierachy of Verbs Based on Their Requirements of an Intrument

scrape = scratch < paint < cut < scrub < sketch < write < draw

The results of this section suggest that instruments are semantic arguments, as revealed by speakers' responses to task 1; however, they are not syntactic arguments, as suggested by their task 2 responses. Additionally, the results provide evidence for the view that instruments cannot be classified as arguments or adjuncts, but rather fall in between the two.

Additionally, a focus on theme rather than on instrument suggests that at least in the case of verbs requiring instruments, participants' responses seem to have been influenced by syntax, not only semantics. For example, verbs such *to draw*, *to paint*, and *to write* do not typically require a direct object to be expressed, while verbs such as *to cut* do.

5.6 Motion Verbs

Motion verbs describe different types of changes due to some movement and are often accompanied by some sort of place or location. Van Luven (2014) proposes that these places should be classified into different classes including locative, goal, and path. The reasoning behind this classification is that different classes of places pattern differently in terms of their argumenthood. Specifically, Van Luven (2014) proposes that locative and path classes are adjuncts, while goal classes are arguments (see also Kearns 2011, p.39).

An example of a motion verb is *to run*. In what follows, example (8) illustrates the

verb *to run* alone, while examples (9), (10), (11) and (12) illustrate the verb *to run* accompanied by a goal, a source, both a source and a goal, and a path, respectively:

- (8) The athlete ran.
- (9) The athlete ran to the finish line.
- (10) The athlete ran from the crime scene.
- (11) The athlete ran from the start line to the end line.
- (12) The athlete ran through the forest.

In task 1, participants were given events such as a *running* event, and they had to mention the participants necessary for the event to take place. The aim of this section was to investigate whether or not the source, goal, path or manner are potential arguments according to the speakers' intuitions. The verbs included in this section were *to arrive*, *to climb*, *to crawl*, *to dart*, *to enter*, *to float*, *to swim* and *to travel*.¹²

Table 5.7 illustrates the percentage of the participants who mentioned the agent, or some sort of location. Because all participants mentioned some sort of medium of transportation, it is also included in Table 5.7.

For example, let us consider the verb *to arrive*. In task 1, the agent was mentioned by 74% of the participants, place was mentioned by 58% of the participants, and 42% mentioned a medium of transportation, which was included under means. The place was further divided in source and goal, and in the case of the verb *to arrive* none of the participants mentioned the source and 47% mentioned the goal.¹³ In task 2, a place, specifically a goal was mentioned by 37% of the participants, the means was mentioned by 5% of the participants. Compared to task 1, in task 2 the time was also included, being mentioned by 50% of the participants.

¹²The verbs *to arrive*, *to climb*, *to crawl*, *to dart*, *to enter* and *to travel* are from van Luven (2014), and the verbs *to swim* and *to float* are from Levin (1993).

¹³In the case of the verb *to arrive*, other places mentioned were *roads*, or *a space to be filled*.

Table 5.7: Speakers' Intuitions on Motion Verbs

Verb	Agent	Place ¹⁴	Source	Goal	Means	Time/ Manner/Reason
arrive	74%	58%	0%	47%	42%	0%
	Given	37%	0%	37%	5%	58%
climb	72%	83%	0%	0%	56%	0%
	Given	95%	0%	15%	0%	0%
crawl	100%	37%	0%	0%	5%	0%
	Given	79%	0%	58%	0%	16%
dart	61%	-	-	-	-	-
	Given	100%	88%	6%	0%	0%
enter	61%	22%	0%	6%	60%	0%
	Given	94%	0%	94%	0%	12%
float	75%	47%	0%	0%	11%	0%
	Given	83%	0%	0%	0%	17%
swim	79%	85%	0%	0%	15%	0%
	Given	89%	0%	28%	0%	0%
travel	60%	20%	0%	20%	65%	0%
	Given	89%	0%	89%	0%	50%

To illustrate the role of the locations, Table 5.8 was created to illustrate a hierarchy starting with verbs that least require a location to verbs for which locations seem to be crucial potential arguments, according to the speakers' intuitions.

Table 5.8: Hierarchy of Verbs Based on Their Requirements of a Place

travel = enter < dart = arrive < crawl < float < climb < swim

Overall, according to speakers' intuitions, motion verbs license three or four potential semantic and syntactic arguments (an agent, a place, a medium of transportation, and time). Interestingly, and consistent with the section on verbs requiring instruments, means are often mentioned in task 1, indicating they are potential semantic arguments; however, they are often absent in task 2, suggesting they are not potential syntactic arguments. In case of time, the situation seems to be reversed: time

is absent in task 1 in all verbs; however, it is often present in task 2, suggesting it is a potential syntactic argument but not a semantic argument. The results of this section suggest that locations are similar to instruments, in the sense that they seem to fall in between arguments and adjuncts.

5.7 Other Results

Tasks 3 and 4

Other tasks used in this experiment were tasks 3 and 4. Task 3 consisted of a multiple choice question, where participants were given seven options and had the possibility of selecting any number of options. For example, given the verb *to purchase*, participants have to choose the items needed for a *purchasing* event, given the options: someone purchasing; something being purchased; someone selling, a price, a reason for the purchasing, a place where the purchasing happens, and a time when the purchasing happens. The reasoning behind this task was to see whether when given both arguments (e.g., someone purchasing) and adjuncts (e.g., a place, a time) speakers will limit their choices to arguments only. The results to this task are only briefly discussed, as the speakers' responses ranged from selecting all 7 options for an unaccusative verb to selecting only 1 option for verbs possibly requiring many arguments, and it was difficult to detect clear trends in the data. Moreover, in some of the cases, participants selected several adjuncts while omitting one or all argument(s). Table 5.9 illustrates a summary of the results obtained for task 3.

Table 5.9: Means and Medians of the Number of Arguments per Verb Category

Verb category	Mean	Median
Unaccusative	3.53	3
Ditransitive	3.81	4
4-Argument	4.16	4
Many arguments	4.03	4
Intruments	3.80	4
Motion	3.67	4

Table 5.9 suggests that verbs' argument requirements lie between three and four arguments, which is consistent with most views found in the literature. Interestingly, the mean for instruments and ditransitives are close, suggesting that verbs requiring instruments license three arguments. Task four, which was presented as a multiple choice format was excluded from the analysis since it was difficult to detect clear trends relevant to the research questions proposed.

Autism Quotient Test

Speakers' responses on the Autism Quotient Test were scored as described in Baron-Cohen et al. (2001) where a scores of zero indicate no autistic-like skills, and scores of 32+ indicate a high level of autistic-like skills. The speakers' results ranged from a score of 5 to 32, suggesting that while they vary in their degree of autistic-like skills, most speakers fell within the normal range of the spectrum, with only two (who scored 32) suggesting they might have sufficient autistic-like traits to be potential victims of Autism. A brief comparison of the extreme scores (speakers from each end of the spectrum) indicates no trends between the level of autistic-like traits and speakers' intuitions about arguments and adjuncts. Because the number of speakers whose scores indicate a high level of autistic-like traits was less than 3%, no in-depth analysis was further considered.

Limitations

Some of the limitations of this study are that each verb category consisted of 8 verbs, which might not provide sufficient evidence to allow verb class generalization. Additionally, several assumptions were necessary in order to code and interpret speakers' responses.

Chapter 6

Conclusion

The intuitions of native speakers suggest that the argument-adjunct distinction is real, and it overall matches with linguists' views on verbs and their argument requirements.

In the case of verbs requiring one or two arguments, speakers' responses do not suggest a preference or initial interpretation of verbs as either transitive or intransitive. Instead, some of the verbs were interpreted as transitive, some as intransitive, and some as both. Aside from the agent, and/or object (depending on whether the verb was interpreted as transitive or intransitive), speakers often mentioned a reason or an instrument in task 1, which suggests that the reason might be a potential semantic argument.

In the case of ditransitive verbs, speakers intuitions patterned with our expectations. More specifically, speakers intuitions suggest that ditransitive verbs require three potential arguments.

In the case of the four-argument verbs, speakers intuitions again patterned with our expectations. For the majority of the verbs, speakers responses suggest that verbs such as *to trade*, *to buy*, *to sell*, *to purchase* among others take four potential semantic arguments. Despite the overall agreement, two verbs were flagged as possibly not

belonging in the category of four-argument verbs: *to fire* and *to hire*. According to speakers responses, the verbs *to fire* and *to hire* take two potential semantic arguments. The number of potential syntactic arguments for four-argument verbs was lower. This is consistent with our predictions because even though participants such as *method of payment* or *reason* might be potential semantic arguments, they are clearly not potential syntactic arguments.

In the case of verbs requiring many arguments, none of the speakers mentioned six potential semantic arguments, contrary to Apresjan (1992). On the contrary, speakers responses suggest that overall verbs that arguably take many arguments take between three or four arguments, with only *to expatriate* and *to deport* taking five potential semantic arguments.

In the case of verbs requiring instruments, speakers responses suggest that instruments are potential semantic arguments, but they are not potential syntactic arguments.

Lastly, in the case of motion verbs, speakers responses suggest that such verbs often take some sort of place or location as a potential argument. More specifically, results suggest that the goal is a potential semantic and syntactic argument; however, the place is neither a potential semantic nor syntactic argument, which is consistent with Van Luven (2014).

Overall, the results are consistent with the claim that arguments do not take more than three or four arguments. Similar to other studies, in this study, verbs requiring instruments and motion verbs proved to be difficult to classify as to whether the instrument or location, respectively, is an argument or an adjunct. Instead, the results suggest that instruments and locations fall somewhere in between adjuncts and arguments.

A brief look at the relation between the speakers' scores on the Autism Quotient test and their responses to the language task suggests no trends between autistic-like

skills and speakers' intuitions with respect to verbs and their argument requirements. Even though no correlation was found between autistic-like skills and speakers' intuitions about verbs and their argument requirements, the results were consistent with a spectrum or gradient view of autism.

Appendices

Appendix A: Language Questionnaire:

Task 1:

Instructions: Imagine an *eating* event is taking place in a large box. What needs to be in the box (people, objects, places, etc.) for *eating* to take place?

Possible answers: a person; or a person and food; or a person, food, place etc.

Sample stimuli:

Sample 1: Now imagine a *denying* event. What needs to be in the box?

Sample 2: Now imagine a *crawling* event. What needs to be in the box?

Sample 3: Now imagine an *extraditing* event. What needs to be in the box?

Appendix A: Language Questionnaire:**Task 2:**

Instructions: Please complete the following sentences however makes most sense to you.

Example: Given the phrase 'The man wrote,' possible ways to complete it include but are not limited to: not adding anything (The man wrote); a book; a book about animals; a book about animals with a red pen, etc.

Sample stimuli:

Sample 1: The man traded

Sample 2: The woman promised

Sample 3: The clothes dried

Appendix A: Language Questionnaire:

Task 3:

Instructions: For each event below, please check the items needed for the event to take place.

Example: writing:

- someone writing
- something being written
- something the writing occurs on
- tool/instrument used for the writing
- someone the writing is for
- a place when the writing occurs
- a time when the writing occurs

Sample stimuli:

Sample 1: scratching

- someone/something being scratched
- someone scratching
- a tool/instrument used for scratching
- a reason for the scratching
- something the scratching happens instead of
- a place when the scratching happens
- a time when the scratching happens

Sample 2: freezing

- something being frozen
- a temperature at which the freezing happens
- someone/something freezing
- a place where the freezing happens
- a tool/instrument used for freezing
- a time when the freezing happens
- a reason for the freezing

Sample 3: purchasing

- someone purchasing
- something being purchased
- someone selling
- a price
- a reason for the purchasing
- a place where the purchasing happens
- a time when the purchasing happens

Appendix A: Language Questionnaire:**Task 4:**

Instructions: Please select the sentence which, based on your intuition, provides the necessary (no more, no less) amount of information for the event to take place. Please select the response which, according to your intuition, provides just enough information for you to make sense of the event/situation.

Example:promising event

- 1. The woman promised.
- 2. The man promised to stop smoking.
- 3. The woman promised her husband to stop smoking.
- 4. The man promised his wife to stop smoking because it is affecting hi health.

Sample stimuli:

Sample 1: traveling event

- 1. The family traveled.
- 2. The friends traveled to Europe.
- 3. The family traveled to Europe by plane.
- 4. The friends traveled to Europe by plane this summer.

Sample 2: opening event

- 1. The door opened.
- 2. The man opened the door.
- 3. The door opened because of the wind.
- 4. The man opened the door for his wife.

Sample 3: translating event

- 1. The boy translated a poem.
- 2. The girl translated an English poem.
- 3. The girl translated a poem from English to Spanish.
- 4. The boy translated a poem from English to Spanish for his homework.

Appendix B: Language Background Questionnaire:

Instructions: Please respond the following questions to the best of your knowledge.

1. Please select your age range:

- 18-22
- 23-40
- 41 and over

2. Sex (select one):

- Male
- Female
- Other

3. Please indicate your first language:

- English
- French
- Other

4. What was the primary language spoken in your household throughout your childhood?

5. If English is not your first language, please state at what age you were exposed to English for the first time?

Appendix C: Autism Quotient Spectrum Questionnaire:

Instructions: Below is a list of statements Please select each statement *carefully* and rate how strongly you agree or disagree with it by selecting your answer. There are no right or wrong answers, or trick questions.

Each question has four potential answers: strongly agree, slightly agree, slightly disagree, or strongly disagree.

1. I prefer to do things with others rather than on my own.
2. I prefer to do things the same way over and over again.
3. If I try to imagine something, I find it very easy to create a picture in my mind.
4. I frequently get so strongly absorbed in one thing that I lose sight of other things.
5. I often notice small sounds when others do not.

Scoring method:

‘Definitely agree’ or ‘slightly agree’ responses scored 1 point, on the following items: 1, 2, 4, 5, 6, 7, 9, 12, 13, 16, 18, 19, 20, 21, 22, 23, 26, 33, 35, 39, 41, 42, 43, 45, 46.

‘Definitely disagree’ or ‘slightly disagree’ responses scored 1 point, on the following items: 3, 8, 10, 11, 14, 15, 17, 24, 25, 27, 28, 29, 30, 31, 32, 34, 36, 37, 38, 40, 44, 47, 48, 49, 50.

Appendix D: List of verbs used in the experiment:

1 or 2 Arguments	Ditransitive	3 or 4 Arguments	Many Arguments	Motion	Instruments
Flip	Deny	Translate	Expatriate	Dart	Scrub
7	65	20	0	8	3
Melt	Hand	Purchase	Extradite	Crawl	Scratch
24	70	20	2	25	10
Freeze	Promise	Trade	Exile	Float	Paint
45	76	20	3	33	12
Dry	Feed	Lend	Deport	Swim	Scrape
48	133	27	3	47	24
Sink	Send	Hire	Evacuate	Climb	Cut
50	269	31	3	92	190
Hang ¹	Show	Fire	Expel	Travel	Write
15/127	468	48	11	98	209
Break	Bring	Sell	Rent	Enter	Draw
229	512	145	29	129	215
Open	Give	Buy	Dismiss	Arrive	Sketch
230	1278	256	35	171	464

Appendix E: List of Verbs across Versions:

	Version 1	Verson 2	Version 3	Version 4
Task 1	flip	melt	sink	freeze
	break	hang	open	dry
	deny	hand	promise	feed
	bring	send	show	give
	lend	trade	translate	purchase
	buy	hire	sell	fire
	deport	expatriate	extradite	exile
	rent	evacuate	expel	dismiss
	crawl	float	swim	dart
	arrive	enter	travel	climb
	cut	scrub	sketch	scratch
	scrape	paint	write	draw
Task 2	melt	flip	freeze	sink
	hang	break	dry	open
	hand	deny	feed	promise
	send	bring	give	show
	trade	lend	purchase	translate
	hire	buy	fire	sell
	expatriate	deport	exile	extradite
	evacuate	rent	dismiss	expel
	float	crawl	dart	swim
	enter	arrive	climb	travel
	scrub	cut	scratch	sketch
	paint	scrape	draw	write

	Version 1	Verson 2	Version 3	Version 4
Task 3	freeze	sink	flip	melt
	dry	open	break	hang
	feed	promise	deny	hand
	give	show	bring	send
	purchase	translate	lend	trade
	fire	sell	buy	hire
	exile	extradite	deport	expatriate
	dismiss	expel	rent	evacuate
	dart	swim	crawl	float
	climb	travel	arrive	enter
	scratch	sketch	cut	scrub
	draw	write	scrape	paint
Task 4	sink	freeze	melt	flip
	open	dry	hang	break
	promise	feed	hand	deny
	show	give	send	bring
	translate	purchase	trade	lend
	sell	fire	hire	buy
	extradite	exile	expatriate	deport
	expel	dismiss	evacuate	rent
	swim	dart	float	crawl
	travel	climb	enter	arrive
	sketch	scratch	scrub	cut
	write	draw	paint	scrape

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