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Title: Intransitive Verbs in Hebrew and the Unaccusativity Hypothesis:
An Experimental Study of Unaccusativity Diagnostics

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Abstract:

The Unaccusativity Hypothesis splits intransitive verbs into two groups, Unaccusatives and Unergatives. It is claimed that the difference between these two groups is in their syntactic structure, with unaccusative verbs merging their argument VP-internally, and unergatives VP-externally. Across languages, unaccusatives and unergatives exhibit different syntactic behaviors. In Hebrew there are two syntactic properties that distinguish between the two types of verbs: The ability to license the Possessive Dative (PD) Construction and the ability to appear in the so-called Strict Verb-Subject (VS) Order.

The account of these behaviors hinges on the status of the argument of an unaccusative verb as internal. In the strict VS order the verb and its argument both remain in-situ, thus the verb precedes the subject when it is internal, but follows it when the subject is external. In regard to the PD construction, it has been suggested that it is only licensed when a dative possessor c-commands the possessee (as is the case for internal arguments, but not external ones). Although both the PD construction and VS order have been used to diagnose unaccusativity in the literature, they have not been experimentally tested.

To validate these properties as unaccusativity diagnostics, I contrasted unergative and unaccusative verbs for both, in a series of acceptability judgement tasks. I hypothesized that PD constructions and VS order with unaccusative verbs will be judged as significantly more acceptable than their counterparts with unergative verbs. The experiments neutralized factors beyond verb type, such as definiteness, animacy, plausibility, and lexical choice, in order to verify that the effect is structural in nature.

The results are in line with my hypothesis, unaccusative verbs are rated higher than unergatives in both diagnostics, and the two diagnostics yield consistent results when examining the same sets of

verbs. Following that, I claim that both the PD and VS are valid unaccusativity diagnostics in Hebrew.

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1. Introduction

1.1. The Unaccusativity Hypothesis

The unaccusative hypothesis concerns itself with the properties of intransitive verbs, splitting them into two groups that broadly differ in their syntactic and semantic properties. The hypothesis splits these verbs into two types: unergative and unaccusative verbs. It is generally accepted that the syntactic difference hinges on the position of the verb's argument: Unaccusative verbs merge their subject VP-internally, in the complement position, while the unergative verbs merge it higher, and are thus said to have an external argument subject (Perlmutter 1978, Burzio 1986). This is schematized in (1a) and (1b) respectively, abstracting away from details.

(1) a. The vase_k fell t_k.

b. The boy_k t_k yawned.

It has also been suggested that the two sets of intransitives differ semantically. Firstly, the subject of unergatives, but not that of unaccusatives, tends to be agentive, performing the action with intent. Second, unaccusatives, unlike unergatives, have been argued to describe a change of state (including location) or even telicity (an event with an endpoint) (Levin and Rappaport-Hovav 1995, Sorace 2004). The semantic differences seem less clear-cut. Unergative emission verbs are not agentive, as will be further discussed, and some unaccusatives are not telic (e.g., *developed*, see Reinhart 1996), though all have been argued to denote a change of state. See Levin and Rappaport Hovav (1995), Potashnik (2014) and references therein for more discussion.

While the unaccusativity hypothesis is generally accepted, the theory differs in how it models the two verb types. One approach treats the division between the two sets as a pure syntactic split, meaning that an intransitive verb is invariably unaccusative, with an internal argument, or unergative, with an external argument. A second approach posits a gradient scale, in which the edges of the scale are constant in their type, but verbs between them on the scale can merge their argument as internal or external depending on various factors such as telicity and agentivity (Sorace 2000, 2004).¹ I will refer to these approaches as the pure split approach and the gradient approach respectively, and will discuss this further in section 4.3.

Regardless of which theory holds, there are impressive regularities in verb classification to the two groups cross-linguistically (e.g., Levin and Rappaport-Hovav 1995), suggesting that the phenomenon is essentially universal. Further, language after language, unaccusatives often

¹ This is a constrained variant of the more general constructional approaches (Borer 1994, 1998, van Hout 2000), which divorce the argument structure from the lexical entry of the verb, and make unaccusativity a higher level property of a predicate.

show different syntactic properties from unergatives. These properties then serve as diagnostics to classify intransitive verbs between the two sets. The literature about Hebrew mentions two main syntactic differences between unaccusative and unergative verbs: the availability vs. unavailability of the Possessive Dative construction and ‘strict verb-subject order’, respectively. These differences have been argued to serve as diagnostics of unaccusativity.

However, Gafter (2014) casts some doubt on the possessive dative diagnostic. Moreover, both diagnostics have never been directly tested experimentally, nor shown (experimentally) to yield the same split to verb types. This study aims to provide experimental evidence towards the validity of the unaccusativity diagnostics in Hebrew, both separately and in comparison to each other. I conducted a series of experiments examining both diagnostics with the same sets of unaccusatives vs. the same sets of several types of unergatives, thereby enabling comparison of their results.

The remainder of the introduction is structured as follows: Section 1.2. discusses the unaccusativity diagnostics in Modern Hebrew in an in-depth manner, explaining why they diagnose unaccusativity, and what restrictions must be in place for them to function. Section 1.3. presents the goals of this study regarding the diagnostics, as well as the overarching methodology used to examine the diagnostics. In section 1.4. I make observations regarding the nature of acceptability judgement surveys and their relation to grammaticality.

Following the introduction, I present two series of acceptability judgement experiments I conducted to test both of the unaccusativity diagnostics. In section 2. I present the experiments that examined the Possessive Dative construction as an unaccusativity diagnostic, and discuss their results. Section 3 parallels section 2, with experiments that examine the VS order as a diagnostic, in a manner that enables comparison to the results yielded by the experiments in section 2. Finally in section 4. I discuss the results of all experiments together, and their relevance to split intransitivity, and I conclude the findings of my study.

1.2. Unaccusativity Diagnostics in Modern Hebrew

In Hebrew, two main differences between unaccusative and unergative verbs are mentioned in the literature. First, while the default word order in Hebrew is subject-verb(-object), unaccusatives permit the so-called ‘strict verb-subject’ order, in which the verb precedes the subject order with neither a clause-initial trigger nor intervention between the two elements (Meltzer-Asscher and Siloni 2012, Siloni 2012). Unergatives disallow it. Additionally,

unaccusative verbs license a possessive dative, a dative DP which is the possessor of the subject, while unergative verbs do not. Both diagnostics are discussed further below.

1.2.1. The Possessive Dative Construction

The Hebrew Possessive Dative (henceforth abbreviated as PD) construction describes possession in a broad sense. Namely, it can denote a relation of ownership, authorship, temporary possession, etc., between a dative noun phrase (the possessor) and a possessee. Berman (1982), Landau (1999) and Linzen (2014) argue that in a PD construction the possessor is somewhat affected by the event denoted by the verb. This is opposed to noun phrase internal possession, where the possessor is introduced by the preposition *lel* 'of'. More recently, Linzen (2016) argues (based on corpus analysis) that unaffected possessors in PD constructions are in the process of becoming more acceptable. This is discussed further in section 2.6.

Structurally, Borer and Grodzinsky (1986) argue that in the PD construction, the possessee must be an internal argument, a noun phrase subordinate to the VP. They show that it can be a direct object (2a), a noun phrase embedded within a VP-internal (locative, source or instrumental) PP (2b), a subject of a passive verb (2c), and a subject of an unaccusative (2d) (in examples (2a-d), the dative possessor is in bold, and the possessee is underlined). Unlike the subject of unaccusatives, the PD is not allowed with the subject of unergatives – it is untenable as a possessee (2e). This is in line with the unaccusativity hypothesis that claims the subject of unergatives is an external argument, merged above the VP, and only the subject of unaccusatives is merged internally. According to Borer and Grodzinsky, the PD must c-command the possessee or its trace.² This is the structural configuration with unaccusatives, but not with unergatives, which merge their subject higher.

(2) a.

dani	hipil	le-yosi	et	<u>ha-robot</u>
Danny	dropped	to-Yossi	ACC	the-robot

'Danny dropped Yossi's robot.'

b.

dani	nirdam	le-yosi	<u>ba-kise</u>
Danny	fell.asleep	to-Yossi	in.the- chair

'Danny fell asleep in Yossi's chair.'

c.

<u>ha-robot</u>	tukan	le-dani
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² See Landau (1999) for the observation that the PD is incompatible with transitive verbs with no agentive entry.

the- robot was.repaired to-Danny
'Danny's robot was repaired.'

d.

ha- robot nijbar **le-yosi**
the-robot broke to-Yossi
'Yossi's robot broke.'

e.

*ha- robot ne'emad le-yosi
the-robot stood.up to-Yossi
Intended meaning 'Yossi's robot stood up.'

The PD can be a *wh*-phrase, forming a constituent question. These questions allow for either the canonical subject-verb order (3a) or a verb-subject order (3b), which is licensed by the initial *wh*-phrase and is in common use. Verb subject order is discussed more in depth below.

(3) a.

le-mi ha-robot nijbar
to-whom the-robot broke
'Whose robot broke?'

b.

le-mi nijbar ha-robot
to-whom broke the-robot
'Whose robot broke?'

Looking at the data above, the PD seems to reliably differentiate between the two types of intransitive verbs. However, there are several caveats to the use of the PD as a reliable diagnostic: The possessee should not be a proper name, the possessor should not be a pronoun, and the possessee should not be an inalienable noun. Below I discuss the restrictions more in depth.

The first restriction, that the possessee not be a proper name, is a result of the fact that proper names do not readily allow possessors (Meltzer-Asscher and Siloni 2012). Consequently, the use of proper names may result in ungrammaticality/marginality of the construction regardless of verb type. This restriction partly overlaps with the animacy/human constraint described by Gafter (2014) and Linzen (2014). They show that in the PD construction, the

possessee tends to be nonhuman, and the possessor human. This pattern is typical of noun phrase external possession. Thus, for example, the same is observed in Cause Possession ditransitive verbs, such as *give*, which tend to have an inanimate Theme and a human Goal-Possessor (Rappaport Hovav and Levin 2008; Mishani-Uval and Siloni 2017). To ensure a reliable PD diagnostic of unaccusativity, one should take this into consideration and avoid a human possessee and an inanimate possessor.

The second constraint on the use of PD as an unaccusativity diagnostic concerns the form of the possessor (Meltzer-Asscher and Siloni 2012). The possessor should not be a pronoun, even though a pronominal possessor is the most frequent form of possessor for the PD construction in spontaneous speech (Linzen 2014). Pronouns should be avoided since dative pronouns also give rise to other dative constructions, namely the reflexive and ethical datives. The reflexive, or coreferential dative, is coreferential with the subject and usually relates to its enjoyment from the denoted event, as exemplified in (4a). The dative pronoun may also give rise to the so-called ethical dative, which does not describe possession, but rather expresses a certain bearing that the event (state) described has upon the individual denoted by the pronoun. This is demonstrated in (4b), where there is no possessee at all throughout the sentence. Neither of these datives requires an internal argument.

(4)

a.

dani	metayel	lo	ba-mizrax	ha-raxok
Danny _k	travels	to-him _k	in.the-east	the-far

‘Danny is travelling in the far east (with pleasure).’

b.

ma	hem	metaylim	li	kol
what	they	travel	to-me	all
ha-zman	ba-mizrax	ha-raxok		
the-time	in.the-east	the-far		

‘What do they think they are doing travelling in the far east all the time.’

(the action has an effect on me).

It is important to note that Hebrew also exhibits an affectee dative (both benefactive and malefactive being possible), which is similar to the ethical dative (Ariel, Dattner, Du Bois and Linzen 2015). However, whereas both ethical and affectee datives introduce an entity that is affected by the state of affairs denoted by the verb, only in the affectee cases is the event actually intended to affect the dative entity. In addition, while in affectee cases the effect is objective, for the ethical dative the effect is subjective (psychological). The affectee dative can be non-pronominal with some verbs and for certain speakers. Thus, in (5a-b), the act of opening the door was intended to affect the dative participant, the act was done for her

benefit, but in (4b), the dative participant is not part of the event: the event was not intended to affect her, and the effect on her is subjective. Of importance to the PD as a diagnostic, is the fact that the dative can receive a benefactive reading both when it is pronominal (5a) as well as non-pronominal (5b). In light of that, the PD diagnostic should avoid cases where the event is intended to affect the dative participant.

(5) a.

dani	patax	la	et	ha-delet
Danny	opened	to-her	ACC	the-door

'Danny opened the door for her.'

b.

dani	patax	le-dina	et	ha-delet
Danny	opened	to-Dina	ACC	the-door

'Danny opened the door for Dina.'

Finally, the possessee should not be an inalienable noun such as a body part (involving untransferable possession).³ Siloni (2012) observes that inalienable noun subjects appear as possesseees in a PD construction independently of their status as external or internal. (6) involves an emission verb standardly classified as unergative (Levin and Rappaport-Hovav 1995). Indeed, while it fails to license strict verb-subject order (6a) it does license a PD, as shown in (6b). This issue is further elaborated in section 2.6.2.

(6) a.

*nacecu	ʃney	koxavim
sparkled	two	stars

Intended meaning : 'Two stars sparkled.'

b.

ha-	nacecu	le-dina
eynayim		
the-eyes	sparkled	to-Dina

'Dina's eyes sparkled.'

These constraints taken into consideration, the PD test seems to create a reliable distinction between the two verb types. It yields a possessive reading with an unaccusative verb, but not an unergative. However, Gafter (2014) challenges the relevance of unaccusativity to the PD

³ Although part-whole nouns and kinship nouns also involve inalienable possession, they are to be avoided by the previous constraints, namely, to refrain from using nonhuman possessors and human possesses, respectively.

in.the-night	yawned	the- boy
'The boy yawned at night.'		
c. Direct Object Trigger		
et ha-cipor	ra'a	ha- yeled
ACC the-bird	saw	the- boy
'The boy saw the bird.'		
d. Indirect Object Trigger		
la-park	rac	ha- yeled
to.the-park	ran	the- boy
'The boy ran to the park.'		

For the purposes of diagnosing unaccusativity, then, avoiding any clause initial XP is the most straightforward way to make sure that the sentence does not involve triggered inversion.

The second restriction states that there should be no intervening material between the verb and the subject (Siloni 2012, Brandel and Siloni to appear, Meltzer-Asscher and Siloni 2012). It is attested that this licenses a VS order with unergative verbs as well, as seen in (11), where a locative intervenes between them and the sentence is felicitous.

(11)

rakdu	po	llofa	yeladim
danced	here	three	children
'Three children danced here.'			

Finally, the subject cannot be a proper name or pronoun. This would result in ungrammaticality of the structure regardless of whether the verb is unergative or unaccusative, as strict VS order is impossible with those types of subjects (12a-b):

(12)

- a. Proper Name Subject
- *nafal dan
- fell Dan
- Intended meaning : 'Dan fell.'
- b. Pronominal Subject

*nafal hu
fell he
Intended meaning : 'he fell.'

An additional point to keep in mind when using the VS diagnostic, is to use an indefinite subject when a definite subject yields marginal results – This is because the post-verbal position is more inclined to introduce new information, which is usually associated with indefinite nouns rather than with definite ones (Brandel and Siloni to appear).

1.3. The Current Study

This thesis aims to provide experimental evidence for the unaccusativity diagnostics in MH. There are two separate observations I will provide evidence for:

- I) Each diagnostic by itself can provide an accurate distinction between the verb types
- II) Both diagnostics yield similar results when used to examine identical verb groups

To do this, I conducted a series of acceptability judgement experiments comparing an identical set of unergative and unaccusative verbs, both in the PD construction and the VS order. These experiments neutralize as much as possible the effects of confounding factors, such as lexical choice, plausibility, and context, and specifically for the PD construction also prominence differences and type of dative. For constructing the stimuli of all experiments, intransitives were classified as unaccusative if they: (a) describe a change of state (Potashnik 2014, Levin and Rappaport Hovav 1995 and references therein), and (b) have a Theme argument, and (c) have a transitive alternant with a cause θ -role, that is, a role associated with a Causer whose mental state is irrelevant to the event (Reinhart 2002).

I conducted seven experiments in this study, in which three sets of unergative-unaccusative verb pairs were tested: Unaccusative verbs compared to unergative verbs, unaccusative verbs compared to reflexive verbs, and unaccusative verbs compared to emission-type unergatives. Each set of verb pairs was tested both in the PD construction and the VS order, such that there were three experiments for each diagnostic. An additional experiment was conducted to examine the issue of inalienable possessives in the PD construction: Are inalienable nouns valid possessives in a PD construction with unergative verbs? All experiments involved sets of context-less sentences, with an identical subject for each verb pair in both constructions.

Referencing the stated goals above, I predicted that for each diagnostic, the difference in acceptability between unergative and unaccusative verbs would be significant (with unergative verbs being rated lower than their unaccusative counterparts). Not only would this validate the reliability of each diagnostic on its own, but also show that both diagnostics provide similar results with identical verb groups – reinforcing the claim that verb type is

relevant to both. As the experiments all tested acceptability, a word on acceptability and grammaticality is in order.

1.4. Acceptability Judgements and Grammaticality

In most standard linguistic theories, grammaticality of syntactic constructions is binary.⁶ If a certain syntactic structure is generated by the grammar, that structure is grammatical, if not then it is ungrammatical (Keller 2000). Acceptability judgements, such as those I use in this study, however, are graded. When speakers are tasked with judging the acceptability of constructions, they do not rely on their grammatical knowledge exclusively, but are also affected by extra-grammatical influences such as discourse effects, frequency, plausibility and processing ease, as well as by experiment-specific factors (Keller 2000; Sorace and Keller 2005, Sprouse 2007; Schutze 1996). Following from this, it is unsurprising that a discrepancy between grammaticality and acceptability may arise in acceptability judgement tasks. Therefore, grammatical constructions are sometimes judged as relatively unacceptable, and conversely that ungrammatical constructions are sometimes judged as relatively acceptable (for the latter see in particular Frazier 2008; Langendoen and Bever 1973).

Seeing as I ascribe the differences between unaccusative and unergative verbs in both the PD construction and the VS order to a difference in grammaticality, I predicted that sentences with unaccusative verbs to be judged as significantly more acceptable than the ones with unergative verbs, for both types of constructions. However, this does not entail that the numerical difference in their acceptability rating would be large. The central tendency bias (i.e., participants' tendency to avoid using extreme response categories) would preclude the grammatical sentences from receiving perfect scores, keeping the unaccusative scores away from the positive end of the scale. For sentences with unergative verbs we expected that their acceptability could be somewhat raised by several factors: In both constructions the experimental sentences were very short and simple (3 word sentences), easing their comprehension. Additionally, all the scenarios were pretested for plausibility and deemed plausible. Moreover, since participants avoid using extreme response categories, they also refrain from choosing extremely low response categories. Thus, ungrammatical sentences were not expected to receive very low ratings. Finally, as for the VS order, it is important to note that such an order is common with all types of verbs in children's literature as well as in Biblical Hebrew, a language that all native Hebrew speakers are exposed to from early school years. This leads to a state in which an untriggered VS order with an initial unergative verb is,

⁶ A different approach, proposed by Almeida (2014), suggests that the binary nature of grammaticality is only a practical heuristic that is useful for linguistic research, and that grammaticality should be thought of as graded (see also discussion in Francis 2021).

in some manner, part of Hebrew speakers' linguistic knowledge. Due to these factors, the numerical difference between grammatical and ungrammatical sentences' acceptability was not predicted to be very large – however it is still predicted to prove significant.⁷

2. The Possessive Dative Construction

2.1. Experimental Design

I ran four acceptability judgement surveys involving the PD, in each one participants were exposed to sentences with a PD and either an unaccusative or unergative verb. The sentences were paired such that in each pair the sentences were identical in word order as well as lexical material other than the verb, which was alternately unergative or unaccusative. As the PD and the possessee were identical in each sentence pair, there was no difference in prominence, in terms of animacy and definiteness, between the sentences in each pair. This being the case, Gafter's proposal (in (6)) predicts that the PD construction should be perceived as equally acceptable whether the verb was unaccusative or unergative. However, the unaccusative hypothesis predicts a difference between the two: sentences with unaccusative verbs should be judged as significantly more acceptable than the ones with unergative verbs.

Three of the experiments tested the relevance of unaccusativity to PD constructions. Experiment 1 tested the grammatical status of the PD construction with unaccusative versus unergative verbs. Experiment 2 was similar to Experiment 1, but examined reflexive verbs in place of unergative verbs. Experiment 3 tested the acceptability of possessive datives with emission type unergative versus unaccusative verbs.

I conducted an additional experiment, Experiment 4, in order to better examine the issue of inalienable possessors in PD constructions. The experiment is structured identically to Experiments 1-3, however each sentence pair was identical in verb and dative possessor, while the difference between the sentences was in the subject, which was either an alienable or inalienable noun.

As much as possible, the verbs in each sentence pair were matched for verbal template. Furthermore, to make sure that there were no differences in semantic plausibility between the unaccusative and unergative sentence in each pair, a plausibility judgment pretest was carried out. The design of the pretest was identical to that of the experiments. The stimuli were also identical to those in the experiments, but with noun phrase internal possession (introduced by *fel* 'of') instead of a PD, as exemplified in (13) below.

(13)

⁷ Additionally, in light of the differences between the strict VS order and Dative DPs in Hebrew, it is expected that unergatives in the strict VS order would be rated higher than those in a PD construction. However, this study does not aim to examine this issue.

Example sentence pair, Plausibility pretest for experiment 1:

a. Unergative Verb

ha-robot	jel	yosef	neema
			d
the-robot	of	yosef	stood
			up

'Yosef's robot stood up.'

b. Unaccusative Verb

ha-robot	jel	yosef	nijbar
the-robot	of	yosef	broke

'Yosef's Robot Broke.'

Questionnaires were built using Google forms and distributed via social media. Participants were presented with a list of sentences and had to rate every sentence on a scale from 1 (completely unacceptable) to 7 (completely acceptable).

2.2. Experiment 1

In Experiment 1 I tested the grammatical status of the PD construction with unaccusative versus unergative verbs, via an acceptability judgment task, as elaborated above.

2.2.1. Participants

Fifty participants completed Experiment 1 (mean age: 24.94, range: 18-52). All participants were native Hebrew speakers.

2.2.2. Materials

Experiment 1 compared the acceptability of possessive datives with unergative and unaccusative verbs, in a canonical (Subject-Verb order) declarative sentence. The experimental stimuli included ten sentence pairs. All sentences consisted of a definite lexical DP subject, a verb, and a dative possessor (14a-b). The sentences in each pair had identical

subjects and dative phrases. They differed only in the verb, which was either unaccusative or unergative, and matched for verbal template where possible.⁸

(14) Example Sentence Pair, Experiment 1:

a. Unergative Verb

ha-robot	ne'ema	le-yosef
	d	
the-robot	stood	to-yosef
	up	

Intended meaning: 'Yosef's robot stood up.'

b. Unaccusative Verb

ha-robot	nifbar	le-yosef
the-robot	broke	to-yosef

'Yosef's Robot Broke.'

The experimental materials were assigned to two lists in a Latin Square design, such that each list contained five unergative and five unaccusative sentences. Each list also contained ten filler sentences of varying acceptability. Order of presentation was randomized for each participant.

A plausibility pretest included twenty-four participants (different from the participants in the main experiment) that were asked to rate the plausibility of parallel sentences with internal possession on a scale of 1-7. The results of the plausibility pretest showed no significant difference between the scenarios with unaccusative verbs (mean plausibility rating = 6.63) and those with unergative verbs (mean plausibility rating = 6.43) ($t(9) = -0.74, p = 0.48$).

2.2.3. Results

Table 1 shows the average acceptability rating that each sentence received in Experiment 1, by verb.⁹

⁸ In Hebrew, verbs are composed of consonantal roots that are embedded in vocalic templates.

⁹ An outlier in experiment 1 is seen in the verb pair with *hitrocec* 'ran around'. The PD construction with the unergative *hitrocec* received a higher rating than its counterpart with an unaccusative *hitlaxlex* 'got dirty'. While unexpected, the result may be explained by the fact that *hitrocec* can appear with a directional dative argument. If *hitrocec* is followed by a dative more often than its counterpart *hitlaxlex*, that may have influenced the perceived acceptability of the PD structure containing it. Also bearing mention are *hitmared* 'rebelled' and *hitpare'a* 'acted rowdy'. While they were not rated higher than their unaccusative counterpart, they were still perceived as more acceptable than other unergative verbs. This may be the influence of a possible affectee dative reading, at least for some speakers. I discuss this further in section 2.6.

Table 1. Average acceptability rating by verb pair, Experiment 1:

Unaccusative		Unergative	
Verb	Average rating	Verb	Average rating
nijbar 'broke'	5.60	ne'emad 'stood up'	3.12
hitmotet 'collapsed'	4.82	hityajev 'sat'	2.56
hitpocec 'exploded'	4.72	hitmared 'rebelled'	3.69
hitlaxlex 'got dirty'	3.68	hitrocec 'ran around'	4.34
nirtav 'got wet'	3.64	nimnem 'napped'	2.95
nafal 'fell'	4.26	naxar 'snored'	3.48
met 'died'	4.2	kam 'arose'	2.91
nisraf 'burned'	3.86	nijkav 'laid down'	2.8
hitpate'ax 'evolved'	5.0	hitatef 'sneezed'	2.64
hijtana 'changed'	4.84	hitpare'a 'acted rowdy'	4.47
Mean (SD)	4.46 (0.64)	Mean (SD)	3.29 (0.68)

Statistical analysis was performed using paired by-item and by-participants t-tests. The analysis revealed a significant effect for verb type by-item ($t(9) = 3.714$, $p = 0.005$) and by-participant ($t(49) = -4.824$, $p < 0.001$).

2.2.4. Discussion

The results of Experiment 1 reveal that verb type has a clear effect on the perceived acceptability of the PD construction. PD constructions with unaccusative verbs received a significantly higher acceptability rating than those with unergative verbs.

2.3. Experiment 2

Experiment 2 compared the acceptability of PDs with reflexive and unaccusative verbs, in a canonical declarative sentence. Reflexive verbs have been argued to have an external argument subject (Reinhart and Siloni 2004, 2005); hence, they should behave on a par with unergatives, and unlike unaccusatives, with regard to the PD construction. The reflexives were selected from a previously identified group (Siloni 2008), while unaccusative verbs were compliant with the diagnostics explained in section 1.3.

2.3.1. Participants

Sixty participants completed Experiment 2 (mean age: 24.29, range: 15-54). All participants were native Hebrew speakers.

2.3.2. Materials

The experimental stimuli for the experiment included ten sentence pairs. All sentences consisted of a lexical DP subject, a verb, and a PD, as in experiment 1. The sentences in each pair had identical subjects and PDs. The verb was either reflexive (15a) or unaccusative (15b), all verb pairs were matched for verbal template.

(15) Example sentence pair, Experiment 2:

a. Reflexive Verb

ha-robot	hitxamej	le-naama
the-robot	armed	to-Naama
	itslef	

Intended meaning: 'Naama's robot armed itself.'

b. Unaccusative Verb

ha-robot	hitmotet	le-naama
the-robot	collapse	to-Naama
	d	

'Naama's robot collapsed.'

The experimental materials were assigned to two lists in a Latin Square design, such that each list contained five reflexive and five unaccusative sentences. Each list also contained ten filler sentences of varying acceptability. Order of presentation was randomized for each participant.

A plausibility pretest included twenty-six participants (different from the participants in the main experiment) that were asked to rate the plausibility of parallel sentences with internal possession on a scale of 1-7. The results of the plausibility pretest showed no significant

difference between the scenarios with unaccusative verbs (mean plausibility rating = 5.34) and those with reflexive verbs (mean plausibility rating = 4.8) ($t(9) = -1.1, p = 0.3$).

2.3.3. Results

Table 2 shows the average acceptability rating that each sentence received in Experiment 2, by verb.¹⁰

Table 2. Average acceptability rating by verb pair, Experiment 2:

Unaccusative		Reflexive	
Verb	Average rating	Verb	Average rating
hitaver 'became blind'	1.71	hitlakek 'licked itself'	1.96
hityabef 'dried'	3.53	hitnaka 'cleaned itself'	1.82
hiftana 'changed'	4.71	hitlabef 'got dressed'	2.15
hitkavec 'shrunk'	3.62	hitmate'ax 'stretched'	2.14
hitpate'ax 'evolved'	5.03	hitraxec 'bathed'	1.75
hitmotet 'collapsed'	4.28	hitxamef 'armed itself'	2
hiftabef 'became faulty'	2.92	hictayed 'supplied itself'	2.53
hitparek 'fell apart'	5.34	hitkafet 'decorated itself'	2.39
hitrasek 'crashed'	2.71	hitmakem 'went to its place'	2.56
hitalef 'fainted'	4.34	hitgared 'scratched itself'	1.64

¹⁰ In Experiment 2 the verb pair *hit'aver* 'became blind' exhibits an outlying result: The PD construction with the unaccusative *hit'aver* is perceived as less acceptable than the one with the reflexive *hitlakek* 'licked itself'. One could suggest that the outlying judgement may stem from the circumstances described in the stimulus (Nitzan's dog became blind), which are undesirable and may influence the acceptability ratings. However, the pretest did not show a parallel effect. A more elaborate explanation is provided in section 4.

Mean (SD)	4.44 (0.62)	Mean (SD)	2.1 (0.32)
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Analysis was performed as in Experiment 1. The analysis revealed a significant effect for verb type ($t(9) = 4.36, p = 0.002$)

2.3.4. Discussion

The results of Experiment 2 once again reveal the effect of verb type on the acceptability of PD constructions. PD constructions with unaccusative verbs were judged as significantly more acceptable than those with reflexive verbs. As mentioned above, reflexive verbs have been argued to have an external argument subject, just like other unergatives (Reinhart and Siloni 2004, 2005). The fact that they received a significantly lower acceptability rating in comparison to unaccusative verbs, then, provides support for the relevance of unaccusativity to the licensing of PD constructions.

2.4. Experiment 3

Experiment 3 compared the acceptability of possessive datives with emission type unergative versus unaccusative verbs. The Stimuli of Experiment 3 were built similarly to those in 1 and 2. The emission type unergative verbs were selected based on Levin and Rappaport Hovav's (1995) classification.

2.4.1. Participants

Fifty-seven participants completed Experiment 3 (mean age: 31.63, range: 17-65.). All participants were native Hebrew speakers.

2.4.2. Materials

The experimental stimuli for the experiments included only eight sentence pairs, as the set of emission verbs is small. All sentences consisted of a subject DP, a verb, and a lexical PD. As in previous experiments, the sentences in each pair had identical subjects and dative phrases. The verb was either unaccusative or an emission type unergative. Given that the set of emission verbs is small, verbs could not be matched for template. Example pairs are provided in (16a,b).

(16) Example sentence pair, for experiment 3:

a. Emission Verb

ha-iton	rifref	le-
		dafna

Verb	Average rating	Verb	Average rating
tava 'sank'	4.46	xarak 'creaked'	4.61
namas 'melted'	5.41	zahar 'shined'	4.61
nafal 'fell'	5.8	nacac 'glistened'	4.42
hitparek 'fell apart'	6.11	nicnec 'glittered'	5
nifpax 'spilled'	6.32	bi'abea 'bubbled'	5.03
hitlaxlex 'got dirty'	4.84	hivhev 'blinked'	5.35
hitpocec 'exploded'	5.41	kirkef 'clanked'	3.69
nirtav 'got wet'	6.06	rifref 'rustled'	4.84
Mean (SD)	5.55 (0.65)	Mean (SD)	4.69 (0.5)

Analysis was performed as in the previous experiments. The analysis revealed a significant effect for verb type ($t(7) = 3.1$, $p = 0.017$).

2.4.4. Discussion

Experiment 3 mirrored the results of Experiments 1-2: again the PD construction is perceived as significantly less acceptable with an unergative verb as compared to an unaccusative verb. As emission type verbs have the same argument structure as other unergative verbs, these results are to be expected.

However, Siloni (2012) observes that emission verbs do allow a PD when their subject is an inalienable noun. In order to further examine this issue, I ran Experiment 4, which compares the acceptability of emission verbs with alienable versus inalienable nouns.

2.5. Experiment 4

Experiment 4 compared the acceptability of possessive datives with emission type unergative verbs when they had an alienable versus inalienable subject. The stimuli of Experiment 4 were built similarly to those in prior experiments. All stimuli had an emission type unergative verb, selected as detailed in Experiments 3. The inalienable nouns were all body parts.

2.5.1. Participants

Fifty-five participants completed Experiment 4 (mean age: 28.01, range: 17-55.). All participants were native Hebrew speakers.

2.5.2. Materials

As the set of emission verbs is very small, it was difficult to construct parallel sentences which are plausible with both alienable and inalienable subjects. Therefore, the experimental stimuli for the experiment included eight sentence pairs. Unlike previous experiments, the sentence pairs differed in possessee type, and not verb type. (17a,b) exemplifies sentence pairs for experiments 4.

(17) Example sentence pair, for experiment 4:

a. Alienable subject

ha-trisim	nakfu	le-meir
the-blinds	knocke	to-
	d	Meir

Intended meaning: 'Meir's blinds knocked.'

b. Inalienable subject

ha-jinaim	nakfu	le-meir
the-teeth	knocke	to-
	d	Meir

'Meir's teeth chattered.'

To make sure that there were no differences in semantic plausibility between the alienable and inalienable subject sentence in each pair, a plausibility judgment pretest was carried out in an identical manner to the previous experiments. The pretest included twenty-four participants (different from the participants in the main experiment) that were asked to rate the plausibility of parallel sentences with internal possession on a scale of 1-7. The results of the plausibility pretest showed no significant difference between the scenarios with alienable subjects (mean plausibility rating = 5.54) and those with inalienable subjects (mean plausibility rating = 5.49) ($t(7) = -0.14, p = 0.89$).

2.5.3. Results

Table 4 shows the average acceptability rating of each sentence in Experiment 4.¹²

Table 4. Average acceptability rating by sentence pairs, Experiment 4:

Verb	Alienable		Inalienable	
	Subject	Average rating	Subject	Average rating
xarak 'creaked'	gag 'roof'	3.38	kol 'voice'	4.07
nacac 'glistened'	yahalomim 'diamonds'	4	enayim 'eyes'	4.65
bahak 'gleamed'	matbe'ot 'coins'	3.23	cipornaim 'fingernails'	3.61
nakaf 'knocked'	trisim 'shutters'	3.11	jinaim 'teeth'	4.5
rifref 'rustled'	iton 'newspaper'	3.5	lev 'heart'	3.38
zahar 'shined'	pesel 'statue'	3.30	se'ar 'hair'	3.23
hivhik 'gleamed'	ekdax 'gun'	2.53	or 'skin'	3.38
nicnec 'glimmered'	yahalomim 'diamonds'	4.19	enayim 'eyes'	4.15
	Mean (SD)	3.4 (0.51)	Mean (SD)	3.87 (0.54)

Analysis was performed as in the previous experiments. The analysis revealed a significant effect for noun type, such that sentences with emission-type unergative verbs are judged as more acceptable with an inalienable compared to alienable subjects by subject ($t(7) = -2.4872$, $p = 0.0355$).

¹² Experiment 4 showed one outlying result: The constructions with the verb *xarak* 'creaked' got a higher ranking with the inalienable noun *kol* 'voice' than with the alienable noun *gag* 'roof'. However, the plausibility pretest revealed that 'roof' is a more plausible complement for the verb than 'voice'. Additionally, I believe that the inalienable noun *lev* 'heart' with the verb *rifref* may be infelicitous as a typical argument for the verb, as *rifruf lev* (lit. rustling of the heart) is a medical condition of 'heart murmurs'.

2.5.4. Discussion

The difference between the perceived acceptability of PD constructions with an emission-nergative verb having an inalienable possessee as opposed to an alienable possessee proved to be significant. When the possessee is inalienable, the PD structure is judged as more acceptable. This provides support for Siloni's (2012) observation that emission-type unergatives permit a possessive dative only with an inalienable subject (possessee), suggesting a difference between alienable and inalienable possession constructions. This is further discussed in section 2.6.1.

2.6. Discussion on the Possessive Dative Construction

2.6.1. Findings

The goal of experiments 1-3 was to examine the PD construction as an unaccusativity diagnostic. The experiments compared unaccusative with different types of unergative verbs, unergative, reflexive, and emission types. All experiments included paired sentences; the subject in each pair was identical, as was the possessor. This creates a situation in which there is no difference in prominence either in animacy or definiteness between the sentences in each pair, the sole distinction being the verb type, unaccusative vs unergative. Further, pretests showed that the sentences in each pair did not differ in the plausibility of the scenario they describe. And yet, an effect of verb type was observed. All experiments yielded statistically significant results, with the unaccusative PD constructions being judged as more acceptable than unergative PD constructions. Thus, the results show that the type of verb is crucial to the acceptability of the PD construction, regardless of prominence.

But although the difference in acceptability ratings between the two verb types is statistically significant, the numerical difference between the ratings is not large. Nonetheless, I claim that the significant difference in acceptability provides evidence that a PD construction is grammatical with an unaccusative verb, but not with an unergative one, for the reasons unfolded in section 1.4

Moreover, there may have been an additional factor that contributed in some manner to improving the score of the unergatives in PD constructions. This would be the possibility of the dative possessor being read as an affectee with some verbs for some speakers. Recall I observed that when used as a diagnostic, the PD should not be pronominal to exclude the ethical and coreferential dative readings. However, affectee datives can be non-pronominal to different degrees, depending on the specific verb and speaker (as observed by Ariel, Dattner, Du Bois and Linzen 2015). Informal examination of the unergative verbs *hitpare'a* 'acted rowdy' and *hitmared* 'rebelled', both from Experiment 1, shows that some speakers do

allow them to appear with a non-pronominal affectee dative (e.g., *ha-robot hitmared le-dani* (the-robot rebelled to-dani, intended meaning ‘Danny’s robot rebelled’). Indeed, *hitpare’a* ‘acted rowdy’ scored relatively highly and *hitmared* ‘rebelled’ too (but less so).

Given all the above, I argue that a contrast in grammaticality can be deduced from the difference in acceptability that the experiments yielded. Thus the experiments reported here, which control for possible confounding factors that could affect the acceptability of the PD (animacy, definiteness, choice of dative, plausibility, inalienability, and context) can be used to diagnose or confirm the status of unaccusativity (or unergativity) for coherent sets of verbs, the prediction being for a significant difference in acceptability in case the sets are of different verb type, and a non-significant one otherwise.

Following Borer and Grodzinsky (1986), I assume that the PD construction is possible only with unaccusative intransitives, as a possessive reading is only available when the possessor c-commands the possessee or its copy, as stated in (18):

- (18) A PD construction only yields a possessive reading when the dative NP possessor c-commands the possessee or its copy.

For concreteness, I assume an Applicative analysis of the PD (Pylkkanen 2008), although the specifics are not crucial. Along the lines proposed by Preminger (2009) I place the Hebrew PD in the specifier position of an applicative head, directly dominating the VP, as roughly schematized in (19).¹³ From that position, the PD c-commands DP₂ (or its trace in case it raises), the object of transitive verbs and the subject of unaccusatives, which are both merged VP-internally (19a,b), but not DP₁, the subject of transitive and unergative verbs (19a,c)

- (19) a. Transitive: [VP DP₁ [V' V] [AppIP Possessor [VP Ψ DP₂]
 b. Unaccsative: [VP [V' V] [AppIP Possessor [VP Ψ DP₂]
 c. Unergative: [VP DP₁ [V' V] [AppIP Possessor [VP Ψ]

Linzen (2014) entertains the idea that the unaccusative-unergative distinction exhibited by the PD construction may be an epiphenomenon of affectedness. Recall that it has been suggested that the distinction between the possessive dative construction and genitive possession has to do with affectedness; Berman (1982), Landau (1999), and Linzen (2014) argue that a PD is perceived as more affected by the event than a genitive possessor. Based on searches in the Israblog Corpus (Linzen 2010), Linzen (2014) suggests that aspects of affectedness including discourse salience, animacy, inalienability, agentivity and eventivity (vs.

¹³ For my purposes, it is irrelevant whether the dative possessor raises from within the possessee (as in Landau 1999, Preminger 2009) or whether it is merged externally in SpecAppIP.

stativity) may underlie the difference in the acceptability of a PD between unaccusatives and unergatives. However, Linzen's study does not set apart PDs from ethical datives. Moreover, the present study controlled for animacy, definiteness and inalienability, and neutralized context,¹⁴ still observing a significant difference between unaccusative and unergative verbs. As for agentivity, in Experiments 1 and 2 the unergatives were agentive but the unaccusatives weren't. However, neither were the emission set in experiment 3. Still, sentences with the latter, too, were significantly less acceptable than sentences with unaccusatives. Regarding eventivity, just like unaccusatives, the unergatives in experiments 1 and 2 were eventive, still they were significantly less acceptable than unaccusatives.

2.6.2. The Constraint on Inalienable Possession

The difference between the perceived acceptability of PD constructions with an emission-unergative verb having a body-part possessee as opposed to an alienable possessee proved to be significant. When the possessee is inalienable, the PD structure is judged as more acceptable. This provides some support for Siloni's (2012) observation that emission-type unergatives permit a possessive dative only with an inalienable possessee, suggesting a difference between alienable and inalienable possession constructions. This reinforces the claim that the PD as an unaccusativity diagnostic should not use a body-part possessee. While I leave further examination of the issue of inalienability to future research, I do propose a possible account of the above difference between alienable and inalienable PDs.

Beyond the fact that in an inalienable possession, the possessor is clearly affected by the eventuality applying to its inalienable possessee, Inalienable possession has several other unique characteristics compared to alienable possession, in the clausal and nominal domains (Vergnaud and Zubizarreta 1992, Siloni 2002a, respectively).¹⁵ In light of that, the difference in acceptability of alienable vs. inalienable dative possession with emission unergative verbs seems less surprising.

In addition to a Low applicative projection, the literature also discusses a High applicative layer (see Pylkkänen 2008, Boneh and Nash 2011, Kim 2011, Cuervo 2020, among many others). Kim (2011) locates a high applicative phrase, which introduces a nominative affectee (in Korean and Japanese passives), higher than the merger position of the subject. Along

¹⁴ Discourse salience is defined by Linzen (2014) via a scale: First person pronoun < second and third person pronouns < animate < inanimate (adapting Haspelmath 1998). Experiments in this study excluded pronouns and controlled for animacy.

¹⁵ Thus, for instance, inalienable possession imposes a distributive reading, and disallows nonrestrictive modification both in the clause (Vergnaud and Zubizarreta 1992) and in the nominal domain (Siloni 2002a).

these lines, I assume a high ApplicativeP, higher than the subject, in addition to the low one, as schematized in (20).

(20)

- a. Low Applicative: [VP [V V] [AppIP [VP Ψ DP₂]
- b. High Applicative: [AppIP [VP DP₁ [V V] [VP Ψ]

Kim (2011) argues that an affectee is introduced via the high applicative. Seeing as the possessor in inalienable possession has properties of an affectee, I propose that it is introduced via the high applicative phrase. It is also possible that there is variance between speakers as to whether they read the possessor as an affectee or not, similar to the variable validity of non-pronominal affectees in general, as discussed above. Following that, if the dative possessor in Hebrew inalienable possession constructions is introduced via the high applicative, it is obvious why the construction is viable even with unergative verbs: A possessor introduced via this high applicative c-commands the external argument possessee.

3. Strict Verb-Subject Order

3.1.1. Experimental Design

I ran three acceptability judgement surveys involving strict (untriggered) VS order, in each one participants were exposed to sentences with an intransitive verb which was either unaccusative or unergative, followed by a subject that consisted of a quantifier and a noun. The sentences were paired such that in each pair the sentences were identical in subject, except for experiment 7 in which the quantifier was not always identical, but the noun was.¹⁶ Given the analysis of the VS order I proposed in section 1.2.2., the unaccusative hypothesis predicts a difference between the two verb types: sentences with unaccusative verbs should be judged as significantly more acceptable than the ones with unergative verbs.

For each experiment the verbs and subjects (sans quantifier) were identical to a corresponding experiment from section 2: experiment 5 corresponded to experiment 1, experiment 6 corresponded to experiment 2, and experiment 7 corresponded to experiment 3. The plausibility pretests for experiments 1-3 also validate the plausibility of the scenarios described in the stimuli for experiments 5-7. The semantic differences between the scenarios were as follows. In the pretests the subjects were possessed but not in experiments 5-7.

¹⁶ This discrepancy stemmed from a clerical error in the construction of experiment 7. That being said, there is no reason to believe that this would affect the results in any meaningful way, as the quantifiers were mostly similar in their meanings (*hamon*, *harbe*, and *male* all describe a large amount, while *kama* 'several' is the only quantifier that does not).

However, there are no grounds to think that this may have an effect, as none of the subjects requires a possessor. Second, while in the pretests the subjects were singular in experiments 5-7 they were introduced by a plural quantifier. But there is also no reason to believe that this difference is relevant as the subjects were all count nouns perfectly able to pluralize with no further effects. Thus, for example, if it is equally plausible that Dan's robot stood up and that Dan's robot broke, it is safe to assume that it is also equally plausible that several robots stood up and several robots broke.

Identically to the PD experiments, questionnaires were built using Google forms and distributed via social media. Participants were presented with a list of sentences and had to rate every sentence on a scale from 1 (completely unacceptable) to 7 (completely acceptable).

3.2. Experiment 5

In Experiment 5 I tested the grammatical status of the PD construction with unaccusative versus unergative verbs, via an acceptability judgment task, as elaborated above. The sentences corresponded to those in experiment 1, such that each verb pair was identical.

3.2.1. Participants

Fifty-one participants completed Experiment 5 (mean age: 42.44, range: 18-60). All participants were native Hebrew speakers.

3.2.2. Materials

Experiment 5 compared the acceptability the VS order with unergative and unaccusative verbs, in an untriggered Verb-Subject order. The experimental stimuli included ten sentence pairs. All sentences consisted of a subject composed of a quantifier and noun, and a verb (21a,b). The sentences in each pair had an identical subject and verbs to the corresponding pair in experiment 1, such that the pair in (21) corresponds to the pair in (14) above (repeated here for convenience).

(14) Example Sentence Pair, Experiment 1:

a. Unergative Verb

Verb	Average rating	Verb	Average rating
nifbar 'broke'	6.11	ne'emad 'stood up'	5.17
hitmotet 'collapsed'	4.82	hityafev 'sat'	4.52
hitpocec 'exploded'	6.17	hitmared 'rebelled'	4.64
hitlaxlex 'got dirty'	5.04	hitrocec 'ran around'	5.89
nirtav 'got wet'	5.48	nimnem 'napped'	5.25
nafal 'fell'	4.32	naxar 'snored'	4.09
met 'died'	5.83	kam 'arose'	4.75
nisraf 'burned'	5.93	nifkav 'laid down'	5.26
hitpate'ax 'evolved'	4.57	hitatef 'sneezed'	4.35
hijtana 'changed'	4.52	hitpare'a 'acted rowdy'	4.21
Mean (SD)	5.27 (0.7)	Mean (SD)	4.81 (0.56)

Statistical analysis was performed using paired t-tests. The analysis revealed a significant effect for verb type ($t(9) = 2.289$, $p = 0.047$).

3.2.4. Discussion

The results of Experiment 5 reveal that verb type has a clear effect on the perceived acceptability of the untriggered VS order. Sentences in the VS order with unaccusative verbs received a significantly higher acceptability rating than those with unergative verbs, in line with my prediction and the results of Experiment 1. However, the numerical differences between the two verb types were very low.

3.2.5. Experiment 6

Experiment 6 compared the acceptability of the untriggered VS order with reflexive and unaccusative verbs, parallel to experiment 2 with the PD. Experiment 2 revealed that reflexive

verbs behaved on par with the unergatives, and unlike unaccusatives regarding the PD, reinforcing the claim that they have an external argument subject (Reinhart and Siloni 2004, 2005). Hence, I predict that they will be perceived as less acceptable than unaccusative verbs in untriggered VS order, as well.

3.2.6. Participants

Forty-three participants completed Experiment 6 (mean age: 34.04, range: 14-61). All participants were native Hebrew speakers.

3.2.7. Materials

The experimental stimuli for the experiment included ten sentence pairs. All sentences consisted of a subject composed of a quantifier and noun, and a verb (22a,b). The sentences in each pair had an identical subject noun and verbs to the corresponding pair in experiment 2, such that the pair in (20) corresponds to the pair in (15) above (repeated here for convenience).

(15) Example sentence pair, Experiment 2:

a. Reflexive Verb

ha-robot	hitxamej	le-naama
the-robot	armed	to-Naama
	itslef	

Intended meaning: 'Naama's robot armed itself.'

b. Unaccusative Verb

ha-robot	hitmotet	le-naama
the-robot	collapse	to-Naama
	d	

'Naama's robot collapsed.'

(22) Example sentence pair, Experiment 6:

a. Reflexive Verb

hitxamju	male	robotim
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armed many robots
 themselves
 Intended meaning: 'Many robots armed themselves.'

b. Unaccusative Verb

hitmotetu male robotim
 collapsed many robots
 'Many robots collapsed.'

The experimental materials were assigned to two lists in a Latin Square design, such that each list contained five reflexive and five unaccusative sentences. Each list also contained ten filler sentences of varying acceptability. Order of presentation was randomized for each participant.

3.2.8. Results

Table 6 shows the average acceptability rating that each sentence received in Experiment 6, by verb.¹⁸

Table 6. Average acceptability rating by verb pair, Experiment 6:

Unaccusative		Reflexive	
Verb	Average rating	Verb	Average rating
hitaver 'became blind'	5.15	hitlakek 'licked itself'	3.64
hityabef 'dried'	5.2	hitnaka 'cleaned itself'	3.45
hijtana 'changed'	4.14	hitlabef 'got dressed'	4.35
hitkavec 'shrunk'	3.73	hitmate'ax 'stretched'	3.75
hitpate'ax 'evolved'	5.09	hitraxec 'bathed'	4.55

¹⁸ There are several outliers in Experiment 6, the verb pairs *hitrasek* 'crashed' - *hitmakem* 'went to its' place', *hitlabef* 'got dressed' – *hijtana* 'changed' and *hitmateax* 'stretched' - *hitkavec* 'shrunk' place'. I have no explanation for these results at this point, however it is worth noting that the differences in acceptability are minor, and together with the facts discussed in sections 1.4 and 4, I believe that no conclusions should be drawn from these results.

hitmotet 'collapsed'	4.95	hitxamef 'armed itself'	4.14
hiftabef 'became faulty'	5.09	hictayed 'supplied itself'	4.4
hitparek 'fell apart'	5.7	hitkafet 'decorated itself'	3.41
hitrasek 'crashed'	4.45	hitmakem 'went to its' place'	4.65
hitalef 'fainted'	5.1	hitgared 'scratched itself'	4.68
Mean (SD)	4.86 (0.58)	Mean (SD)	4.1 (0.49)

Analysis was performed as in previous experiments. The analysis revealed a significant effect for verb type ($t(9) = 2.81, p = 0.02$)

3.2.9. Discussion

The results of Experiment 6 parallel those of experiment 2, the VS order with unaccusative verbs was judged as significantly more acceptable than those with reflexive verbs in line with my prediction and the results of Experiment 2. However, the numerical differences between the two verb types were very low.

3.3. Experiment 7

Experiment 7 compared the acceptability of emission type unergative versus unaccusative verbs in the untriggered VS order. The Stimuli of Experiment 7 were built similarly to those in experiments 5 and 6, but due to a clerical error the quantifiers were not identical in each verb pair (the nouns however, still were). The emission type unergative verbs were identical to those in experiment 3, selected based on Levin and Rappaport Hovav's (1995) classification.

3.3.1. Participants

Forty-four participants completed Experiment 7 (mean age: 37.97, range: 16-66.). All participants were native Hebrew speakers.

3.3.2. Materials

The experimental stimuli for the experiments consisted of a subject composed of a quantifier and noun, and a verb (23a,b). The sentences in each pair had an identical subject noun and

verbs to the corresponding pair in experiment 3, such that the pair in (23) corresponds to the pair in (16) above (repeated here for convenience).

(16) Example sentence pair, for experiment 3:

a. Emission Verb

ha-iton	rifref	le-dafna
the-newspaper	rustled	to-Dafna

Intended meaning: 'Dafna's newspaper rustled'

b. Unaccusative Verb

ha-iton	nirtav	le-dafna
the-newspaper	got wet	to-Dafna

'Dafna's newspaper got wet.'

(23) Example sentence pair, for experiment 7:

a. Emission Verb

rifrefju	male	itonim
rustled	many	newspapers

Intended meaning: 'Many newspapers rustled'

b. Unaccusative Verb

nirtevu	hamon	itonim
got wet	plenty	newspapers

'Plenty of newspapers got wet.'

The experimental materials in Experiment 7 were assigned to two lists in a Latin Square design. Due to the fact that the set of emission verbs is small, it was difficult creating a suitable set of matched sentences. Due to that, and in order to avoid a case where a participant was exposed to the same subject twice, the verbs were divided between the lists such that each contained either three unergative-emission and five unaccusative sentences, or vice-versa. Each list also contained ten filler sentences of varying acceptability. Order of presentation was randomized for each participant.

3.3.3. Results

Table 7 shows the average acceptability rating of each sentence in Experiment 7 by verb.

Table 7. Average acceptability rating by verb pairs, Experiment 7:

Unaccusative		Emission	
Verb	Average rating	Verb	Average rating
tava 'sank'	5.8	xarak 'creaked'	3.71
namas 'melted'	4.71	zahar 'shined'	3.25
nafal 'fell'	6.13	nacac 'glistened'	3.7
hitparek 'fell apart'	5.45	nicnec 'glittered'	4.08
nifpax 'spilled'	6.17	bi'abea 'bubbled'	4.8
hitlaxlex 'got dirty'	5.95	hivhev 'blinked'	4.25
hitpocec 'exploded'	6.5	kirkef 'clanked'	4.05
nirtav 'got wet'	6.25	rifref 'rustled'	4.55
Mean (SD)	5.86 (0.56)	Mean (SD)	4.04 (0.49)

Analysis was performed as in the previous experiments. The analysis revealed a significant effect for verb type ($t(7) = 11.47, p < 0.001$).

3.3.4. Discussion

Experiment 7 once again reflected the results of its corresponding experiment (Experiment 3), similar to the other VS experiments. The VS order is perceived as significantly less acceptable with the emission type unergative verb as compared to an unaccusative verb.

3.4. Discussion on the Strict Verb-Subject order

The goal of experiments 5-7 was to examine the VS diagnostic, performed with identical sets of verbs as the PD diagnostic was in experiments 1-3. The experiments compared unaccusative with different types of unergative verbs. In all experiments the subject of each intransitive verb pair was identical to the subject for that verb pair in experiments 1-3.

Importantly, an effect of verb type was observed. All experiments yielded statistically significant results, with the unaccusative VS constructions being judged as more acceptable than unergative VS constructions. Thus, the results show that the acceptability of the VS construction is affected by the type of verb, unaccusative or unergative. Crucially, the VS diagnostic yields parallel results to the PD diagnostic.

However, the numerical differences between the scores obtained with the two types of verbs were not large. Recall the discussion in section 1.4, which points out that an untriggered VS order with unergatives is available to some extent to native speakers, primarily due to the appearance of such structures both in Biblical Hebrew and in children's literature. Thus, the numerical difference in acceptability between unergative and unaccusative untriggered VS constructions in experiments 5-6 is significant, but not large, smaller than the difference in the corresponding PD experiments. That being said, experiment 7 shows a larger difference between verb types, both compared to the other VS experiments and compared to the parallel PD experiment. This may be so because the subjects of the stimuli in experiments 5-6 are all animate to a certain degree (real or fictional animals, or robots), while the subjects of experiment 7 are inanimate. In children's literature, one of the sources of exposure of speakers to the untriggered VS order with unergative verbs, subjects tend to be animate nouns, even non-human animates, and not inanimate. This, compounded with the natural tendency of the subjects of unergatives to be animate, may have boosted the perceived acceptability of untriggered VS structures with unergative verbs, but only with animate subjects – The type of subject common in children's literature.

I believe this provides evidence that a VS construction is grammatical with an unaccusative verb, but not with unergative one. That is, my claim is that a contrast in grammaticality can be deduced from the difference in acceptability, and therefore the tasks I designed, which control for possible confounds that may affect acceptability, can be used to diagnose or confirm the verb type (unaccusative or unergative) for a coherent set of verbs, the prediction being for a significant difference in acceptability in case the status of the sets is different, and a non-significant one otherwise. Crucially, as I have shown that the VS diagnostic draws parallel results to the PD diagnostic, examining the verb sets with both diagnostics can reinforce the results.

Following Borer (1995), and Shlonsky and Doron (1992), I claim that a untriggered VS order appears when the arguments of a verb, as well as the verb itself, remain in situ. This is why untriggered VS is possible with unaccusatives and passives, but not with unergatives, as illustrated in (8) (repeated below), and schematized (abstracting from details) in (24), where we can see the internal argument, DP2, surfacing following the verb, while the external argument DP1 precedes it. If the verb moves to T, the agreeing subject is attracted to the specifier position, yielding an SV order for both verb types, as schematized in (9c-d) in section

1.2.2. Therefore, the verb can precede the subject when it is an unaccusative or a passive verb (24a), but neither unergatives (24b) nor transitives (24c) can precede it, as they merge their subject externally.

(8) a. Unaccusative Verb-Subject

nafal ha-kad
 fell the-vase
 'The vase fell.'

b. Unergative Verb-Subject

*pihek ha-yeled
 yawned the-boy
 Intended meaning : 'The boy yawned.'

c. Passive Verb-Subject

hupal ha-kad
 was dropped the-vase
 'The vase was dropped.'

d. Transitive Verb-Subject

*hipil ha-yeled et ha-kad
 dropped the-boy ACC the-vase
 Intended meaning: 'The boy dropped the vase.'

(24) a. Unaccusative and Passive: $[_{VP} [v] [_{VP} [v V] [DP_2]]]$

b. Unergative: $[_{VP} [DP_1] [v] [_{VP} [v V]]]$

c. Transitive $[_{VP} [DP_1] [v] [_{VP} [v V] [DP_2]]]$

Thus, the difference exhibited in the VS experiments between unaccusative and unergative verbs reinforces the unaccusative hypothesis, according to which the two types of verbs differ in the merger position of their sole argument.

4. General Discussion

The goal of my research was to test both unaccusativity diagnostics in Modern Hebrew, each on its own and compared to each other. The study included a series of acceptability judgement experiments. Experiments 1-3 examined the PD diagnostic, comparing unaccusative verbs with different types of unergative verbs (including reflexive, and emission verbs). Experiments 5-7 examined the VS diagnostic, comparing the same sets of unaccusative verbs and the same types of unergative verbs. In all experiments, there was a significant effect of verb type: All experiments yielded statistically significant results, with the unaccusative

verbs receiving higher acceptability ratings than unergative verbs of all types in both constructions.

4.1. Revisiting Acceptability and Grammaticality

As predicted in section 1.4, the acceptability of the constructions was found to be significantly higher with unaccusatives than with unergatives, although the numerical difference in the ratings was not necessarily large. However, as discussed in section 1.4, taking into account the length, simplicity, and plausibility of the sentences, as well as the central bias generalization and the occurrence of untriggered VS structures in children literature and Biblical Hebrew, the numerical differences between the scores obtained with the two types of verbs were not predicted to be necessarily large. Further, the two diagnostics achieved the same overall results when examining the same sets of verbs, reinforcing the validity of the syntactic intransitivity split. Furthermore, except for one outlier in experiments 1 and 5, the verb pairs that behaved in an unexpected manner were not consistent between constructions. Rather than invalidate the diagnostics, I believe that this further points to the fact that these outlying results are an effect of extra-grammatical factors on the perceived acceptability.

For instance, the discrepancy in acceptability of the ‘hit’aver’-‘hitlakek’ (to go blind – to lick oneself) pair between constructions can be explained as a confluence of such factors. As discussed in 2.6, there is a certain possibility that affectedness may be a part of the PD construction. The conjunction of the undesirability of the event (see note 9) and affectedness could lower the perceived acceptability of the undesirable event. In the VS construction, without any possible affectee, the perceived acceptability is not impacted by this. This is further exemplified by the fact that the acceptability judgement pretest with the same event, and noun phrase internal possession (denoted by *jel* ‘of’) instead of dative possession did not show this effect either (as discussed in 1.2.1, it has been claimed that the difference between dative and internal possession is the inherent affectedness of the PD by the event described). Given all the above, I believe that a contrast in grammaticality can be deduced from the difference in acceptability which we observed.

4.2. The Diagnostics and the Unaccusativity Hypothesis

As discussed in sections 2.6 and 3.5, the analysis of each unaccusativity diagnostic, independently from the other, hinges on the structural difference between unergative and unaccusative verbs. The PD diagnostic is valid as such due to the condition required to license possessive datives in (18) (repeated below for convenience):

- (18) A PD construction only yields a possessive reading when the dative NP possessor c-commands the possessee or its copy.

Namely, the possessee must be an internal argument. The VS diagnostic also follows from the status of the subject of unaccusative verbs as an internal argument. It is also apparent that the structures impose no other shared requirement on the argument beyond internality: The possessee in the PD structure doesn't have to remain in-situ, unlike in untriggered VS, and (obviously) the subject in a VS construction can be human, unlike the possessee.

These two separate diagnostics draw the same results from the same verb sets, and these results rise from different properties of argument internality opposed to externality. This provides considerable evidence for the claim that the argument of unaccusative verbs is internal, while the argument of unergative verbs is external – that is, for The Unaccusativity Hypothesis.

Thus, the tasks as performed in this study, controlled for possible confounding factors, can be used to diagnose or confirm the status of unaccusativity (or unergativity) for a coherent set of verbs (e.g., the set of reciprocal or experiencer verbs), the prediction being for a significant difference in acceptability in case the status of the sets is different, and a non-significant one otherwise. If one wishes to use these diagnostics to determine the status of a single intransitive verb, I propose to do so in a manner similar to the experiments in this study. The verb in question should be compared both to a known unaccusative verb, and a known unergative verb, in sentence triplets rather than pairs, in such a manner that there are ten sentence triplets, all with the same three verbs, while each triplet differs in its subject (and possessor, in the case of the PD diagnostic). The results that would be yielded by an acceptability judgement survey in line with those in this study should reveal whether the verb under examination patterns with its unaccusative or unergative counterpart.

4.3. Evidence Towards Gradience in Unaccusativity?

As mentioned in section 1.1., there are two theoretical approaches to the unaccusativity hypothesis. The pure split approach states that any intransitive verb is either unaccusative or unergative, and thus always maps its argument either internally or externally, respectively. According to this approach unaccusativity is a lexical property of a verb, and there will be no variance within or between speakers as to the type of the verb. The gradience approach, an outline of which is proposed by Sorace (2000, 2004), suggests that intransitive verbs do not always exclusively map their argument either internally or externally.

Sorace reaches this idea by observing the behavior of auxiliary selection in several romance languages, which has been proposed as an unaccusativity diagnostic. Verbs that select BE as an auxiliary verb are unaccusative, while those that select HAVE are unergative (Sorace 1993, Bentley and Eythórsson 2004). However, Sorace provides data showing that some verbs behave in a variable manner, sometimes accepting BE and sometimes HAVE as an auxiliary. Sorace provides the Auxiliary Selection Hierarchy (ASH) to describe this data, a hierarchical

scale that separates verbs according to semantic properties. The scale is shown in (23) below ((9) in Sorace 2004):

(25) The Auxiliary Selection Hierarchy

CHANGE OF LOCATION	SELECTS BE (LEAST VARIATION)
CHANGE OF STATE	
CONTINUATION OF PRE-EXISTING STATE	
EXISTENCE OF STATE	
UNCONTROLLED PROCESS	
CONTROLLED PROCESS (MOTIONAL)	
CONTROLLED PROCESS (NON-MOTIONAL)	SELECTS HAVE (LEAST VARIATION)

On the edges of the scale are the core verbs, that invariably select the same auxiliary and are either unaccusative or unergative, while between them are verbs that map their arguments variably. Core verbs on the unaccusative side are those that describe changes in location and state, while on the unergative end are controlled processes – processes in which the subject is a volitional participant or at least initiator. Intermediate verbs are split between those that describe continuation of pre-existing states, which tend to select BE, and uncontrolled processes (such as bodily functions or emission verbs), which select HAVE. Existence of state verbs are most variable, and have different auxiliary tendencies in different languages.¹⁹

Sorace shows that for intermediate verbs, those between the core verbs, there is variation in the selection of auxiliary, such that the closer a verb type is to the edge of the scale, the more reliably it tends to select its auxiliary. The two factors Sorace puts forth as affecting auxiliary selection of intermediate verbs are telicity and agentivity. This variation is seen both in the natural variance of auxiliary selection attested and accepted by speakers, as well as the verbs' sensitivity to manipulation. The same sensitivity to manipulation can also be seen in agentivity, either by comparing an agentive subject with a non-agentive subject ('The bird/airplane landed'), or by expanding upon the event. Between the two, telicity is the main factor that determines selection, such that the more telic a predicate is, the more likely the auxiliary verb will be BE. The effect of agentivity is inversely proportional to telicity: The less telic the verb, the more effect agentivity will have on auxiliary selection.

¹⁹ Sorace notes that different languages may draw different lines regarding core and intermediate verbs, both between and within the categories. In such a manner one language may be insensitive to the difference between change of state and change of location regarding auxiliary selection, while another could draw an additional distinction within non-motional processes along the lines of whether they inherently affect the subject (cause some change of state).

While Sorace admits that this scale may be relevant only to the phenomenon of auxiliary selection, it could also be relevant to the unaccusativity hypothesis, as auxiliary selection has been argued to be a diagnostic of unaccusativity in Romance.²⁰ Expanding on that, this would mean that core verbs map their arguments either externally or internally invariably, while intermediate verbs would map their arguments variably, under the same constraints as auxiliary selection. In order to verify this, the ASH needs to show relevance both to other unaccusativity diagnostics in romance languages, as well as to unaccusativity diagnostics in non-romance languages.

While this study didn't attempt to directly examine the relevance of the ASH to the PD and VS diagnostics, it is interesting to see whether some correlation with the ASH can be found. My study advances the claim that the PD and VS structures are grammatical with an internal argument, and ungrammatical with an external argument. If a verb were to map its argument variably, then when judging its acceptability for some speakers it would be grammatical, and for others non-grammatical. As such, intermediate verbs with a more variable mapping would have results that shy away from a uniform judgment, reflected a higher standard deviation.

In all experiments the unaccusative verbs were 'change of state' verbs, high on the hierarchy. In experiments 1,5 and 2,6 the unergatives were of the 'controlled process' types, however the unergatives in experiments 3,7 were emission type unergatives, of the 'uncontrolled process' category. Thus, in order to examine possible effects of the ASH, I compared the standard deviation of each verb's acceptability score, and compared the deviations of each verb type in a paired T-test. Table 8 shows the average standard deviation each verb type received in each experiment.

Table 8: Standard Deviation of Verb Types by Experiment

	Unaccusative	Unergative
Experiment 1	1.95	1.81
Experiment 2	2.06	1.45
Experiment 3	1.58	1.81
Experiment 5	1.84	1.98
Experiment 6	1.87	1.92
Experiment 7	1.58	2.08

There was a significant difference between the standard deviations of the verb groups in experiments 2 ($p = 0.003$), 3 ($p = 0.02$), and 7 ($p = 0.01$). Experiments 3 and 7 were those that

²⁰ But see Reinhart and Siloni (2005) for further discussion on the auxiliary selection and how it can't be used to diagnose unaccusativity.

used emission type unergatives, so the fact that both of them exhibit significant differences may in fact point towards some correlation between the ASH and these structures, however experiment 2 was also statistically significant (by a larger margin, as well), and was identical in its verbs to those in experiment 6 – there is no explanation for this discrepancy.

That being said, making any sort of strong claim based on this would be misleading at best. As mentioned, my study did not concern itself with gradience in unaccusativity, and as such none of the experiments were designed with that in mind. The experiments did not test intermediate verbs in varying conditions. As such, trying to derive anything in line of evidence towards or against gradience, beyond vague notions, is impossible. However, the methodology I used does lend itself towards future research.

My proposal is to perform an acceptability judgment survey structured similar to those in this study, only comparing sentences with intermediate verbs, that differ only in an adverbial addition that affects telicity or agentivity. If the ASH is relevant to unaccusativity in general, then the more telic or non-agentive sentence of a pair would tend to map its argument externally more often than its atelic or agentive counterpart. As such, it should generally be judged as acceptable more often. Thus an effect of the ASH, and specifically the notions of telicity and agentivity, would predict a difference in acceptability for the same verb and subject in identical constructions that differ only in those notions.

4.4. Conclusions

The aim of the current study was to experimentally examine and compare the unaccusativity diagnostics in Modern Hebrew. Specifically, I ran three experiments to examine the PD construction, and three corresponding experiments to examine the VS structure. The experiments compared sets of unaccusative verbs with unergative verbs (including reflexive verbs and emission verbs). By testing sentences that differ only in whether they have an unaccusative or an unergative verb, I showed that unaccusatives are significantly more acceptable than unergatives in both constructions. Additionally, I showed that both constructions yield comparable results when applied to the same sets of verbs. I argue that these results show that the PD and VS constructions are grammatical with intransitives only if their subject is an internal argument. To account for this, I adopted an account in terms of c-command to explain the difference in status regarding the PD: the dative possessor has to c-command the possessee or its trace (Borer and Grodzinsky 1986). The VS structure is yielded when both the verb and its subject remain in-situ, such that only an internal argument will appear post verbally in such cases. If the verb moves to T, the subject also moves to Spec-TP, yielding an SV order with both unaccusatives and unergatives. I have provided direct evidence for the relevance of unaccusativity to the PD and VS constructions, while neutralizing other factors that have been claimed to affect them, such as prominence in the case of the licensing

of the possessive dative. In light of that I claim that both constructions can be used as unaccusativity diagnostics.

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היפותזת האנאקוזטיביות מבחינה בין שני סוגי פעלים עומדים: אנאקוזטיביים ואנארגטיביים. נטען כי ההבדל בין שתי קבוצות פעלים אלו הוא במבנה התחבירי שלהן, כאשר הנושא של פעלים אנאקוזטיביים משולב במבנה בתוך הצירוף הפעלי, בעוד הנושא של פעלים אנארגטיביים מחוצה לו. אנאקוזטיביים ואנארגטיביים מפגינים התנהגויות תחביריות שונות. בעברית הטענה היא ששתי תכונות תחביריות שונות מבחינות בין שני סוגי הפעלים האלו: היכולת להופיע במבנה השייכות הדאטיבית, והיכולת להופיע בסדר פועל-נושא ללא כל טריגר.

ההסבר להבדל זה בין אנאקוזטיביים לאנארגטיביים נעוץ בהנחה שהנושא של פעלים אנאקוזטיביים הוא ארגומנט פנימי. בסדר נושא-פועל (ללא טריגר), הפועל והנושא שלו שניהם מופיעים בעמדה בה הם משובצים למבנה, כך שכאשר הנושא הוא ארגומנט פנימי הפועל קודם לנושא אבל כאשר הוא ארגומנט חיצוני הנושא קודם לפועל. לגבי מבנה השייכות הדאטיבית, הוצע שמבנה זה מתאפשר רק כאשר בעל הקניין הדאטיבי עושה c-command לנושא (דבר שקורה כשהנושא הוא ארגומנט פנימי, אבל לא כשהוא חיצוני. למרות שתכונות אלו שימשו כמבדקים לאנאקוזטיביות בספרות, הן אף פעם לא נבדקו באופן ניסויי.

על מנת לאשש תכונות אלה כמבדקי אנאקוזטיביות, השווייתי פעלים אנאקוזטיביים ואנארגטיביים ביחס לשתייהן, בסדרה של ניסויי קבילות. ההשערה שלי הייתה שהן מבנה השייכות הדאטיבית והן סדר הפועל-נושא עם פועל אנאקוזטיבי יישפטו כקבילים יותר באופן מובהק מאשר אותם מבנים עם פועל אנארגטיבי. בניסויים ניטרלתי גורמים מתערבים כגון חיות, יידוע, סבירות, בחירה לקסיקלית ועוד על מנת לוודא שהתוצאות אכן נובעות מההבדל בסוג הפועל.

התוצאות עלו בקנה אחד עם ההשערה שלי, פעלים אנאקוזטיביים קיבלו דירוג גבוה יותר מאשר אנארגטיביים בשני המבדקים, והמבדקים, שבדקו אותן קבוצות פעלים, הניבו תוצאות עקביות. לנוכח התוצאות האלו, אני טוען שהן מבנה השייכות הדאטיבית והן הסדר פועל-נושא (ללא כל טריגר) הם מבדקי אנאקוזטיביות אמינים בעברית.

אוניברסיטת תל-אביב

הפקולטה למדעי הרוח ע"ש לסטר וסאלי אנטין

החוג לבלשנות

הנושא: פעלים עומדים בעברית והיפותזת האנאקוזטיביות: מחקר ניסויי אודות מבדקי אנאקוזטיביות

חיבור זה הוגש כעבודת גמר לקראת התואר

"מוסמך אוניברסיטה" - M.A. באוניברסיטת ת"א

על ידי

זיו פלוטניק-פלג

העבודה הוכנה בהדרכת:

טל סילוני

תאריך:

אוגוסט 2023