Alternating Perception Verbs in Modern Hebrew

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Abstract

“...seemingly different semantics of verbs of perception is a corollary of their transitivity [voice] patterns... It would be a worthwhile task to provide a cross-linguistic investigation of transitivity of verbs of perception...”.

(Aikhenvald and Storch 2013, p. 20)

This work wishes to participate in the typological project put forward by Aikhenvald and Storch, by exploring the contribution of diathesis within the domain of alternating perception verbs in Modern Hebrew (MH): לָาָּה, ‘to see’, לָהֵּרָּו, ‘to hear’, לָהּ, ‘to feel’ and לָהַר, ‘to smell’. When the complement of these verbs is a clause, they undergo alternation in voice, active and middle diathesis, which reveals alternation in the semantic properties of the verbs. Factivity is a salient semantic property which is sensitive to the alternation. The active diathesis, where the experiencer is expressed in the nominative case, contrasts with the middle diathesis, which lacks a nominative experiencer. Concomitantly, the active diathesis is interpreted as factive, while the middle diathesis is non-factive.

An additional dimension which classifies MH perception verbs is the syntactic category of the clause embedded by the verb. This parameter introduces a second significant semantic property - the distinction between sensory direct perception, and belief formation integrated with indirect perception.

This work also discusses three more properties in addition to factivity and belief formation, which are: lower interpretation of negation (LIN), types of embedded predicates and imaginative meaning.
Together, the two dimensions discussed in the present work yield four constructions, different in their semantic properties, in which the four alternating perception verbs in MH participate. The syntactic and semantic properties of the diathesis dimension are orthogonal to those of the second dimension, the embedded clause category. Nevertheless, it is discovered in the current work that general principles of sentence structure in natural language give rise to a priority of the diathesis over the second dimension. This is revealed by the property of belief formation (and the imaginative meaning). In the active diathesis, the category of the embedded clause determines the distinction between direct perception and belief formation (with the availability of the imaginative meaning). But in the middle diathesis, which is marked morphologically in MH in the verbal form, the meaning of belief formation and indirect perception obtains obligatorily, independently of the clausal complement, and an imaginative reading does not arise. The conclusion to be drawn is that the diathesis bleeds clausal category with respect to the property of indirect perception and the availability of the imaginative reading.

Revealing a systematic alternation in diathesis and clausal category, the class of perception verbs in MH sheds light on the interaction between these two parameters, through their effects on the semantic properties of those perception verbs and their complements.
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Oh Lord my god please teach me how to bless and pray
The truth of falling leaves and fruits of summers day
The freedom that it brings - to see to feel to breath
To know, to yearn, and even fail

Teach my lips a song that tells us how to praise
The morning and the nights the secrets of your ways
Guide my mind to find the truth, see through the haze
‘cause I don’t want no ordinary days

(‘Teach me my God’, Leah Goldberg, English version: Shimon Smith & Nir Cohen)

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1. Introduction

This work discusses a particular class of perception verbs in Modern Hebrew, namely לְרָאָה (to see), לְשָׁמַע (to hear), לְזָרוּע (to feel), and לְרַחְמ (to smell). These particular verbs reveal an intricate array of alternations: morphological, syntactic, and semantic. Morpho-syntactically speaking, the experiencer argument of see, hear, feel and smell alternates between nominative and dative marking. This alternation is accompanied by a voice alternation between active and middle voice, which is morphologically marked by the verbal form. In addition, all these verbs can embed two types of clauses, a small clause and a finite clause. Together, the alternation yields four different constructions, which might seem redundant. Semantically, however, each construction shows different properties, arising systematically for all the verbs in the class. The properties of this class of perception verbs in Modern Hebrew call for an explanation, shedding light on the interrelations between morphology, syntax and semantics.

The literature on perception verbs typically divides these verbs into two subclasses and describes them separately. The terminology of Levin (1993) distinguishes between see-verbs and stimulus-subject-perception-verbs. The two subclasses differ in whether the experiencer is expressed as the nominative subject or a dative object of the verb. The two subclasses contain different lexical verbs for the same sensory perception, e.g. English see vs. look to, hear vs. sound to, or homonymous verbs which differ in their syntax: smell vs. smell to, feel vs. feel to, taste vs. taste to. Most theoretical work only analyzes one of the two classes, either those perception verbs which take a nominative experiencer (Moulton 2009 a.o.), or those perception verbs which take a dative experiencer (Matushansky 2002, Kastner 2015). Yet the two
classes of verbs have important characteristics in common. Semantically, both are perception verbs. Syntactically, both classes allow both finite clausal complements and non-finite clausal complements, which differ in their semantic properties, as Dretske (1969) was the first to distinguish for see. These facts call for a unified analysis.

In Modern Hebrew, the verbs of the two classes are voice alternants of each other, i.e. they actually constitute a single class of verbs alternating in voice. This class consists of the verbs 'see', 'hear', 'feel', and 'smell'. In addition to the morphological alternation in voice, the duality found in these verbs has an important semantic dimension. As has already been shown for other languages, when perception verbs take a non-finite small clause complement (see Barwise 1981, Higginbotham 1983 for the semantics of non-finite complement of see, and Clark & Jäger 2000, Declerck 1983 for their syntax), they denote a sensory experience not necessarily connected to any mental apprehension. When they take finite complements, they denote a sensory experience that gives rise to mental apprehension.

The goal of the present work is to present an analysis of alternating perception verbs in (1).

1 All examples in this work are attested, and all judgments here are mine, as a native speaker of Modern Hebrew. I am grateful to Prof. Edit Doron and Dr. Aynat Rubinstein for vital examples. The examples which are taken from the World Wide Web are given with the URL. All other examples are utterances which I was exposed to in naturally occurring conversations, or my own.

2 Hebrew verbal morphology marks tense, gender (feminine/masculine), person and number (singular/plural) (but only gender and number in present tense), pronominal morphology marks person, gender and number, and nominal and adjectival morphology marks gender and number.

3 The spirantized allophones of the phonemes /b/ (ב), /k/ (כ) and /p/ (פ) in Hebrew will be transcribed here as [ḇ], [ḵ] and [p̄] respectively, to distinguish them from the phonemes /v/ (ו) and /x/ (ח). The non-spirantizable /k/ (ק) will be transcribed as [q]. The transcription [’] stands for the common variants of the glottal stops /ʔ/ and /ʕ/ in fluent speech.

In my glosses, ACC = accusative, GEN = genitive, MID = middle voice, NEG = negation. When the subject is null, the verb is glossed here for person, gender and number (or only gender and number for
(1) **לראות li-ْr’ot ‘to-see’**

(a) active voice:

\[ \text{Avner} \text{ see ACC the-books sold} \]

‘Avner saw the books being sold.’

(ii) middle voice:

\[ \text{the-books see.MID to-Avner interesting} \]

‘The books seemed to Avner interesting.’

(b. **לשמוע li-ْšmo’a ‘to-hear’**

(i) active voice:

\[ \text{Dafny hear that-the-children play} \]

‘Dafny heard that the children were playing.’

(ii) middle voice:

\[ \text{hear.MID to-Dafny that-the-child play} \]

‘It sounded to Dafny that the children were playing.’

(c. **להרגיש le-ْhargiś ‘to-feel’**

(i) active voice:

\[ \text{Rivka feel ACC the-house get.warm} \]

‘Rivka felt the house get warm.’

(ii) middle voice:

\[ \text{the-house get.warm to-Rivka} \]

The glosses for the perception verbs will not show tense.
I will name this unified class alternating perception verbs. Other perception verbs in MH, some of which will be listed below in section 2, do not systematically alternate in the same way. For example, the verb לֵהָרֵיחַ ‘to listen’ (23) cannot appear in middle voice, and does not take a clausal complement. The verbs in (23) will not be part of the present discussion. In the case of alternating perception verbs, the voice alternation correlates systematically with contrasts between nominative experiencers and dative experiencers (henceforth NomExp and DatExp respectively) – NomExp appear only with active voice and DatExp only with the middle voice, hence this alternation will be viewed here as secondary to the alternation in voice. The voice alternation (and the concomitant experiencer alternation) is orthogonal to the second alternation, the alternation of the category of the embedded clause. The embedded clause may be a finite clause headed by a complementizer, i.e. a CP, or a non-finite
small clause, a SC. These two parameters, voice and the category of the embedded clause, yield four constructions for each of the alternating perception verbs, illustrated in list items I-IV below: active voice and a non-finite small clause (active-SC), active voice and a finite clause (active-CP), middle voice and a finite clause (middle-CP), and middle voice and a non-finite small clause (middle-SC). All the alternating perception verbs are attested in each construction, and I will use all the verbs from this class in order to illustrate them.

I. Active voice and a non-finite small clause (active-SC)

(2) רק פעם אחת ראיתי אותה מבשלת, אולי פעמיים, כשרק הכרינו
4 raq pa'am axat ra'iti [ota mebašelet], ulay pa'ama'im,
only time one saw.is [her cook], maybe twice,

kše-raq hikarnu
when-just met.1P

‘I saw her cook only once, maybe twice, when we just met.’

(3) במו אוזני את פקידת הרישום אומרת בהקלטה נסתרת למועמד ערבי שלא קשור לשום
5 "שמעתי בומי את מזכירת הרישום אמרה בregistrah מסוכנה מסתרת מעבר לשום ערב שלא קשור לשהים
Šamati be-mo oznay [et pqidat ha-rišum
Hear.is with-own ears.my [ACC secretary.GEN the-registration

omeret be-haqlata nisteretle-mo'adam ‘arabi še-lo qašur
say in-recording hidden to-candidate Arab that-NEG related

le-šum mišlala še-nisgera: “ ata lo tilmad be-ono”}

4 https://books.google.co.il/books?id=YW0fCGAAQBAJ&pg=PT16&lpg=PT16&dq=%D7%A8%D7%99%D7%AA%D7%99+%D7%90%D7%AA%D7%95%D7%94&source=bl&ots=NEOR99wMVI&sig=IQZIv1h21DIS-8bDCje889w8N_Q&hl=iw&sa=X&ved=0ahUKEwi6h6_FnMjXAhUPZ1AKHfLHCG4Q6AEISjAJ#v=onepage&q=%D7%A8%D7%99%D7%99%D7%AA%D7%99%20&D7%90%D7%95%D7%AA%D7%94&f=false
5 http://www.haaretz.co.il/magazine/tozeret/.premium-1.4213064?=&ts=1499007574575
to any college that-closed: “you NEG will.study in-Ono”]

‘I heard with my own ears the registration secretary say in a hidden recording to an Arab candidate: “you won't study in Ono (Academic College)”.

(4) Lilak omnam margiša [et ha-dma’ot yordot]
Lilach surely feel [ACC the-tears fall
'al lexayeha], 'abal mexa’ata dey menumeset]
on cheeks her], but protest-her quite polite

‘Lilach surely feels the tears fall on her cheeks, but her protest is quite polite.’

(5) Molly herixa [et ha-bisqvitim šel šoqolad al ha-ricpa]
Molly smell [ACC the-biscuits of Chocolate on the-floor
le-yad-a]
to-side-her]

‘Molly smelled Chocolate's biscuits on the floor beside her.’

In different languages, active voice perception verbs may appear with different types of non-finite complements. Moulton (2009, p. 2, example (1)) presents an inventory for English of meanings for see, and the different non-finite clausal complements it appears with.

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6 https://www.haaretz.co.il/literature/youngsters/premium-1.4376993
7 https://books.google.co.il/books?id=iXGDrvkphZMC&pg=PA54&dq=%D7%94%D7%99+%D7%90+%D7%94%D7%A8%D7%99%D7%97%D7%94+%D7%A9&ei=Ux7yUrk8H48-idyvH7uQCg&lpg=PA54&source=bl&ots=IW13MfsK62&sig=b8PCqQZpV69pRu9X4APFs2wKb8E&hl=iw&sa=X&ved=0ahUKEwiwlfryvMTXAhU8pKQKHdC4AQUQ6AEIKTAC#v=onepage&q=%D7%94%D7%99%D7%90%20%D7%94%20%D7%A8%20%D7%99%D7%97%20%D7%A9&f=false
8 Moulton (2009) introduces five different clausal complements, the fifth being a finite clause:

(i) finite clause: John saw that Fred left early. factive (p. 2, ex. (1e))
(6)  
a. bare infinitive:  John saw Fred leave early.  
   direct perception  
b. gerundive:  John saw Fred leaving early.  
   direct perception  
c. gerundive:  John saw Fred owning a house.  
   imaginative  
d. infinitive:  John saw Fred to be a party-pooper.  
   belief

All these constructions exhibit ‘exceptional case marking’ (ECM) of the embedded 
subject, and an infinitive/gerundive form of the embedded verb. In Modern Hebrew, 
the non-finite complement clause of perception verbs is not infinitival, but is headed 
by a participle (as in (2)-(5)). The participle in Hebrew is marked for number and 
gender, but bears no inflection for tense. This non-finite clause will be referred to as 
Small Clause (SC) (Chomsky 1981). As in English, the embedded subject is marked 
for accusative case, which, in Hebrew, is overtly marked by the morpheme et when 
the direct object is definite NP. In Hebrew, nominative is not marked 
morphologically, hence a NomExp subject is not marked for case. Voice (active, 
middle and passive) is morphologically marked in the verbal form.

II. Active voice and a finite clause (active-CP)

A second construction involves a perception verb in the active voice, complemented 
by a CP. The following sentences exemplify this construction for the verbs under 
discussion.

(7)  
kše-laqxu  
mexoga,  
ra’u  
še-ze  
ma’agal

⁹https://books.google.co.il/books?id=YiRCLRBVdLMC&pg=PA123&lpg=PA123&dq=%D7%A8%D7%90%D7%95+%D7%A9%D7%96%D7%94&source=bl&ots=8_hrL2a4V&sig=xYhiAji-
JRq4hPbaVsG01IXSS-4&hl=iw&sa=X&ved=0ahUKEwiWqee6jcTXAhWDDwKHWZCDHg4ChDoAQgsMAM#v=onepag
e&q=%D7%A8%D7%90%D7%95%20%D7%A9%D7%96%D7%94&f=false
when-took.3MPL pair.of.compasses, see.3MP that-it circle
mušlam
perfect
‘When they took a pair of compasses, they saw that it was a perfect circle.’

(8) When they took a pair of compasses, they saw that it was a perfect circle.

ani šome'a-be-qol-ka [še-eyn le-ka šum
I hear in-voice-yours [that-NEG.exist to-you any
'i-noxut mi-pirsum ha-sirton] NEG-comfort from-publishing the-video
‘I hear in your voice that you feel no discomfort from publishing the video.’

(9) I hear in your voice that you feel no discomfort from publishing the video.

kše-anaxnu lo maḇinizim bdixa, anaxnu margišim
when-we NEG understand joke, we feel
[še-hiš'iru otanu baxuc]
[that-left.3MP outside].
‘When we don’t understand a joke, we feel left outside.’

(10) When we don’t understand a joke, we feel left outside.

ka'asher ayaš bīqeš ha'ala'a šel 50 axuz me-xoze-hu
when Ayash asked raise of 50 percent of-contract-his
ha-noḵexi hem herīxu [še-ze holek le-kivun šel aziḫa],
the-current they smell [that-it goes to-a direction of leaving],
ve-šam lema'ase hiḇinu še-hu kbars mexuyab
and-there in.fact understood.3MP that-he already.committed
‘When Ayash asked for a raise of 50% of his current contract, they smelled that it was going towards leaving, and there, in fact, they understood that he had already committed to a different group.’

III. Middle voice and finite clause (middle-CP)

The DatExp in the middle voice is marked by the preposition le ‘to’. To express a pronominal experiencer, the dative preposition is inflected for person and number. The DatExp is optional rather than obligatorily overtly expressed (13). When unpronounced, the experiencer is interpreted deictically (or even universally). The verbal form of the perception verb in both III (middle-CP) and IV (middle-SC) is the middle voice. The main-clause subject, then, is assumed to be non-thematic. The main-clause subject of the middle-CP construction can be either null, as in (11)-(12), (14), or overtly expressed by the expletive pronoun ze ‘it’ (13).

Asher mi-ṭoṭem, neraḥo le-shanai yishu al ha-sapah hom (11)

ymi-ṭoṭem ma-ṭoṭem, ko’esset nir’e le-i [še-ani yaṣen ’al ha-sapah hayom]  
wife.my angry, see.MID to-me [that-I sleep on the-couch today].

‘My wife is angry, it seems to me that I am sleeping on the couch today.’

nišma l-i [še-ata lo holek le-nateq l-i],  
hear.MID to-me [that-you NEG going to-hang.up on-me],
ve-ze meroš ye’amir li-zkut-ka

13 http://www.haaretz.co.il/magazine/tozeret/premium-1.4101539
and-it already will.be.said to-right-yours

‘It sounds to me that you are not going to hang up on me, and that already speaks in your favor.’

לא נזה שע outputFile kilograms. outputFile קילוגרם (ל), שמא כול(OutputFile) כל ימי יום ב dầu קורה (13)

lo no'ax l-anu im ha-situacia, ze margiš
NEG comfortable to-us with the-situation, it feel
(l-i) [še-beyn kol kise ve-kise yeš bloq qerax] to-me [that-between every chair and-chair exists block ice]

‘We don’t feel comfortable with the situation, it feels (to me) as if between each and every chair there is a block of ice.’

(14)

mi-kol ha-pirsumim, heri'ax l-i [še-yeš
from-all the-publications, smell to-me [that-exist
l-o in'yan iši ba-gbi'ya], ve-lo raq
to-him interestpersonal in.the-collection], and-NEG just
icug ragil šel lago'ax
representation standard of client

‘From all the publications, it smelled to me that he had a personal interest in the collection, and not just standard representation of a client.’

IV. Middle voice and non-finite small clause (middle-SC)

As already stated, the main-clause subject position in the middle-CP and middle-SC constructions is assumed to be non-thematic. The subject of the non-finite small clause (SC) must raise to the nominative subject position of the main clause, since the

14 al-pachad.blogspot.com/2014/04/blog-post_25.html
middle verb cannot assign it accusative case. Hence, the argument we find in the highest subject position is thematically the subject of the embedded clause.

Note that in (15)-(18), the pronoun ze ‘it’ is the referential demonstrative pronoun, which is homonymous to the expletive ze, which we saw above in the middle-CP

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15 [http://www.markivsodi.co.il/2012/12/blog-post_15.html]
construction. In middle-CP, ze is obligatorily expletive and cannot be replaced by an argument, while in middle-SC construction, it is necessarily referential, and has undergone raising from the subject position of the embedded clause. To support the difference between the demonstratives in each construction, I first note that the expletive demonstrative has a single form ze, whereas the referential demonstrative has a gender contrast: ze/ zot ‘it.MS/ it.FS’. Second, I consider the contrast in (19).

(19) a. דני סיפר לי שהיא חזרה אתמול לפני בוקר.

Danny told to-me that-she returned yesterday

lifnot boqer,

before morning,

and-(it) hear.MID to-me that-he worried

‘Danny told me that she returned yesterday before sunrise, and it sounds to me that he is worried.’

b. דני סיפר לי שהיא חזרה אתמול לפני בוקר.

Danny told to-me that-she returned yesterday

lifnot boqer,

before morning,

and-(it) hear.MID to-me that-he worried

‘Danny told me that she returned yesterday before sunrise, and it sounds to me that he is worried.’

It is not completely clear whether ze ‘it’ in Hebrew is purely expletive even when it occurs in the non-thematic subject position of (19a). It seems to be felicitous in (19a), but not in a clause where there is no extraposed clause, as in (19b) (nisma ha-cilcul ‘it is heard the-bell’. This will be left here as an open issue.
and-*(it) hear:MID to-me peculiar

‘Danny told me that she returned yesterday before sunrise, and it sounds peculiar to me.’

In (19a), ze is expletive and does not co-refer to the first conjunct. In (19b), ze obligatorily co-refers to the first conjunct. The expletive ze can be null in (19a), but the raised referential ze in (19b) is obligatorily overt. Thus, ze in the main-clause subject position can only be referential when raised from the non-finite clause.17

These four constructions in Modern Hebrew are summarized as the paradigm of alternating perception verbs, shown in Table 1. The contrasts that will be pointed out between the four constructions concern the following features: the interpretation of the embedded clause as true in the actual world; lower interpretation of negation; the type of the embedded predicate; epistemic non-neutral reading; and availability of an imaginative reading. These contrasts will be presented in section 3, with an attempt to account for the central three in section 4.

17 This generalization, however, does not necessarily exclude cases in which the raised subject of the SC is both null and, so it seems, expletive, as in the following examples from naturally occurring discourse:

(i) מרגיש לי לא נעים
margiš l-i lo na’im
feel to-me NEG pleasant
'It feels unpleasant to me.'

(ii) מרגיש לי בול הזמן למבזק טקטי
margiš l-i bul ha-zman le-mibzaq taqti
feel to-me spot on the-time to-news flash tactic
'It feels to me exactly the right time for a tactic news flash.'
Table 1: The alternating perception verbs constructions

<table>
<thead>
<tr>
<th>Construction</th>
<th>Case of the Experiencer Argument</th>
<th>Diathesis</th>
<th>Category of the Embedded Clause</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. active-CP</td>
<td>nominative (NomExp)</td>
<td>active voice</td>
<td>finite (CP)</td>
</tr>
<tr>
<td>2. active-SC</td>
<td>nominative (NomExp)</td>
<td>active voice</td>
<td>non-finite (SC)</td>
</tr>
<tr>
<td>3. middle-CP</td>
<td>dative (DatExp)</td>
<td>middle voice</td>
<td>finite (CP)</td>
</tr>
<tr>
<td>4. middle-SC</td>
<td>dative (DatExp)</td>
<td>middle voice</td>
<td>non-finite (SC)</td>
</tr>
</tbody>
</table>

The current work can hopefully be a modest contribution to a comprehensive typological study of semantic and syntactic perception verbs with respect to their voice alternation, prompted by Aikhenvald and Storch (2013, p. 20):

“...seemingly different semantics of verbs of perception is a corollary of their transitivity [voice] patterns... It would be a worthwhile task to provide a cross-linguistic investigation of transitivity of verbs of perception...”.

...
2. The paradigm of alternating perception verbs

Conceptually speaking, perceptual experience involves a relation to perceived objects (Crane & Craig 2017). The group of alternating perception verbs expresses a perceptual experience of an event, state or an object in the world by means of one of the senses. In (20), for example, Lavy perceives the rain through a sensory experience – seeing, hearing, feeling or smelling.

לבי ראה/ שמע/ הרגיש/ הריח את הגשם

(20)

labi ra'a/ šama/ hirgiš/ heri'ax et ha-gešem

Lavy see/ hear/ feel/ smell ACC the-rain

‘Lavy saw/ heard/ felt/ smelled the rain.’

As introduced in section 1, alternating perception verbs in Modern Hebrew appear in two constructions, which distinguish the case of the experiencer: NomExp and DatExp. The forms of the different perception verbs correlate with the case of the experiencer, as listed again in (21).18

(21)  

a. NomExp: ראה ra'a ‘see’; שמע šama ‘hear’; הרגיש hirgiš ‘feel’; ריח heri'ax ‘smell’.

b. DatExp: נראית nir'a see.MID ‘seem’; נשמע nisma hear.MID ‘sound’; רגישה hirgiš ‘feel’; ריח heri'ax ‘smell’.

In Hebrew, a Semitic language, all verb stems, and also many noun and adjective stems are derived from (tri-)consonantal roots by different intercalations, called

18 All forms in (21) are marked for past tense, third person masculine singular.
19 I will disregard here possible semantic and syntactic similarities and differences between seem and look in English.
templates, of CV skeleta, vowel sequences and affixes (Doron 2003, p. 10). Voice is morphologically marked by the choice of template (Doron 2003, 2008): the active voice is expressed by the simple active kal, the intensive active pi’el and the causative active hif’il, whereas the middle voice (MID) is expressed by the simple middle nif’al and the intensive middle hitpa’el. All NomExp verbal forms are in the active voice, and all DatExp are in the middle voice, though the morphology does not always reflect this. The voice alternants are derived from the same consonantal root, i.e. r.ʔ.y ‘see’, š.m.ʕ ‘hear’, r.g.š ‘feel’ and r.y.x ‘smell’. The alternating perception verbs see and hear are derived by the simple active template in the active voice, and in the simple middle template in the middle voice: ראה-ראה ra’a-nir’a; שמע-שמע šama-nišma. The verbs feel and smell in Hebrew are both derived in the causative template hif’il, a template which does not mark morphologically the middle voice. Rather, its active form also serves for the derivation of unaccusative verbs denoting internal causation. For the sake of simplicity, let us call the active forms of feel and smell with a DatExp also middle.

In Hebrew, the passive voice has verbal patterns: huf’al and pu’al. According to Doron (2008, p. 26-27), both middle and passive voices lack an external argument. However, for the passive, the thematic role of the external argument is optionally realized and marked as oblique, for example by the preposition עלי-ידי al-yedey ‘by’.

Middle voice verbs disallow the realization of the original external argument. The verbs feel and smell have a morphologically marked passive voice, hurgaš ‘was

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21 It might be worth mentioning that these two patterns for the middle forms correlate with the divergence of these sense-perception verbs in English: While see and hear have different forms as unaccusatives (seem and sound), feel and smell have the same forms. A possible path to to explain this might be that only feelings and smells can emerge from within the experiencer, somewhat like helešši le-haḥsīl ‘to-ripen’ and helešši le-ha’ādim ‘to-redden’.
sensed’ and hurax ‘was smelled’. In the case of see and hear, the middle voice forms ‘seem’ and ‘sound’ can function as passive (‘seen’, ‘heard’), as do many simple middle verbs. But when interpreted as passive, they are ungrammatical with DatExp, either with a SC complement (22a) or an object complement (22b):

\[(22)\]
a. נראתה (*לי) אשה הולכת ברחוב
\(nir’ata (*l-i) \ i’ša \ holket \ ba-rexov\)
seen (*to-me) woman walk in.the.street
‘A woman was seen (to me) walking in the street.’

b. נשמעת (*לי) צעקה מרחוק
\(nišme’a (*l-i) \ ce’aqa \ me-raxoq\)
heard (*to-me) shout from-distance
‘A shout was heard (to me) from a distance.’

I propose that alternating perception verbs form a sub-group of a larger class of perception verbs. The class of perception verbs in Modern Hebrew includes the following (non-exhaustive) list of verbs:

\[(23)\]

\[22\] The form nišma also has the non-perceptual meaning ‘obey’.

It should be noted that some of these verbs can embed both finite and non-finite clauses, for example:

(24) a. הוָה חָשׁ שֶלֶבھָہ פוּטֶה
   hu xaš [še-lib-a po’em]
   He sense [that-heart-her beat].
   ‘He sensed that her heart beats.’

b. הוָה חָשׁ אָתָ לִיבָה פוּטֶה
   hu xaš [et lib-a po’em]
   He sense [ACC heart-her beat].
   ‘He sensed her heart beat.’

However, there is neither voice nor nominative-dative experiencer alternation for these verbs.

Among the perception verbs, there are (at least) three more verbs which show the nominative-dative experiencer and some voice alternation, namely:

(25) NomExp: tapas ‘perceived’ (active); dima ‘visualize’ (active); zakar ‘remember’ (active).

DatExp: niptas ‘perceived’ (middle); nidme ‘resembles’ (middle); za’kur ‘remembered’ (adjectival passive).
These verbs will not be discussed here. First, the DatExp form of remember is an adjectival passive rather than middle. Second, these verbs are not directly related to sensory perceptions, and thus could be expected to show some different semantic and morpho-syntactic properties. The current discussion will be dedicated to the sensory perception verbs only.

To recapitulate, the alternating perception verbs in MH show a systematic morpho-syntactic alternation in the case-marking of the experiencer and in voice.

In addition, there is variation in the syntactic makeup of the embedded clauses, specifically – the nature of the complementizer. I illustrate this again with schematic constructed examples in (26)-(29), where both NomExp in the active voice (a and b examples) and DatExp in the middle voice (c and d examples) accordingly, embed two types of clauses: a finite clause - CP (a and b examples), headed by a complementizer (še/ke’ilu), and a non-finite small clause - SC (c and d examples).

\[(26)\]

\[a. \text{ sc} \]

\[\text{hi ra'ata sc[et roren ose kbisa]}\]

she see sc[ACC Ronen do laundry]

‘She saw Ronen do the laundry.’

\[b. \text{ CP} \]

\[\text{hi ra'ata cp[še-ronen asa kbisa]}\]

she see cp[that-Ronen did laundry]

‘She saw that Ronen did the laundry.’

\[c. \text{ CP} \]

\[\text{rir'a l-a cp[še/ke’i lu-ronen asa kbisa]}\]
‘It seemed to her that/like Ronen did the laundry.’

‘The laundry seemed to her clean.’

‘He heard Rakefet practice the cello.’

‘He heard that Rakefet practiced the recorder.’

‘It sounded to him that/like Rakefet practiced the recorder.’

‘Rakefet sounded to him like a good cellist.’
He felt the days shorten.

He felt like the days are getting shorter.

It felt to him like the days are getting shorter.

The days felt short to him.

They smelled the cake cook in the oven.

They smelled that the bakery opened.

They smelled that the bakery opened.
smell  to-them  cp[like/that  the bakery  opened]

‘It smelled to them like the bakery opened.’

d. sc

העוגה הריחה להם _ אפייה

ha-uga  herixa  la-hem  sc[_ aḥuya]

the-cake  smell  to-them  sc[_ baked]

‘The cake smelled baked to them.’

The bracketing in all d examples assumes a raising construction. The complementizer in the c examples is optionally ‘like’; it is also acceptable with active voice of margiš ‘feel’ (28a). In the d examples, ‘like’ is optional for middle voice with NP embedded predicates, as in (27d). ‘Like’ as a complementizer in Hebrew - in particular in the case of perception verbs - requires comprehensive research in order to reveal the systematic nature of its distribution. Therefore, this work will abstract away from the contribution of ‘like’ and its optionality, and leave its status in Hebrew for further research.24,25

In addition to joint morpho-syntactic properties, the alternating perception verbs share the lexical semantic property of stativity. Perception verbs as mental verbs are treated as statives in the literature (Vendler 1957 a.o.), having a non-agentive external

23Elements in this position that mean ‘like’ include kmo (or the clitic ke) with NPs and ke'illo with IPs.
24 Lasersohn (1995), for example, proposes that ‘like’ in the ‘sound like’ construction in English is an empty operator that only shifts IPs and NPs into APs. Brook (2014) conducted a corpus study in Canadian English on the DatExp perception verbs seem, appear, look, sound, and feel she calls Ostensibility Verbs, which can be linked to the lower clause by one of five complementizers: as if, as though, like, that, and null. Her research shows that “although like is the newest of these variants it is overwhelmingly the predominant one in vernacular Canadian English and as if and as though have become negligible” (ibid.). Further research is required in order to determine the properties of ‘like’ as a complementizer in Hebrew.
25 Another possible complementizer, which I will not discuss here, is שג im ‘whether’, mostly in questions, as in:

(i) ראה? שג דני רץ?
ra'ita  im  dani  rac?
see.2MS  whether  Danny  ran?
‘Did you see whether Danny ran?’
argument. All alternating perception verbs are not eventive. This can be shown by the “did so too” test (Ross 1972).

(30) a. מִשפָּר רָאוּת/ שומֶה/ הָאִירִיָּה/ הָאוֹרִיָּה/ הָאֵיתֶרֶת/ הָוֶקֶד, * وبֵּגֶוָלְטֵרֶת עַשְּתֶה זָאת.

Meshy see/ hear/ feel/ smell ACC the-yard clean,

*ve-gam kalanit asta zot

and-also Kalanit did it

‘Meshy saw/ heard/ felt/ smelled the yard clean, and Kalanit did so too.’

b. מִשפָּר רָאוּת/ שומֶה/ הָאִירִיָּה/ הָאוֹרִיָּה/ הָאֵיתֶרֶת/ הָוֶקֶד, * ובֵּגֶוָלְטֵרֶת עַשְּתֶה זָאת.

Meshy see/ hear/ feel/ smell that-the-yard clean,

*ve-gam kalanit asta zot

and-also Kalanit did it

‘Meshy saw/ heard/ felt/ smelled that the yard was clean, and Kalanit did so too.’

c. נְרָא/ נְשָמָה/ הָאִירִיָּה/ הָאוֹרִיָּה/ הָאֵיתֶרֶת/ הָוֶקֶד, * והַכְּפֶּרֶת גָּשָׁה לְכָלָלְטֵי.

see.MID/ hear.MID/ feel /smell to-Meshy that-the-yard clean,

*ve-kaḵ gam asa le-kalanit

and-so also did to-Kalanit

‘It seemed/sounded/felt/smelled to Meshy that the yard was clean, and so did to Kalanit.’

d. הָאֵיתֶרֶת/ נְשָמָה/ הָאִירִיָּה/ הָאוֹרִיָּה/ הָוֶקֶד, * והַכְּפֶּרֶת גָּשָׁה לְכָלָלְטֵי.

The test for alternating perception verbs is not applicable.
The “did so too” conjunct, meaning “saw/heard/felt/smelled the yard clean”, is ungrammatical, so we can conclude that alternating perception verbs are stative. However, as statives, both the active and the middle voice verbs seem to also get an inchoative reading, of a starting point of the perception event (Doron 2013). Consider a context in which Danny and Moshe are roommates.

(31) a. בלילה, דני שמיע את משה מנהל שיחה בצרפתית
   be-xacot, dani šama et moše menahel
   at-midnight, Danny hear ACC Moshe conduct
   sixa be-carpatit
   conversation in-French
   ‘At midnight, Danny heard Moshe converse in French.’

b. בלילה, דני שמיע שישה Моше מנהל שיחה בצרפתית
   be-xacot, dani šama še-moše menahel
   at-midnight, Danny hear that-Moshe conduct
   sixa be-carpatit
   conversation in-French
   ‘At midnight, Danny heard that Moshe conversed in French.’
At midnight, it sounded to Danny that Moshe conversed in French.

At midnight, Moshe sounded to Danny converse in French.

In all these examples, there is a point in time, namely midnight, where Danny is either in the midst of hearing the conversation in French, or actually just starts hearing the conversation. In addition, in (31c)-(31d), midnight is the starting point of Danny perceiving Moshe speaking French, but it is not at all necessary for it to be a point in time of actually hearing Moshe talking. Consider, for example, a context in which Moshe is conducting a perfectly fluent and coherent conversation in Hebrew around midnight, and at the same time Danny’s sleeping pill effects kick in. At midnight, blurred from the pill, Danny starts perceiving Moshe as talking French, even though it is not the case in reality. Thus, both active and middle verbs are non-eventive, and both can get an inchoative reading, but only the former is an inchoative reading of an actual event.

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26 The partial acceptability of this example will be discussed in more detail in section 3.3.
27 This property is addressed in section 3.1 in terms of factivity.
One might wonder why ‘taste’, which is a sense verb, is absent from the alternation exemplified in (26)-(29). In Hebrew, the consonantal root *t.f.m* ‘taste’ co-occurs with a DatExp only with the adjective ***טעים*** ta’im ‘tasty’ (32) derived from that root, both with CP (32a) and SC (32b). The middle voice verbal form with the DatExp is ungrammatical, neither with CP (33a), nor with SC (33b), in accordance with the c-d examples of (26)-(29) above, since it is only interpreted as passive.

(32)  

a. **טעים לו שהמילקשייק חמוץ**
\[ ta'ım \ l-o \ še-ha-milqšeq \ xamuc \]
tasty to-him that-the-milkshake sour

‘It is tasty to him that the milkshake is sour.’

b. **המילקשייק טעים ליו חמוץ**
\[ ha-milqšeq \ ta'ım \ l-o \ xamuc \]
the-milkshake tasty to-him sour

‘The milkshake is tasty to him sour.’

(33)  

a. **טעים לא שהמילקשייק חמוץ**
\[ *nit'am \ l-o \ še-ha-milqšeq \ xamuc \]
tasted.MID to-him that-the-milkshake sour

‘It tasted to him that the milkshake was sour.’

b. **המילקשייק קטאמ ליו חמוץ**
\[ *ha-milqšeq \ nit'am \ l-o \ xamuc \]
the-milkshake tasted.MID to-him sour

‘The milkshake tasted sour to him.’
In addition, it seems that the NomExp active verb expresses more of a physical action, somewhat like ‘sample’, rather than a more perceptual one. This difference can be supported by the grammaticality of active voice ‘taste’ in the “did so too” test (34), contrasted with ungrammatical sentences in (30). Moreover, the verbal ‘taste’ with a NomExp cannot embed a clausal complement, CP (35a) or SC (35b).

(34) דודו טעם את הסופגניה, גם רוטי עשתה אאת

*dudu* *ta'am* *et* *ha-sufganiya*, *ve-gam* *ruti*

Dudu *tasted* ACC the-sufganiyah, *and also* Ruti *asta* *zot*

did so

‘Dudu tasted the sufganiyah, and Ruti did so too.’

(35) a. הוא הריח/ *טעם שהשוקולד נמס

*hu* *heri'ax*/ *ta'am* *še-ha-šogolad* *names*

he smelled/ *tasted* that-the-chocolate melt

‘He smelled/ tasted that the chocolate melted.’

b. הוא הריח/ *טעם את השוקולד נמס

*hu* *heri'ax*/ *ta'am* *et* *ha-šogolad* *names*

he smelled/ tasted ACC the-chocolate melt

‘He smelled/ tasted the chocolate melt.’

The adjectival ‘taste’ with a DatExp can embed a clausal complement, CP (36a) and SC (36b). This contrasts with ‘smell’, as shown by the following examples.
Unlike the alternating perception verbs, the adjective ‘tasty’ with a DatExp expresses a general preference, or a personal taste (Lasersohn 2005, Stephenson 2007, Kennedy & Willer 2016, a.o.). The plain, general complementizer še ‘that’ can be replaced by the temporal complementizer kše ‘when’, yielding the meaning of a dispositional stance of the experiencer towards the complement. Thus, for example, (37a) is understood as “He (generally) likes the taste of melted chocolate”. In addition, it does not necessarily get an evaluative meaning of a specific state. Consider again the contrast with ‘smell’, in a context where Danny eats chocolate cake.

‘It is tasty to him when/that the chocolate melts, but he doesn’t think that the chocolate in the cake melts.’
b. מריח לدني (*כ)שהשוקולד נמס, # abolish a la mueche shechocolate ha names.

meri'ax le-dani (*k)še-ha-šogolad names, smell to-Danny (when/)that-the-chocolate melting, #abal hu lo xošeb še-ha-šogolad ba-uga names #but he not think that-the-chocolate in the cake melts

‘It smells to him when/that the chocolate melts, but he doesn’t think that the chocolate in the cake melts.’

The sentence in (37a) can mean that Danny generally finds melting chocolate to be tasty, but it is not necessarily the case that he finds the specific chocolate portion that he is having to be melting. The (37b) sentence does not imply any preference Danny has about chocolate, and necessarily evaluates the chocolate portion he is having as melting. I return to the incongruity of ‘taste’ with the paradigm of the sensory-perception verbs presented here in the discussion in section 5. It remains, however, an issue for further investigation.

It is worth mentioning two more verbs, related to sound perception, which can appear with DatExp and SC. These are ‘ring’, ‘play’ and ‘echo’:28

(38) a.29 ha-niq šel-ka mecalcel l-i mukar, the-nick of-yours ring to-me familiar abal lo ma'ale l-i šum asoci'acya but not raises to-me any association

28 The verbal forms in (38a) and (38c) are not middle forms.
29 http://fullgaz.co.il/forums/archive/index.php/t-5653.html
‘Your nick (= nickname) rings a bell to me, but it doesn’t have any association for me.’

המושג פמיניזם התנגן לי שלילי.

*ha-musag* *ה* feminizem *פ* hitnagen *מינ* l-i šlili *נ* the-term *feminism* play.MID to-me negative

‘The term “feminism” sounded negative to me.’

מיתדדה לי כל מיני דברים.

*mehadhed* l-i kol miney dḥarim *

*echo* to-me all sorts.GEN stuff

‘It echoes to me all sorts of stuff.’

These verbs behave similarly to the perception verb *nišma* ‘hear.MID’, with SC complements (although only (38b) has middle morphology).

To sum up the discussion of the paradigm, this work focuses on four sensory perception verbs in Modern Hebrew, namely ‘see’, ‘hear’, ‘feel’ and ‘smell’, which all share the following semantic properties and morpho-syntactic variation:

i. Stative verbs with an experiencer argument.

ii. A diathesis alternation between an active verbal form and a middle verbal form, which correlates with an alternation between a nominative and dative experiencer argument (NomExp and DatExp, respectively).

iii. A clausal complement, alternating between CP and SC.

30 [https://www.haaretz.co.il/magazine/ayelet-shani/.premium-1.4647969](https://www.haaretz.co.il/magazine/ayelet-shani/.premium-1.4647969)
The combination of the diathesis alternation and the category of embedded clauses yields four constructions: active-CP, active-SC, middle-CP, and middle-SC. Each one of the constructions has distinct semantic properties, consistent for all four verbs ‘see’, ‘hear’, ‘feel’ and ‘smell’. The contrasts between the constructions are presented in the following section.
3. Alternating constructions and their semantic properties

As laid out in the previous section, the Hebrew alternating perception verbs ‘see’, ‘hear’, ‘feel’ and ‘smell’ appear in four constructions when embedding a clausal complement. I have introduced the terms active voice verbs and middle voice verbs to refer to constructions 1-2 (NomExp) and 3-4 (DatExp) in Table 1 respectively. In the present section, five phenomena that distinguish between the four constructions in Table 1 will be presented and discussed: 1. factivity, 2. lower interpretation of negation, 3. embedded predicates, 4. mental apprehension, 5. imaginative reading. For the sake of simplicity, the properties will be exemplified in some cases by just one of the alternating perception verbs, implying that the other alternating perception verbs behave similarly, unless mentioned otherwise.

3.1 Factivity

Within the class of attitude verbs, factivity is the property of a predicate which entails the truth of its complement (Karttunen 1971). The attitude verbs in (39a) are factive, entailing the truth of the complement “Ben is a dancer”, while (39b) predicates are non-factive.

(39) a. Dan {knows, realizes, is aware} that Ben is a dancer.

=> Ben is a dancer.

b. Dan {thinks, believes, is certain} that Ben is a dancer.

31 Karttunen’s (1971) definition crucially talks about entailments for factive predicates in terms of presupposition. The truth of the complement of factive verbs (e.g. know) ‘survives’ under negation, questions, possibility modals such as may and in antecedents of conditionals. Consider:

(i) Dan didn’t know that Ben was a dancer/ Did Dan know that Ben was a dancer?/ Dan may know that Ben was a dancer/ If Dan knew that Ben was a dancer, he should have tried to learn some steps. => Ben was a dancer.

Karttunen distinguishes factive predicates from ‘implicative’ ones, for which factivity is not similarly presupposed. In what follows, I will abstract away from the nature of the presupposition, and its survival in the abovementioned environments.
Ben is a dancer.

Among the alternating perception verbs, active voice verbs are factive, whereas middle voice verbs are non-factive. Consider the following sentence:

ゲラר [שהאמא בברית]ガル [ MOM ガルが家にいる]ガル saw that mom is home.’

Let us assume that Gal knows that when the car is parked in the driveway, his mother is at home. In a context where Gal comes home and sees his mother's car in the driveway, (40) entails that the complement ‘mother is at home’ is true. This judgment can be tested by the contradiction test in (41) (Moulton 2009, p. 128).

Factivity holds for the active voice verbs, with both categories of clauses, CP and SC. In a context in which Ronen comes to perceive Danny as drunk by means of one of his senses - for example, seeing an empty bottle of wine, or smelling Danny's breath –
the truth of the complement in the first sentence in (42a)-(42b) follows from factivity, hence the contradiction resulting from the second sentence:

(42) a. רון ראה/ שמע/ הרגיש/ הריח שדני שיכור, # אך実際に דני כלל לא שתה.

Ronen see/ hear/ feel/ smell that-Danny drunk,

#אכן lema'ase dani biqlal lo šata
#but in.fact Danny at all NEG drank

‘Ronen saw/ heard/ felt/ smelled that Danny is drunk, but in fact Danny didn’t drink at all.’

b. רון ראה/ שמע/ הרגיש/ הריח את דני שיכור, # אך実際に דני כלל לא שתה.

Ronen see/ hear/ feel/ smell ACC Danny drunk,

#אכן lema'ase dani biqlal lo šata
#but in.fact Danny at all NEG drank

‘Ronen saw/ heard/ felt/ smelled Danny drunk, but in fact Danny didn’t drink at all.’

It is important to note, though, that under some circumstances, ‘hear’ and ‘feel’ are non-factive with the active-CP construction. With ‘hear’, factivity arises only when the experiencer heard (some concrete evidence for) the event described in the embedded clause, but not if it is the content of a hearsay or a report (as was claimed for English by Moulton (2009, p. 145-147)). For example, (43a) is factive when Ronen hears Danny singing loud and tipsily, but non-factive if he heard about Danny being drunk from his parents (43b).
a. Ronen שמע (מהשירה שלו) شדני شיכור, # אך למעשה דני כלל לא שתה

Ronen hear (from-the-singing of-him) that-Danny
šikor, #ak lema'ase dani biklal lo šata
drunk, #but in.fact Danny at.all NEG drank

‘Ronen heard (from his singing) that Danny is drunk, but in fact Danny didn't drink at all.’

b. רון שמע (מההורים שלו) שדני שיכור, אך למעשה דני כלל לא סתת

Ronen hear (from-the-parents of-him) that-Danny
šikor, #ak lema'ase dani biklal lo šata
drunk, #but in.fact Danny at.all NEG drank

‘Ronen heard (from his parents) that Danny is drunk, but in fact Danny didn't drink at all.’

With ‘feel’, the source of the perception might be an unreal impression rather than perceived evidence (44a), or may report an internal unverifiable sensation (44b). In such cases, ‘feel’ is non-factive, and the sentence describes a feeling that is not necessarily real.

(44)
a. היא אמרה לי קודם שהשמלה נורא יפה, אבל היא מרגישה שזה לא הסגנון שלה

hi amra l-i qodem še-ha-simla nora yaḇa, abal
she said to-me earlier that-the-dress very pretty, but
še-hi margiša še-ze lo ha-signon šel-a
that-she feel that-it NEG the-style of-her
‘She told me earlier that the dress was very pretty, but that she felt it wasn’t her style.’ (Saydon 2009, p. 391)

b. אני מרגישה שהחלمري

ani margiša še-hu mitraxeq

I feel that-he is distancing

‘I feel that he is becoming distant.’

Therefore, in some cases NomExp alternating perception verbs can be non-factive.\(^{33}\)

But crucially, active voice ‘feel’ can be factive with CP, and is obligatorily factive with SC. Consider the following contrast between active voice ‘feel’ embedding CP (45a) and SC (45b).

(45) a.Danny feels that Danit is estranged, but she is just preoccupied.

\[
dani \text{ margiš } še-danit \text{ meruxeqet, } aḥal \text{ hi stam}
\]

Danny feel that-Danit estranged, but she just

truda be-maxšabot

occupied in-thoughts

‘Danny feels that Danit is estranged, but she is just preoccupied.’

b. Danny feels that Danit is estranged, but she is just preoccupied.

\[
dani \text{ margiš } et \text{ danit } meruxeqet, \text{ } ?aḥal \text{ hi stam}
\]

Danny feel ACC Danit estranged, but she just

truda be-maxšabot

\(^{32}\) www.ynet.co.il/articles/0,7340,L-4677708,00.html

\(^{33}\) I will not attempt to explain these exceptions for factivity with ‘hear’ and ‘feel’ here. The non-factive active voice ‘hear’ might be explained through the distinction presented in the evidentiality literature (Willet 1988, cited by Krawczyk 2012, 63) between different types of evidence: Direct – attested (visual, auditory, other sensory), and indirect – either reported (second or third hand, such as hearsay), and inferring (based on results or reasoning). I leave this possibility as an open issue.
occupied in-thoughts

‘Danny feels Danit being estranged, but she is just preoccupied.’

For me, (45a) could be said about Danny having the impression that Danit is estranged, yet it is not really the case, while in (45b), his feeling corresponds to Danit’s actual state, that is, that she is estranged.

While the clausal complements of active voice verbs, both CP and SC, are interpreted as true when the sentence is true, with middle voice verbs they are both interpreted as a probable or an evaluated statement, but not necessarily true. In (46a), Danny can evaluate Danit as drunk based on some sensory impression, even if she is perfectly sober. Sentence (46b), then, is not a contradiction.

(46)

a. נראיה/ נשמעה/ הרגישה/ הריחהلدני شيئיתSpiroth,  

אָג לָמֵעֵשׁ הָדָא כָּלָא לַא שַחַתָא אֶלפָּהוֹת.

nir’a/ nišma/ hirgiš/ heri’ax le-dani

see.MID/ hear.MID /feel /smell to-Danny

še-danit šikora, ak lema’ase hi klal lo  

that-Danit drunk, but in.fact she at.all NEG

šateta alkohol

drank alcohol

‘It seemed/ sounded/ felt/ smelled to Danny that Danit is drunk, but in fact she didn’t drink alcohol at all.’

b. דָּנִית נָרָאתה/ נְסַמְּתָה/ הָרָגַיְתָה/ הָרִיחָה לַדְּנִי שֶׁיְּכַוְּרוֹת.

אָғ לָמֵעֵשׁ הָדָא כָּלָא לַא שַחַתָא אֶלפָּהוֹת.
Danit see.MID/hear.MID/feel/smell to-Danny drunk,

But in fact she at.all NEG drank alcohol

‘Danit seemed/ sounded/ felt/ smelled to Danny drunk, but in fact she didn't drink alcohol at all.’

To conclude the factivity property, active voice verbs are factive with CP and SC, aside from some exceptions with ‘hear’ and ‘feel’. Middle voice verbs are non-factive across the board.

3.2. Lower interpretation of negation

Active and middle voice verbs, with both CP and SC complements, also come apart with respect to Lower Interpretation of Negation (LIN) (Hegarty 2016, chapter 7). LIN is the possible interpretation of matrix negation as negating the embedded predicate rather than the expected meaning in which the matrix verb is negated. In example (47a) from Hegarty (2016, p. 185, example (1e)), the attitude ascription want in English shows LIN, thus licensing the NPI until in the complement. In (47b), hope, which does not allow LIN, can only be interpreted as describing a lack of hope, and cannot mean that liberals hoped that Bush wouldn’t win (p. 186 example (5a)).

(47)  a. They don’t want (him) to find the document until Tuesday.

   b. Liberals didn’t hope that Bush would win.

---

34 This property is known in the literature as ‘Neg-Raising’ (Horn 1978, Gajewski 2007, among many others).
Among Hebrew alternating perception verbs, LIN is less acceptable with active voice verbs, while with middle voice verbs LIN is easily available, and even preferred.\(^{35}\)

(48) a. שקד לא ראוה/ שמעה/ הרגיש/ הריח שדני היה שיכור

\(\text{šaqed lo ra'a/shama/hirgiš/heri'ax še-dani haya šikor}\)

ShakedNEG see/ hear/ feel/ smell that-Danny was drunk

'Shaked didn't see/ hear/ feel/ smell that Danny was drunk.'

\(\Rightarrow\) \(\text{šaqed ra'a/shama/hergiš/heri'ax še-dani lo}\)

Shakedsee/ hear/ feel/ smell that-Danny NEG

haya šikor

was drunk

'Shaked saw/ heard/ felt/ smelled that Danny was not drunk.'

b. שקד לא ראוה/ שמעה/ הרגיש/ הריח את דני לא שיכור

\(\text{šaqed lo ra'a/shama/hirgiš/heri'ax et dani šikor}\)

ShakedNEG see/ hear/ feel/ smell ACC Danny drunk

'Shaked didn’t see/ hear/ feel/ smell Danny drunk.'

\(\Rightarrow\) \(\text{šaqed ra'a/shama/hergiš/heri'ax et dani *lo}\)

Shakedsee/ hear/ feel/ smell ACC Danny NEG

šikor

drunk

'Shaked saw/ heard/ felt/ smelled Danny not being drunk.'

\(^{35}\) The middle voice verbs נרא הא see. MID ‘seemed’ and נשימה hear. MID ‘sounded’ also appear with negation in the phrases: (זה \(\text{לא נרא לא שמע לא הרגיש לא הריח} \) (לו), 'It doesn’t seem/ sound good to me'. I will not attempt to account for this reading, in which the embedded predicate ‘good’, which is negated, is implicit.
a. לא נראת/ נשמע/ הרגיש/ הריח לשקד שיכור

It didn't seem/sound/feel/smell to Shaked that Danny was drunk.

= > nir'a/ nišma/ hirgiš/ heri'ax le-šaqed

see.MID/ hear.MID/ feel/ smell to-Shaked

še-dani šikor

that-Danny drunk

b.Danny לא נראת/ נשמע/ הרגיש/ הריח לשקד לא שיכור

Danny didn't seem/sound/feel/smell drunk to Shaked.

= > dani lo nir'a/ nišma/ hirgiš/ heri'ax le-šaqed šikor

Danny see.MID/ hear.MID/ feel/ smell to-Shaked NEG drunk

‘Danny seemed/sounded/felt/smelled not drunk to Shaked.’
In Hebrew alternating verbs, the availability of LIN seems to be independent from the embedded clause category, and only sensitive to the voice dimension – LIN does not arise with active voice (and NomExp), but is easily obtained with middle voice (and DatExp). Descriptively speaking, the LIN property aligns with the factivity contrast – the two active constructions are factive and do not generally allow LIN, while the two middle constructions are non-factive and allow LIN.

3.3 Embedded predicates

Active and middle verbs differ with respect to the type of predicates of the embedded clause. For non-verbal predicates, NP and AP, the basic distinction I will address here will be between predicates describing a permanent property of an individual versus a temporary one. This is a contrast known in the literature as Individual Level Predicate (ILP) versus Stage Level Predicate (SLP) (Kratzer 1995). The distinction can be illustrated by the following example from Kratzer (1995, p. 125, ex. 2):

(50)    a. Firemen are altruistic.      ILP
       b. Firemen are available.       SLP

Being available (50b) is a temporary state, while altruism (50a) is more of a permanent property.

With SC, middle voice verbs can embed both ILPs and SLPs. Active voice verbs only allow a more restricted range of non-verbal predicates in SC. The contrast is shown (51), where the active voice verbs are only felicitous with the SLP ‘tired’, but not with
the ILPs ‘Club-Med dancer’, ‘tall’ and ‘chef’ (51a). The middle voice, in contrast, is felicitous with both SLPs and ILPs (51b).

(51) a. דנית ראתה את דני עייף/ רקדן בקלאב-מד/ גבוה/ שף
Danit see ACC Danny tired/ dancer in.the-Club-Med/ tall/ chef

‘Danit saw Danny tired/ Club-Med dancer/ tall/ chef.’

b. דני נראה לדנית עייף/ רקדן בקלאב-מד/ יפה/ שף
Danny see.MID to-Danit tired/ dancer ba-qlab-med/ tall/ chef

‘Danny seemed to Danit tire/ a Club-Med dancer/ tall/ a chef.’

The ILP predicates in (51a) can be replaced by SLPs as in (52):37

36 An exception for the active voice ungrammaticality with ILPs is when the perception verb is reflexive, in particular with ‘feel’. Consider the contrast in (i)-(ii), from Saydon (2009, p. 390), that shows that the predicate ‘smart’ is grammatical in active-SC ‘feel’ only with a reflexive pronoun.

(i) בה מרגישה את עצמה חכמה
she feel ACC herself smart

‘She feels herself smart.’

(ii) *דוד מרגישה את יעל חכמה
David feel ACC Ya’el smart

‘David feels Ya’el smart.’

Agranovsky (2017, p. 79-80) shows that the ‘feel oneself’ construction in Hebrew may be Slavic influence. As suggested by Saydon (2009, p. 390), the sentence in (i) probably does not involve an embedded SC [herself smart] but rather the phrasal verb ‘feel oneself’, which can indeed be replaced by ‘feel’.

37 The ILPs ‘Club-Med dancer’, ‘tall’ and ‘chef’ are grammatical in an imaginative reading, which will be further discussed in section 3.5.
The distinction between the alternating perception verbs with respect to embedded predicates cannot be attributed to what is known in the literature as “subjective predicates” (Kennedy & Willer 2016). The perception verb find in English is claimed to embed only “subjective” predicates, such as fascinating (53a), but not vegetarian (53b). In Hebrew, both predicates are ungrammatical with active voice verbs embedding SC (54a), and grammatical with middle voice (54b).

(53)

a. Kim finds Lee fascinating.

b. # Kim finds Lee vegetarian.

(Kennedy & Willer 2016, p. 914, example (1))

(54)

a. דני ראה את Данית מרתקת/ טבעונית

Danny see ACC Danit fascinating/ vegan

‘Danny saw Danit fascinating/ vegan.’

b. דנית נראתה לדני מרתקת/ טבעונית

Danit see MID to-Danny fascinating/ vegan

‘Danit seemed fascinating/ a vegan to Danny.’
PP predicates, such as comitative or locative PPs, are grammatical when embedded under active voice (55a), but rarely felicitous under middle voice (55b). Sentences (56a)-(56c), however, express more of an emotional state, which is temporary, rather than a physical PP location.38

38 Sentence (55a) is ambiguous between subject and object comitative. Only the object comitative should be considered here.

39 The original example in English is John sounds in a good mood.
‘Danny feels at home.’

d. זה מרגיש לדני בבית

ze margiš le-dani ba-bayit

It feel to-Danny at-home

‘It feels to Danny like home.’

Another special case of an embedded PP is with ‘smell’.

(57) דני מריח מאלכוהול; המשקה מריח מתפוזים
dani meri’axet me-alcohol; ha-mašqe meri’ax mi-tapuzim

Danny smells from-alcohol; the-drink smells from-oranges

‘Danny smells of alcohol; the drink smells of oranges.’

This construction, however, is not grammatical with an overt experiencer, neither NomExp nor DatExp (58a)-(58b). In addition, to me, it is factive (58c).

(58) a. הוא מריח את דני מאלכוהול; הוא מריח את המשקה מתפוזים
*hu meri’axet dani me-alcohol;

He smell ACC Danny from-alcohol;

*hu meri’axet ha-mašqe mi-tapuzim

He smell ACC the-drink from-oranges

‘He smells Danny of alcohol; he smells the drink of oranges.’

b. דני מריח את המשקה מהריח מתפוזים??
dani meri’ax l-o me-alcohol;

Danny smell to-him from-alcohol;
Danny smells to him of alcohol; the drink smells to him of oranges.

The drink smells of oranges, but this is Coke.

It is not clear to me that (57) contains a bi-clausal structure, and thus may not belong to the paradigm discussed here. This is an issue for which I cannot propose an answer at this point.40

Active and middle voice verbs also reveal a contrast with verbal predicates in SC. Participles are acceptable in SCs under active perception verbs, but not under middle verbs.41 Mental verbs, such as ‘know’ and ‘love’, could be treated as ILPs (59d) and (60d),42 and they are ungrammatical with active voice verbs, but felicitous with middle voice verbs.

(59) a. He saw Danit dance.

He saw Danit dance.

b. He saw Danit dance.

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(59) a. He saw Danit dance.

He saw Danit dance.

b. He saw Danit dance.
He saw Danit draw a circle.

He saw Danit enter home.

He saw Danit sit in the garden; he saw Danit know French/ love Danny.

Danit seemed to him dance.

Danit seemed to him draw a circle.

Sentences (60a)-(60c) are grammatical when ‘seems’ is parenthetical, as in:

(i)  
Danit, apparently, is dancing/ drawing a circle/ entering home.
Danit see.MID to-him enter to.home

‘Danit seemed to him enter home.’

d. דנית נראתה לו יושבת בגן; דנית נראתה לו יודעת צרפתית/ אוהבת את דני *

Danit see.MID to-him sit in.the-garden;

Danit see.MID to-him know French/ love ACC Danny

‘Danit seemed to him sit in the garden; Danit seemed to him know French/ love Danny.’

To give a clearer picture of the restriction on embedded predicates with SC, the data above is summarized in Table 2. The distinction can be stated as follows: active verbs cannot embed ILPs in SC, and middle verbs cannot embed verbs.

Table 2: types of embedded predicates in SC

<table>
<thead>
<tr>
<th></th>
<th>SLP (i.e. tired)</th>
<th>ILP (i.e. chef, know French)</th>
<th>verbs (i.e. run)</th>
</tr>
</thead>
<tbody>
<tr>
<td>active-SC</td>
<td>✓</td>
<td>✗</td>
<td>✓</td>
</tr>
<tr>
<td>middle-SC</td>
<td>✓</td>
<td>✓</td>
<td>✗</td>
</tr>
</tbody>
</table>

Turning now to types of embedded predicates with CP, there is no contrast:

(61) a. דנית ראתה שעון/ לקדב בא-קלאב-מד

Danit ra'ata še-dani ayef/ raqdan ba-glab-med

The parenthetical distribution of the alternating perception verbs in Modern Hebrew calls for a comprehensive treatment, which is beyond the scope of the current work.
Danit saw that-Danny tired/ dancer in.the-Club-Med

‘Danit saw that Danny was tired/ a Club-Med dancer.’

b. נראתה לדנית שדני עייף/ רקדן בקלאב-מד

*nir’a* le-danit Še-dani ayef/ see.MID to-Danit that-Danny tired/

raqdanba-glab-med
dancer in.the-Club-Med

‘It seemed to Danit that Danny was tired/ a Club-Med dancer.’

With verbal predicates, all verb classes can be embedded under both active and middle voice verbs, especially in the present or past tense. Middle voice verbs allow future tense complements, but this is slightly degraded in the active voice.

(62)  

a. **He saw that Danit dances/ danced/ will dance.**

*hu ra’a Še-danit roqedet/ raqda/ ?tirqod*

b. **He saw that Danit is drawing/ had drawn/ will draw a circle.**

*hu ra’a Še-danit mecayeret/ ciyra/ ?tecayer ‘igul*

c. **He saw that Danit enters/ entered/ will enter home.**

*hu ra’a Še-danit niḵneset/ niḵnesa/ ?tikanes habayta*
d. He saw that Danit sat/ had sat/ will sit in the garden; he saw that
Danit knew/ had known/ will know French.

(63)

a. It seemed to him that Danit danced/ had danced/ will dance.

b. It seemed to him that Danit is drawing/ had drawn/ will draw a circle.

c. It seemed to him that Danit enters/ entered/ will enter home.

d. He saw that Danit sat/ had sat/ will sit in the garden; he saw that
Danit knew/ had known/ will know French.
‘It seemed to him that Danit sits/ sat/ will sit in the garden; it seemed to him that Danit knew/ had known/ will know French.’

To summarize this section, restrictions for the type of the embedded predicates arise mainly with SC complements. Embedded under active verbs, only ILPs are ungrammatical, and under middle voice verbs, verbal predicates are ungrammatical.

3.4 Mental apprehension (belief formation) and indirect perception

The active voice ‘see’ reveals an epistemic contrast between CP and SC complements, as was first pointed out by Dretske (1969, p. 33-34) for English:

(64) a. S saw the man wave to his wife.
   b. S saw that the man was waving to his wife.

According to Dretske (ibid.), for (64a) to be true, it is “not enough for S to see the man, he must also have been in a position to differentiate some of the movement which constitutes a wave”. No belief about the event being a waving of a man to his wife is necessarily involved in the seeing. The meaning of (64b), however, is not only that S saw the event, “but that he identified it as described” (ibid.). It follows then that with CP, mental apprehension is involved, and the seeing is understood as a non-neutral perception, i.e., it must include apprehension. In order for (64a) to be true, it has to be the case that S senses directly the wave, but not necessarily acknowledging that fact. This contrast can be tested by the following test for epistemic non-neutral perception (Moulton 2009, p. 128, example (2), attributed to Barwise 1981), and
adopted here in (65). For (65a) to be true, Martha must believe the content of the CP complement, and a contradiction arises. Taking an SC as the complement of see, (65b) reports direct perception, and no belief is required.

(65)  
a. Martha saw that Fred was driving too fast,  
# but she believed he wasn’t.  
b. Martha saw Fred driving too fast,  
but she believed he wasn’t.

This contrast is also found in Hebrew for active voice verbs with SC complements. However, middle voice verbs with both clausal types are epistemically non-neutral.

(66)  

a. דני ראה את דנה שיכורה, אבל הוא חשב שהיא רק עושה הצגה

Danny saw Dana drunk, but he thought that she was just putting on a performance.

b. דני ראה שדנה שיכורה, # אבל הוא חשב שהיא רק עושה הצגה

Danny saw that Dana drunk, # but he thought that she was just putting on a performance.

דני ראה את דנה שיכורה, אבל הוא חשב שהיא רק עושה הצגה
Danny saw Dana drunk, but he thought that she was just putting on a performance.

# but he thought that-she just makes show
‘Danny saw that Dana was drunk, but he thought that she was just putting on a performance.’

c. *נראה לו שדנה שיכורה, אבל הוא חשב שהיא רק עושה הצגה* —

nir’a l-o še-dana šikora,

see.MID to-him that-Dana drunk,

#aḇal hu xašaḇ še-hi raq osa hacaga

#but he thought that-she just makes show

‘It seemed to him that Dana was drunk, but he thought that she was just putting on a performance.’

d. *דנה נראתה לו שיכורה, אבל הוא חשב שהיא רק違反 הצגה* —

dana nir’ata l-o šikora,

Dana see.MID to-him drunk,

#aḇal hu xašaḇ še-hi raq osa hacaga

#but he thought that-she just makes show

‘Dana seemed drunk to him, but he thought that she was just putting on a performance.’

Another contrast between CP and SC complements with the active voice verbs is the requirement for indirect evidence.

(67) a. *רננה הרגישה שיורד גשם* —

renana hirgiša še-yored gešem

Renana felt that-descends rain

‘Renana felt that it was raining.’

b. *רננה הרגישה את הגשם יורד* —

RENANA HIRGIšA ETA HEGŠEM YORD
Sentence (67a) can be true in a context where Renana feels that her hair gets frizzy, an unfortunate side effect she experiences every time that it starts raining. In such a case, sentence (67a) can be true even if she has no direct perception of the rain. For (67b) to be true, it must be the case that Renana directly felt the rain. Embedded under active voice verbs, then, the SC requires direct perception of the event described. The active voice with CP enables, but does not necessarily require, indirect perception, or sensation. Consider the following examples:

(68)

a. רֶנָנָה ראתהشيורדֵגֶשֶמ
gerena ra’ata še-yored gešem

Renana see that-descends rain

‘Renana saw that it was raining.’

b. רֶנָנָה הרגישהשיורדֵגֶשֶמ
gerena hirgiša še-yored gešem

Renana feel that-descends rain

‘Renana felt that it was raining.’

Sentence (68a) is felicitous in a context where Renana looks directly as the rain through a window. Sentence (68b) is not entirely felicitous in such a context. With active voice verbs with CP, it seems that the relation between the sensory perception and the embedded event/state is looser, and can be indirect.
Middle voice verbs embedding a CP require indirect perception. Consider the contrast in (69), in a context in which a person watched the rain outside.

(69)  

a. ראהショップ גשם  

\[ hu \ ra'a \ \text{še-yared} \ \text{gešem} \]  
he see that-descended rain  
‘He saw that it was raining.’

b. ראהショップ כל שדר גשם  

\[ \# \text{nir}'a \ l-o \ \text{še-yarad} \ \text{gešem} \]  
see.MID to-him that-descended rain  
‘It seemed to him that it was raining.’

The middle voice with SC also requires an indirect perception. Consider again (66d), adapted and repeated as (70):

(70) דנה נראתה לעדינה שתיכורה  

\[ dana \ \text{nir}'ata \ \text{le-adina} \ \text{šikora} \]  
Dana see.MID to-Adina drunk  
‘Dana seemed drunk to Adina.’

The sentence in (70) is infelicitous in a context where Adina is a policewoman who tests if Dana is drunk with a breathalyzer, which shows, by the common standards, that Dana is drunk.\(^{44}\)

\(^{44}\) With the first person DatExp, \(\text{nir}'e\) see.MID ‘seem’ may be used when there is a direct perception in the context of hedging. I am thankful to Miri Bar-Ziv Levy for pointing out this issue. I will disregard the hedging uses special to the first person in the current discussion.
To conclude this section, the active voice verb embedding a SC does not require mental apprehension and requires direct perception. The three other constructions, i.e. active-CP, middle-CP and middle-SC involve belief formation and indirect perception.

3.5 Imaginative reading

A final contrast to be presented between active and middle voice verbs is the availability of a reading referred to as ‘imaginative’. The imaginative reading is one among several meanings discussed in the literature for the active voice verbs see and hear. Recall the inventory of meanings for see in English (Moulton 2009, p. 2, example (1)) with different clausal non-finite complements in (6), repeated here as (71):

(71)  a. bare infinitive: John saw Fred leave early. direct perception
     b. gerundive: John saw Fred leaving early. direct perception
     c. gerundive: John saw Fred owning a house. imaginative
     d. infinitive: John saw Fred to be a party-pooper. belief

The imaginative reading reported for English in (71c) is found also in Hebrew (Cohen 2015). Sentence (72a) can get an imaginative reading in a context where Danny sees Moshe, who is a young ambitious teenager, delivering fiery arguments at a family dinner about a burning issue on the news. This reading is found only with active voice verbs embedding SC. The active voice verb with CP in (73) does not have this reading.
The imaginative reading is more difficult to get with ‘feel’ and ‘smell’. I will not attempt to explain the differences in acceptability between the different verbs. As pointed out in section 3.3, active voice verbs are not grammatical with ILPs in SC.
complements. In (72a)-(72b), the only available reading for the complement is of a mental image which the experiencer can hold, not an actual scenario in the real world that he perceives through his senses: a scenario which could happen in the future based on the current state of affairs, as in (72a), or expressing more of a wishful thinking, as in (72c). It differs from the belief reading (71d) – in (72a), Danny doesn’t know or believe that Moshe is currently a politician, only that Moshe being a politician is a viable future scenario. With verbal embedded predicates (74a), both the direct perception (71a)-(71b) and imaginative readings (71c) arise.\(^{46}\) To me, the imaginative reading is also available with embedded stative states, which were shown to be ungrammatical when embedded under active voice perception verbs (74b).

\[(74)\]
\[
\begin{array}{l}
\text{(a. ב的应用)}
\text{He see ACC Danit conquer ACC the-summit}
\\
\text{He sees Danit conquering the summit.‘}
\\
\text{(b. כ的应用)}
\text{I see ACC Rona know Chinese}
\\
\text{‘I see Rona knowing Chinese.’}
\end{array}
\]

With middle verbs, no imaginative readings arise. The only reading obtained is an evaluation of a perceived state:\(^{47}\)

\(^{46}\) However, the imaginative one is much more difficult to attain with a past-tense matrix verb.\(^{47}\) Example (75b) may be uttered about a child who is currently not an opera singer, but has some voice qualities that make us think he would make a good opera singer. However, for me, the salient reading is of an evaluation, which is shared with the other verbs in (75).
In sentences (75a)-(75d), the DatExp argument believes that the content of the complement is true. Sentence (76) then, is a contradiction.

(76) a. פזית נראית לרונן פוליטיקאית.

pazit nir'ata le-ronen politiqa'it

Pazit see.MID to-Ronen politician

‘Pazit seemed to Ronen like a politician.’

b. חנוך נשמע לסיתני זמר אופרה.

xanoḵ nišma le-sitvanit zamar opera

Chanoh hear.MID to-Sitvanit singer opera

‘Chanoh sounded to Sitvanit like an opera singer.’

c. ורד הריחה לצחי גבוהה.

vered hirgiša le-caxi gboha

Vered felt to-Tzahi tall

‘Vered felt tall to Tzahi.’

d. מיכל הריח בבלשנית זמרת.

miḵal herixa le-gal bašlanit cameret

Michal smelled to-Gal chef top

‘Michal smelled to Gal like a top chef.’

In sentences (75a)-(75d), the DatExp argument believes that the content of the complement is true. Sentence (76) then, is a contradiction.
but he NEG thinks that exist to her whatever

tšuna šel politiqa’it

characteristic of politician

‘Pazit seems to Ronen like a politician, but he doesn’t think that she has any characteristic of a politician.’

Concluding this section, the imaginative reading in Hebrew arises only in the active-SC construction. In this reading, the embedded predicate types are not as restricted as has been described in section 3.3. Rather, ILPs such as ‘tall’ and ‘knowing Chinese’ are grammatical. The imaginative reading is not available with active-CP and middle voice constructions, which only show a belief reading. Descriptively speaking, this aligns with the belief formation and indirect perception property, shown in the latter three constructions, and not in the active-SC.

To conclude the discussion of semantic properties, the four constructions of the alternating perception verbs show variation in semantic properties concomitant to the morpho-syntactic alternation between diathesis and clausal category of their complements. The semantic properties and contrasts are summarized in Table 3.
Table 3: Summary of the active/middle voice and CP/SC contrasts

<table>
<thead>
<tr>
<th>Category</th>
<th>Active Voice</th>
<th>Middle Voice</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CP</td>
<td>SC</td>
</tr>
<tr>
<td>1. Factivity</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>2. LIN</td>
<td>×</td>
<td>×</td>
</tr>
<tr>
<td>3. Restrictions on embedded predicates</td>
<td>×</td>
<td>non-ILPs</td>
</tr>
<tr>
<td>4. (i) Belief formation</td>
<td>✓</td>
<td>×</td>
</tr>
<tr>
<td>(ii) Indirect perception</td>
<td>✓</td>
<td>×</td>
</tr>
<tr>
<td>5. Imaginative reading</td>
<td>×</td>
<td>✓</td>
</tr>
</tbody>
</table>

In what follows, I wish to propose an explanation for these contrasts. In the following section, I will propose a semantic and syntactic analysis for each of the four constructions of the alternating perception verbs. After laying out the proposal, I will return to the contrasts, and examine how the analysis may account for the array of alternating properties.
4. An account of alternating perception verbs

In this section, a semantic and syntactic account will be proposed for the alternating perception verbs in Hebrew. It will be shown how the different parts of the alternating perception verbs, i.e. diathesis, preposition introducing experiencer arguments, and the syntactic type of the embedded clause, give rise to the semantic properties surveyed above for the four constructions in the paradigm (namely, active-SC, active-CP, middle-CP and middle-SC). In section 4.5, I explore how a compositional analysis may provide the basis for explaining the characteristics presented in section 3, for each of the four constructions.

The discussion starts with a detailed derivation of the active-SC construction. The general semantic and syntactic framework of the account is then extended to the active-CP, middle-CP and middle-SC constructions. I will not attempt to specify a compositional semantics that delivers the truth conditions of the additional constructions. The development of a formal system that captures the phenomena in full generality is beyond the scope of the present work, and it will have to be left to further research. In what follows, I will formally analyze the active-SC construction, and then informally describe the proposed analysis for the other three constructions.

4.1 Active-voice perception verb with a SC complement (Active-SC)

The starting point of the analysis is the semantics of Modern Hebrew perception verbs: li-r'ot ‘to-see’, li-šmo'a ‘tohear’, le-hargiš ‘to-feel’ and le-hari'ax ‘to-smell’.

For ease of presentation, I will discuss the Hebrew verb ra'a ‘see’, assuming that other members of the class of alternating perception verbs can be defined along the
same lines. The suggested basic lexical entry for perception verbs is formalized in (77), for the verb ‘see’.

(77) \([see\]<s, <s, t>> = \lambda s'. \lambda s: P=see. s' = P(s)\)

In (77), ‘see’ is analyzed as a relation between two situations, the situation \(s\) in which perception takes place, and a situation which is perceived, \(s'\). Type \(s\) is the type of situations, and \(s\) and \(s'\) are variables of this type. Events, as well as situations, are assumed to be of type \(s\). I abstract away from the distinction between events and situations (Kratzer 2007), and treat them both as situations, of type \(s\). The lexical entry in (77) introduces the presupposition that \(s\) and \(s'\), for ‘see’, are related by visual perception. The motivation for the presupposition with \(P\) is the proposal for a unified analysis of the verbs in the class which brings out their common perceptual core. The major difference of the denotation in (77) for ‘see’ with respect to Higginbotham (1983) and Moulton (2009, p. 136, example (10)), is that the ‘seer’ is not an argument of the verb.

This lexical entry of a predicate which is purely a relation between two situations, excluding an individual participant - the ‘seer’ in ‘see’ - builds on Kratzer's (1996) notion of severing the external argument. According to this notion, external arguments, unlike internal arguments, are not arguments of the verb, but introduced by a functional head - the Voice head - that syntactically attaches right above the VP node. Accordingly, internal and external arguments are composed by different rules of combination. The interpretation of VP is composed through Function Application (Heim & Kratzer 1998, p. 49 example (5)) when a verb (V) takes a direct object as its
argument. The external argument is combined later, through a different operation which Kratzer (1996) calls Event Identification, which identifies two event variables as one (p. 122 example (23)). I thus assume here two types of compositional rules: Function Application (FA) and Event Identification (EI).48

I start by discussing FA when the verb ‘see’ combines with its complement, first when the complement denotes an individual situation, as in (78), and next when it denotes a property of situations, as in (79). In example (78), the complement of ‘see’ is of type s, in this case the name ‘the Jerusalem Marathon’:

(78) a. דן ראה את מרתון ירושלים
   dan ra'a et maraton yerušala'im
   Dan see ACC Marathon Jerusalem
   'Dan saw the Jerusalem Marathon.’

b. \[see\]_{s, <s, t>} = \lambda s'. \lambda s: P=see. s' = P(s)
   \[\text{JM}\] = \lambda s: P=see. P(s) = JM

In the next example, the complement of ‘see’ is a SC:

48Kratzer’s definition of Event Identification (1996, p. 122, example (23)):
(i) Event Identification
  f \langle e, <s, t> \rangle \quad g \langle s, t \rangle \rightarrow h \langle e, <s, t> \rangle
  \lambda x, \lambda e \ [ f(x)(e) \ & g(e) ]

EI is a conjunction operation between functions f and g of the types noted, yielding as an output function h, of type \langle e, <s, t> \rangle, mapping individuals to functions from events/ situations to truth values. I assume that presuppositions are retained in the process as well.
Dan saw George run.

In the lexical entry (77) above, ‘see’ is of type <s, <s, t>>, defined for taking situation arguments. In the active-SC construction, the matrix verb ‘see’ combines with a SC, which as shown below is of type <s, t>. Derived to be of type <s, t>, the SC in (79) denotes the set of situations in which George runs (the embedded VP, which is the property ‘run’ of events, is combined with the agentive argument ‘George’ in VoiceP via Event Identification, as discussed above). The SC calculation is given in (80).

(80) SC calculation

\[
\begin{align*}
\llbracket \text{[Voice VP]} \rrbracket &= \text{EI} (\llbracket \lambda x. \lambda s'. \text{Agent} \ (x)(s') \rrbracket, \llbracket \lambda s. \text{run} \ (s) \rrbracket) \quad \text{by EI} \\
&= [\lambda x. \lambda s'. \text{Agent} \ (x)(s') \ & \text{run} \ (s')] \\
\llbracket \text{[SC]} \rrbracket &= [\text{Voice VP}] \ (\text{George}) \quad \text{by FA} \\
&= [\lambda x. \lambda s'. \text{Agent} \ (x)(s') \ & \text{run} \ (s')] (\text{George}) \\
&= \lambda s'. \text{Agent} \ (\text{George})(s') \ & \text{run} \ (s')
\end{align*}
\]

The matrix VP can now be represented syntactically in (81), and calculated in (82).\(^{49}\)

---

\(^{49}\) For reasons of presentation, I will henceforth exclude functional categories such as tense and aspect altogether from the syntactic and semantic representations.
The SC is a property of situations, we therefore need to shift the basic denotation of the verb ‘see’, so that it takes properties of situations rather than individual situations (van Geenhoven 1998, p. 132):

(82) Matrix VP calculation:

\[
\begin{align*}
\llbracket \text{see} \rrbracket_{ss', ss, t} &= \lambda s'. \lambda s: \text{P=see. } s' = \text{P(s)} \\
\llbracket \text{see} \rrbracket_{\text{shift}, ss', ss, t} &= \lambda Q. \lambda s: \text{P=see. } \exists s'[s' = \text{P(s)} & Q(s')] \\
\llbracket \text{see} \rrbracket_{\text{shift}}(\llbracket \text{SC} \rrbracket) &= [\lambda Q. \lambda s: \text{P=see. } \exists s'[s' = \text{P(s)} & Q(s')]](\llbracket \lambda s'. \text{Agent (George)}(s') & \text{run (s')}\rrbracket)
\end{align*}
\]

In prose, the topmost node in (81) denotes the set of situations of seeing a situation in which George runs. The final part of the derivation is the combination of the
NomExp, the ‘seer’, with the matrix verb marked for active voice. I propose that the nominative experiencer of alternating perception verbs is a special kind of attitude holder, which crucially comes with a factive presupposition. This proposal amounts to the introduction of a new type of thematic role, reserved for the notion of perception: the perceiver. The proposed denotation of the perceiver role, which I will call Perc, is given in (83).

\[
\text{Perc} \equiv \lambda x. \lambda s: P(s) \subseteq w_0. \text{Perc}(x)(s)
\]

\(\text{Perc}\) introduces the presupposition that the situation perceived \((s'\) above, the situation that is visually perceived in \(s\)) holds in \(w_0\), the actual world. Together with the VP in (81) and VoiceP marked for active voice, construction active-SC is proposed to be combined as presented in (84), and calculated in (85).

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\[
\text{Dan} \quad \text{VoiceP}_{\text{active}}
\]

\[
\text{Perc} \equiv \lambda x. \lambda s: P(s) \subseteq w_0. \text{Perc}(x)(s)
\]

This proposal departs from Kratzer (2006) and Moulton (2009), who treat the experiencer of perception verbs, as well as of other mental or attitude verbs, as a “holder” (distinguished from an agent).
(85) Active-SC calculation

\[
\begin{align*}
\llbracket \text{Active-SC} \rrbracket &= \\
\llbracket \text{VoiceP}_{\text{Active}} \rrbracket (\llbracket \text{Dan} \rrbracket) &= \\
(\llbracket \text{Perc} \rrbracket)(\llbracket \text{VP} \rrbracket)(\llbracket \text{Dan} \rrbracket) &= \\
\lambda s: \text{P=see} \land \text{P}(s) \subseteq w_0. \text{Perc (Dan)}(s) \\
&\land \exists s'[s' = \text{P}(s) \land \text{Agent(George)(s')} \land \text{run (s')}]
\end{align*}
\]

In prose, (85) denotes the set of situations \( s \) with Dan as a perceiver such that the perceived situation \( P(s) \) – a situation of George running – is in \( w_0 \). The presupposition inheritance requires that the situation seen by the perceiver (Dan) takes place in \( w_0 \).

This is a welcome result with respect to the factivity property of this construction. Factivity is accounted for according to this proposal by the presupposition introduced by \( \text{Perc} \), requiring that the perceived situation be seen by the seer in the actual world, \( w_0 \).

I will now discuss the other three constructions, active-CP, middle-CP and middle-SC, and introduce the notion of Applicative head in order to account for their properties. I will not attempt to specify a compositional semantics that delivers the truth conditions of these constructions, but informally describe the analysis proposed for them.
4.2 Active-voice perception verb with a CP complement (Active-CP)

I will treat CPs (consisting of a finite clause and complementizer) as a unit denoting propositions, or sets of worlds.\(^{51}\) The basic lexical entry for ‘see’ given in (77) takes only situations as its arguments. In the active-CP construction, ‘see’ takes a propositional CP as its complement. In order for the basic, non-type shifted, lexical entry of ‘see’ (77) to combine with this CP compositionally, some adjustment is required. In addition, an intensional component should be incorporated into the semantics of this construction to account for its epistemic non-neutrality. I propose that this component is an epistemic modal added together with an argument by the applicative head in (87).\(^{52}\) Applicatives are means by which a language can add an argument to the argument structure of a given verb (Pylkkänen 2008, 11). I assume that the epistemic applicative (\textit{Appl}) adjoins at the VP level, takes ‘see’ as its argument, and returns a predicate that can take a propositional argument which can be apprehended by a belief holder. The syntactic structure of the VP is given in (86).

\(^{51}\) As already stated in section 2, I will only address the ordinary complementizer \(\text{še} \) ‘that’, and leave the possible additional semantic properties of the ‘like’ complementizers for future research.

\(^{52}\) In terms of Pylkkänen (2008), the added argument could be considered part of a ‘high applicative’ (collapsing different kinds of applicatives, such as Appl\textsubscript{Inf}, Appl\textsubscript{Ins} and Appl\textsubscript{Loc}). According to Pylkkänen, high applicatives - benefactives, malefactives, instruments, and so forth - are assumed to relate new event participants to the event described by the verb; they attach right above the VP (p. 13-14, 74). Low applicatives, on the other hand, relate individuals to the direct object of a verb and state that the direct object is either from the possession of this additional individual, or intended to enter the possession of this new individual. The position proposed here for the applicative departs from the position for the dative argument suggested by Landau 2010 (p. 8, example (12b)), above \(v\) combined with its complement. I leave empirical support for the proper position of the added argument in the case of perception verbs to further research.
This specific applicative head applies to ‘see’ and derives a predicate that takes a propositional complement, rather than a situation. In addition, \textit{Appl} adds an argument, the “belief holder”. The proposed lexical entry for \textit{Appl} is given in (87).

\begin{equation}
\text{[Appl]}_{\langle s,s,d,\quad \langle s,s,>se,\quad s,s,>\rangle} = \lambda P. \lambda p. \lambda x. \lambda s: P = \text{see.}
\end{equation}

\[ \forall w \in \text{MB}_{\text{abduction}(x,P(s))} [w \in p] \]

Where abduction modal bases are epistemic and involve specifically reasoning by abduction: \textit{abduction}(x, s’) = the set of worlds compatible with what \textit{x} abducts from \textit{s’}.

Thus, \textit{Appl} is proposed here to introduce a special kind of a thematic role - a percept-based kind of an experiencer. The current proposal attributes the epistemic modality to \textit{Appl} rather than to the embedded clause (contrasting with proposals to locate this meaning specifically in the embedded complementizer; Kratzer 2006, Moulton 2009).

\textit{Appl} in (87) is a function that takes ‘see’ as its argument, and returns a function that takes a proposition and an individual argument, the belief holder, returning a proposition. It introduces modal meaning to the perception construction. The meaning
is one of reasoning from perceptual evidence: all worlds compatible with the relevant sensory evidence, in which the proposition \( p \) is inferred, are worlds in which \( p \) is true. In (87), the worlds compatible with the relevant sensory evidence are introduced by the modal base (MB), which following Kratzer (1981, 1991, 2012) is a function defining the (here: epistemically) accessible worlds. I assume, then, that the belief holder is an argument of the applicative phrase, and since the MB is restricted to those worlds “compatible with percepts”, what (87) basically says is that the belief holder comes into believing the content of the propositional complement based on the percepts, visual percepts when the verb is ‘see’. This type of percepts-based-belief is a type of reasoning that is defined in (87) as “abduction”.

The term “abduction” as used by Peirce (1934: 94-131), refers to reasoning from data to the “best fit” explanation of the data (see Krawczyk 2012, p. 199-207). Citing Krawczyk, “Reasoning can be commonly categorized into three basic types: (logical) deduction, induction, and abduction. The latter two reflect defeasible reasoning, a non-logical deduction, a type of an observation-based reasoning to a conclusion that goes beyond the logical premises reasoning may render inference invalid”. An example of defeasible reasoning, given by Krawczyk (2012, p. 199) is a case in which “I have reasoned that it has rained based on a sensory evidence, that the street is wet. When I turn the corner, I see that a street sweeper has been spraying water as it drives down the streets. In this case, my conclusion that it rained has defeated my inference that it rained due to the fact that I now also know there is another cause for the wet street.”53

53 In her dissertation, Krawczyk (2012) discusses this type of inference in Yupik and in English, expressed by what she defines as “inferential evidentials”. In Yupik, this type of reasoning is claimed to be expressed lexically by the \( illini \) particle, and in English by the adverbials \( apparently \) and \( evidently \).
In Hebrew, the active-CP construction of perception verbs does not have the characteristics of induction or deduction. This can be shown by adapting the tests Krawczyk (2012) proposes for inductive and deductive reasoning ((88) and (90)) respectively, her examples (261a)-(261b):

(88) Inductive reasoning, from general premises and particular conclusions:

General premise:  
כל אבני המברקת שנצפו עד-ה כה ויירוקות  
_kol_ _abney_ _ha-bareqet_ _še-nicpu_  
all stones.GEN the-emerald that-watched

א柊 קיי יירווקט  
_ad-ko_ _hayu_ _yeruqot_  
so-far were green

‘All observed emeralds have been green.’

Conclusion:  
לכל, א柊 המברקת המאה שנלכאת חיה ויירוקה  
_laken, eben_ _ha-bareqet_ _ha-ba'a_ _še-timace_  
Hence, stone the-emerald the-next that-found

טייה יירוqua  
_will.be green

‘Therefore, the next emerald to be observed will be green.’

In a context where the belief of the perceiver is based on inductive reasoning as given in (88), the following sentence in Hebrew is infelicitous.

(89) # הוא ראה שאבן המברקת הבאה תהיה ירוקה  
_hu_ _ra'a_ _še-eben_ _ha-bareqet_ _ha-ba'a_ _tihiye_ _yeruqa_  

#hu ra'a še-eben ha-bareqet ha-ba'a tihye yeroqa
He saw that the next emerald stone will be green.

(90) Deductive reasoning, from particular premises and general conclusions:

Particular premises:

New-York is from-east to-Mississippi

delaware is from-east to-Mississippi

Conclusion:

Thus, every thing that is either New-York or Delaware is east of the Mississippi.

In a context where the belief of the perceiver is based on deductive reasoning as given in (90), the following sentence in Hebrew is infelicitous.
He saw that New York or Delaware are east of the Mississippi.

After eliminating inductive and deductive reasoning as the basis of belief formation in the active-CP construction, we hypothesize that it expresses abductive reasoning.

The final part required to obtain the active-CP construction is the combination of the VP with the NomExp. As already stated for the active-SC construction, the external argument is assumed here to combine with the verb via VoiceP and Event Identification. As in the derivation of active-SC, the NomExp is proposed to be introduced by a Perc role, introducing the presupposition of actualization. The structure of active-CP construction for sentence (92) is given in (93).

Dan saw that George ran.

DanVP[see CP[that George ran]].

DanVP[ra'a CP[še-ʒorʒ ‡ rac]].

DanVP[see CP[that George ran]].
In prose, the top node in (93) denotes the set of situations \( s \) where Dan perceives a situation \( s' \) in \( w_0 \), and which abducts to Dan the proposition that George ran. Importantly, the sentence also presupposes that George ran in \( w_0 \). A potential problem arises, since both \( \text{VoiceP} \) and \( \text{Appl} \) are proposed to add an argument, the former introduces the argument of \( \text{Perc} \), and the latter the belief holder, but only one argument is realized. I propose to resolve this by adding a compositional rule – Argument Identification. Similar to Event Identification, I assume this rule to apply in \( \text{VoiceP} \), and to identify two argument variables as the same – individual variables in this case. Through Argument Identification in \( \text{VoiceP}_{\text{Active}} \), the argument that satisfies the belief holder variable is the one introduced by \( \text{Perc} \).\(^{54}\) Composed together, the

\(^{54}\) Another caveat arising is the potential “case-stacking” which is not treated here: It is assumed here that \( \text{VoiceP}_{\text{Active}} \) block the insertion of the \( \text{Appl} \) argument, in addition to the \( \text{Perc} \) argument, avoiding sentences like the following:

(i) דני ראה לדרי סג'ורג' רץ

Danny saw to Danny that George ran.

"Danny saw to Danny that George ran.”
Perc and the Appl can account for the factivity and mental apprehension properties of the ative-CP construction – Perc accounts for the factivity, requiring that the perceived situation will be seen by the seer in the actual world. At the same time, the epistemic MB is introduced by the Appl, and Argument Identification identifies the belief holder, the argument of Appl, as the perceiver.

As stated at the beginning of this section, the account proposed here for constructions active-CP, middle-CP and middle-SC is represented informally, and a detailed calculation of the truth conditions is an issue for further research.

4.3 Middle-voice perception verb with a CP complement (Middle-CP)

This construction is distinguished from the former by the parameter of diathesis. I will assume that the middle voice bears a feature or an index “flagging” that no external argument is about to join, and that this sign in Hebrew is marked overtly by the middle templates among the binyanim (see Doron 2003, 2008 on the semantics of middle templates), as exemplified in (94).

\[
\text{nir’a le-dan cr[še-זורז] rac]}
\]
\[
\text{see.MID to-Dan cr[that-George ran].}
\]

‘It seemed to Dan that George ran.’

Similar to the active-CP construction, in order for the perception verb ‘see’ to take a CP, I propose that the VP incorporates Appl. The Appl takes the matrix verb ‘see’ as

It remains an empirical question whether VoiceP wins lower heads in case of clash. I am deeply thankful to Dr. Todd Snider for pointing out this issue.
its argument, and returns a predicate that takes a propositional complement. The VoiceP middle is assumed to be combined above the VP. According to the proposed denotation, Appl introduces its own argument, the ‘belief holder’. This individual variable needs to be saturated, but the middle VoiceP is assumed to signal that no external argument is about to be added. I propose that the DatExp is combined at the VoiceP level, as a realization of the Appl argument. Therefore, I will treat DatExp as a ‘believer’.\footnote{Marked by an oblique case, the dative experiencers may be conceived as a mental location container or destination of mental states (Landau 2010, p. 10). It is worth mentioning in this regard that in Stát’imcets there is a sensory inferential evidential lákw7a (Matthewson 2011, cited by Krawczyk 2012) which historically was a locative adverb, but synchronically also functions as a non-visual-evidential. A typical example is in (i) (Matthewson 2011, p. 336, example (11)):}

\begin{verbatim}
wa7 lákw7a u7s7-ám
IMPF lákw7a egg-MID
\end{verbatim}

‘It’s laid an egg (by the sound of it).’

The dative in Hebrew, quite similarly, is also used as a locative argument.
Overall, the sentences denote those situations $s$ such that $P(s)$ abduct to Dan the proposition that George ran. The demonstrative $ze$ ‘it’ in highest subject position is assumed to be expletive, satisfying the EPP. In Hebrew, the expletive subject can also be null. Given the representation in (95), the middle-CP construction is understood as an epistemic attitude ascription, similar to ‘believe’ or ‘think’, with the unique component of a sensory-evidence-based MB. This is also a welcome result, with respect to factivity and mental apprehension. No $Perc$ is incorporated into the structure, hence factivity is not expected to arise, and mental apprehension is achieved through $Appl$. 
4.4 Middle-voice perception verb with a SC complement (Middle-SC)

The middle-SC construction is similar to the middle-CP construction with respect to VoiceP and Appl, but differs from it with respect to the category of the embedded clause. As stated earlier in (87), Appl takes a propositional complement. It is assumed here that the SC embedded under middle voice verbs denotes propositions, i.e. sets of worlds, and not situations. Crucially, only propositional SC complements, and not situational SCs as in active-SC, are allowed with DatExp. The propositional interpretation of SC is what determines the differences in the characteristics of the SC predicate in middle-SC vs. active-SC. Treating SC in this construction as propositional, Appl takes ‘see’ as its argument, adding the ‘belief holder’ argument and returning a predicate that takes a propositional complement, SC in this case. The DatExp adjoined at VoiceP fulfills the role of argument of Appl.

Syntactically speaking, the middle-SC construction is a raising construction. The verb in the middle voice cannot give the embedded subject accusative case. The subject of the embedded clause moves to the highest subject position, and is assigned nominative case. I assume that subject raising here is purely syntactic, with no semantic implications. The syntactic representation for sentence (96) is shown in (97).

(96) לארה נראת לדרי טני (96)

ג'ורג' נראה לדן עייף

George1 see.MID to-Dan SC[t1 tired].

‘George seemed tired to Dan.’
With the propositional SC together with Appl, which is assumed to insert a sensory-based epistemic MB, the meaning obtained is of Dan “abducting” the tiredness of George, based on a sensory evidence. Differently from the SC in the active-SC construction, no situation of George being tired is necessarily sensed. The “tiredness” in the propositional SC is obtained here as a property of George, perceived epistemically. Along the same lines as middle-CP, the non-factivity is explained here by the absence of Perc, and the mental apprehension is accounted for by the Appl.

4.5 Accounting for the central semantic properties

After laying out the general ingredients of a semantic and syntactic account of alternating perception verbs, I now return to the semantic properties of factivity, mental apprehension and restrictions on embedded predicates. The LIN and
imaginative reading properties will be discussed in section 5. Table 3, summarizing the contrasts, is repeated here.

Table 3: Summary of the active/ middle voice and CP/ SC contrasts

<table>
<thead>
<tr>
<th>Category</th>
<th>Active Voice</th>
<th>Middle Voice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contrast</td>
<td>Active Voice</td>
<td>Middle Voice</td>
</tr>
<tr>
<td>1. Factivity</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>2. LIN</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>3. Restrictions on embedded predicates</td>
<td>✓</td>
<td>non-ILPs</td>
</tr>
<tr>
<td>4. (i) Belief formation</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>(ii) Indirect perception</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>5. Imaginative reading</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

4.5.1. Factivity

The active-SC and active-CP constructions are factive, while the middle-CP and middle-SC constructions are not factive. In the current analysis, factivity comes from the Perc argument, which is the nominative experiencer. Perc introduces a presupposition of actualization, as repeated in (98):

\[
\left[\text{Perc}\right]_{<s, t>} = \lambda x. \lambda s: P(s) \subseteq w_0: \text{see. Perc } (x)(s)
\]

The perceived situation is presupposed to occur in \(w_0\). The middle-CP and middle-SC have no Perc, hence factivity is not expected to arise. Consider examples (42) and (46), repeated here as (99).
Ronen saw/heard/felt/smelled that Danny is drunk, but in fact Danny didn't drink alcohol at all.'

It seemed/sounded/felt/smelled to Danny that Danit is drunk, but in fact she didn't drink alcohol at all.'
Danit see.MID/ hear.MID/ feel/ smell to-Danny drunk,

ak lema'ase hi klal lo šateta alkohol

but in.fact she at.all NEG drank alcohol

‘Danit seemed/ sounded/ felt/ smelled to Danny drunk, but in fact she didn't

drink alcohol at all.’

The active constructions (99a)-(99b) are factive, and the middle constructions (99c)-(99d) are non-factive. According to the proposed account, factivity arises from the NomExp, Ronen, bearing the thematic role of perceiver (99a)-(99b). In the middle constructions, Perc is assumed not to be introduced by VoiceP. The DatExp Danny bears only the thematic role of “belief holder” (as an argument of Appl) and no factivity is derived.

4.5.2. Mental apprehension (belief formation) and indirect perception

Belief formation in active-CP, middle-CP and middle-SC constructions is due within the current proposal to Appl, which inserts a meaning of inference, namely abduction. In the case of the active-SC, no epistemic component is involved and no belief formation is assumed to arise. In all other three constructions, Appl turns the perception verb into a proposition embedding predicate. “Indirectness” is the result of the intervening Appl between the perception verb and the complement, and the epistemic modal flavor it bears.

However, indirect perception is marginally felicitous in the active-CP construction, while it is required in the middle verb constructions. Recall example (69), repeated here as (100).
(100) a. הוה ראה יורד גשם

\( hu \quad ra'a \quad še-yared \quad gešem \)

he see that-descended rain

‘He saw that it was raining.’

b. נראה לו שירד גשם

\( #nir'a \quad l-o \quad še-yarad \quad gešem \)

see.MID to-him that-descended rain

‘It seemed to him that it was raining.’

Sentence (100a) is felicitous in a context where a person looks directly at the rain through a window. Sentence (100b) is infelicitous in such context. I suggest that the active-CP construction (100a) is tolerable to direct perception due to the \( Perc \) argument, which presupposes a perception situation in the actual world. However, the middle-CP (100b), not having a \( Perc \), does not tolerate direct sensation.

4.5.3. *Embedded predicates*

The SC constructions show a nearly complementary distribution of embedded predicates in the SC – active-SC is restricted to non-ILPs, while what middle-SC allows is restricted to non-verbal predicates. The SC in the active construction is proposed to be situational SC, a set of situations, as opposed to the propositional SC in the middle construction, a set of worlds. In active-SC, the perception verb is assumed to take a set of situations as its complement. Thus, active-SC is restricted to a type of predicates that can occur situationally, typically SLP and eventive verbs. In middle-SC, the SC is propositional, and the perceiver is a belief holder, introduced by \( Appl \). If the predicate is verbal, it requires the specification of tense and mood in order
to derive a proposition. Accordingly, verbal predicates are not found in SCs which are interpreted as propositions. As discussed by Kratzer (1995) and Mittwoch (2005), SLPs, such as ‘tired’, can be ambiguous between temporal and property predicates, depending on context. Accordingly, those predicates can function either as situational or propositional, and can be embedded in both situational SC and propositional SC. The CP constructions reveal no restriction regarding the embedded predicate in the CP.
5. Discussion

This work has analyzed the alternating perception verbs **לראות** לְרָאוֹת ‘to-see’, **לשמוע** לְשָמֹעַ ‘to-hear’, **להרגיש** לְהֶרְגִּיס ‘to-feel’ and **להריח** לְהַרְיָח ‘to-smell’ in Modern Hebrew, revealing unified syntactic alternations and an array of semantic contrasts. The current discussion counters the common objection of speakers, who object to the use of ‘feel’ as when stating an opinion or an assertion in conversation,\(^{56}\) instead of ‘think’, for example. The account proposed here for alternating perception verbs provides support for the special need of speakers to use ‘feel’, which has been shown here to be a perception verb, and also includes a special epistemic flavor, i.e. sensory based.

The current proposal introduces a new thematic role - **Perc**, reserved for the notion of perception, and a special type of applicative head – the “abductive” **Appl.** This proposal might seem stipulative. It can, however, be supported. For one thing, there is a long-standing philosophical treatment of senses as having a special epistemic status, as the primary way to acquire knowledge about the world (Crane & Craig 2017, a.o.). In addition, the lexical encoding of evidential systems in languages cross-linguistically may indicate their special cognitive status (Aikhenvald 2004). However, the current proposal has only considered the alternating perception verbs of Modern Hebrew. It is hoped that it could be extended to sensation and perception verb systems in other languages.

The current proposal does not provide an account for the properties of LIN and imaginative reading. As was described, the LIN property lines up with the factivity

\(^{56}\) See, for example, the discussion in: [https://www.nytimes.com/2016/05/01/opinion/sunday/stop-saying-i-feel-like.html](https://www.nytimes.com/2016/05/01/opinion/sunday/stop-saying-i-feel-like.html), and in [https://www.haaretz.co.il/magazine/theword/premium-1.2533521](https://www.haaretz.co.il/magazine/theword/premium-1.2533521)
property. I suggest that these two properties may stem from the same component – the presupposition introduced by Perc. Among the class of attitude verbs, the LIN effect is known to be very strong with ‘believe’, and mostly not available with factive attitude verbs. It is proposed here that the middle construction incorporates an epistemic MB, and no Perc. I believe that the explanation proposed in the literature for LIN with ‘believe’, such as by Hegarty (2016, chapter 7), could be extended to the effect at hand. The imaginative meaning arises only with active-SC. According to the current account, all other three constructions incorporate Appl, which restricts the MB to a sensory-based-epistemic belief. I suggest that this “evidential” flavor is incompatible with an imaginative meaning. See Cohen (2015) for an account of the imaginative construction in Modern Hebrew. Thus, both LIN and the imaginative reading are properties left to be explored in future work.

Another open issue that arises from the current work is the case of ‘taste’ with respect to the alternating perception verbs in Hebrew. Matushansky (2002) shows that the verb taste is available in English in middle voice with a SC complement, and considers it as one of the perception verbs seem, look, sound, smell, feel. In a typological study, Viberg (2008) shows that Swedish, English, German, French and Finnish differ with respect to lexicalization of a verbal form with a nominative experiencer. English is found as the most lexicalizing, having verbs for ‘see’, ‘hear’, ‘feel’, ‘smell’ and ‘taste’ with a nominative experiencer, while French, for example, has only a single verbal form for ‘feel’, ‘smell’ and ‘taste’ with a nominative experiencer (sentir, but a special form tâter for ‘touch’ with a nominative agent). A typological perspective on lexicalization may suggest the following sensory

57 For example:
(i) The wine tastes sour (to me). (Matushansky 2002, p. 228, example (23b))
hierarchy: sight → hearing → touch → smell → taste. The sensory hierarchy may be realized linguistically, as different languages cut the lexicalization in different points on the scale. From a typological view, the divergence of ‘taste’ from the alternating perception verbs in Hebrew seems unexceptional. Moreover, the typology may suggest additional support for the special linguistic status of a perceiver, distinguished from other types of experiences, such as physical or emotional.

The current work leaves many open questions. One major issue that was pointed out in the introduction is the place of voice alternation within the evidentiality typology presented by Aikhenvald (2004). The alternating perception verbs in Hebrew call for a broader (typological and other) investigation, to shed light on the relation between diathesis alternations and evidentiality phenomena. This kind of research may provide a possible extension, support, or challenge for the account proposed here.

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58 This is an extended version of the hierarchy that appears in Viberg (2008, p. 126, table 4):

(ii) Sight → Hearing → touch
    taste
    smell
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“...seemingly different semantics of verbs of perception is a corollary of their transitivity [voice] patterns... It would be a worthwhile task to provide a cross-linguistic investigation of transitivity of verbs of perception...”.

(Aikhenvald and Storch 2013, p. 20)
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