Current Patterns of Variation in Modern Hebrew Spirantization

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I. Introduction

Modern Hebrew spirantization

- o [p], [b], and [k] alternate with [f], [v], and [χ] (fricatives occur in post-vocalic position).
- o There are exceptional segments (both stops and fricatives) that don't alternate.
- o Previous literature reports variation in spirantization:
  - ▪ Schwarzwald (1981) cites variation as a discrepancy between formal rules of language and children's pronunciation.
  - ▪ Adam (2002) claims that the variation in alternating segments is due to the presence of exceptional segments and suggests that alternating segments are heading toward non-alternation.

Experimental rating task

- o Seventy-four native speakers of Modern Hebrew rated acceptability of the pronunciation of target words in sentences presented auditorily.
- o Overall, variation is acceptable in both alternating and exceptional segments.
  - ▪ Variation is more acceptable in alternating segments.
  - ▪ Higher rates of acceptability in post-consonantal position than in other positions.
  - ▪ Overall trend doesn't show strong preference toward stops or fricatives.

Outline of the talk

- o Overview of Modern Hebrew Spirantization
  - ▪ Alternation
  - ▪ Exceptionality
  - ▪ Variation
- o Results of Rating Experiment
  - ▪ Overall Patterns
- o Trends in preferences within verbal paradigms
- o Theoretical implications

II. Overview of Modern Hebrew Spirantization

Regular alternation

- ▪ Spirantization traces back to older forms of Hebrew.
- ▪ Spirantization in Modern Hebrew verbal paradigms is loosely characterized by the alternation of [p], [b], and [k] with their fricative counterparts [f], [v], and [χ], respectively. Fricatives occur in post-vocalic position and stops occur elsewhere.

(1) Spirantization distribution in Modern Hebrew

	Root[1]	Infinitive	3rd Person Sg. Past.m.	Gloss
[p] ~ [f]	/**p**gʃ/	[lifgoʃ]	[**p**agaʃ]	'to meet'
[b] ~ [v]	/**b**gd/	[livgod]	[**b**agad]	'to betray'
[k] ~ [χ]	/**k**tb/	[liχtov]	[**k**atav]	'to write'

Exceptionality

- ▪ Exceptions to spirantization are non-alternating [p], [b], [k], [f], [v], and [χ], which may surface as stops in post-vocalic position or as fricatives elsewhere.
  - o Historically, these were sounds that did not participate in spirantization (emphatic stops, geminates).

(2) Exceptions to spirantization in Modern Hebrew (underlined)

	Root	Infinitive	3rd Person Sg. Past.m.	Gloss
/**k**/ (< q)	/**k**rʔ/	[li**k**ro] (*liχro)	[**k**ara]	'to read'
/**v**/ (< w)	/**v**tr/	[le**v**ater]	[**v**iter] (***b**iter)	'to give up'

Variation

- ▪ Variation has been reported in Modern Hebrew spirantization (Schwarzwald 1981, Adam 2002) and consists of segments that normally conform to the spirantization distribution surfacing as stops where fricatives are expected or as fricatives where stops are predicted.

(3) Variation in Modern Hebrew spirantization

Expected	Acceptable Variant	Gloss
jik**b**or	jik**v**or	'will bury'
je**χ**ase	je**k**ase	'will cover'

- ▪ Adam (2002) claims that this variation is driven by non-alternation and exceptionality.
  - o Variation in alternating forms is seen as a *"conflict [which] entails a competition between two grammars: one which allows alternation and one which blocks it."*
  - o Variable Grammar with direction towards non-alternation as final state of grammar.

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[1] No claim is being made here as to whether the UR of spirantized segments is a stop or fricative.

III. Rating Experiment

Designed to examine acceptability of variation in alternating *and* exceptional segments.

Hypotheses

    1. Alternating Segments
      a. Variation is acceptable
      b. Not free variation: variation is biased to expected form
      c. Positional effects
    2. Exceptional Segments
      a. If any variation, then less than variation in alternating segments
      b. Positional effects

Stimuli

- A total of 42 roots were used in the experiment (24 with alternating segments, 12 with exceptional segments, 6 containing two target segments).

- Each root was conjugated (two conjugations per root) and recorded in the expected and variant form for each conjugation, resulting in 204 target words. Each participant rated 102 tokens.

(4) Expected and variant forms in the spirantization distribution

Pair	Root	3rd Person Sg. Past.m		Infinitive		Gloss
		Expected	**Variant**	**Expected**	**Variant**	
[p] ~ [f]	/**p**rs/	[**p**aras]	[**f**aras]	[li**f**ros]	[li**p**ros]	'to spread'
[b] ~ [v]	/**b**nh/	[**b**ana]	[**v**ana]	[li**v**not]	[li**b**not]	'to build'
[k] ~ [χ]	/**k**tb/	[**k**atav]	[**χ**atav]	[li**X**tov]	[li**χ**tov]	'to write'

- Target words were inserted into carrier sentences. Following each of the verbs was a semantically plausible four-syllable sentence ending (e.g. the verb 'to wash' could be followed by 'in the bathroom').

(5) Sample carrier sentences for target words

    Past
    [amru   li   ʃedaniel   <u>(target verb)</u>   le/be/me/et ha _____]
    told   to me that Daniel <u>(target verb)</u>   to/in/from/the _____
    "I've been told that Daniel <u>(target verb)</u> to/in/from/the _____"
    e.g. "I've been told that Daniel <u>built</u> the <u>hut</u>."

    Infinitive
    [amru li   ʃedan   holeχ   <u>(target verb)</u> le/be/me/et ha_____]
    told   to me that Dan   is going   <u>(target verb)</u>   to/in/from _____
    "I've been told that Dan will <u>(target verb)</u> to/in/from _____"
   *e.g. "I've been told that Dan is going <u>to build</u> the <u>hut</u>."*

Results

- Participants' responses to the rating task were converted into numbers (from 1 to 4)[2]
  - Very natural pronunciation = 4
  - Unnatural pronunciation = 1

1. Alternating segments

- Both *position* and *allophone* contributed to the acceptability of variation in alternating segments.
  - Main effect of *position* ($F(2, 72) = 36.963$, $p < .001$)
  - Main effect of *allophone* ($F(1, 73) = 890.882$, $p < .001$)
  - Interaction between *position* and *allophone* ($F(2, 72) = 89.036$, $p < .001$)

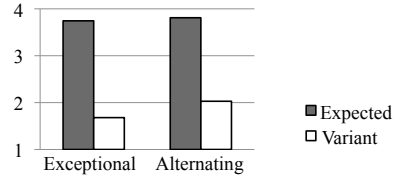(6) Acceptability of variation in alternating segments
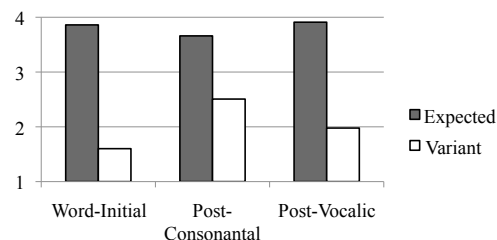
  - Main effect of the segment preceding the alternating segment within a given token ($F(1, 36) = 32.869$, $p < .001$)
  - Interaction of *consonant type* and *allophone* ($F(1, 36) = 38.346$, $p < .001$)
    - Driven by the higher rating of acceptability of the variant form (a fricative) when following a stop.

2. Exceptional segments

- Variation is acceptable in exceptional segments.
  - Significant difference between the acceptability of variants of exceptional segments vs. baseline ($t(73) = 10.718$, $p < .001$)

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[2] I used z-scores to control for individual variation in use of the four-point scale. However, the graphs are based on raw scores (1-4) for ease of visualization. The use of z-scores also conveniently helped take care of order effects within lists.

(7) Difference between acceptability of exceptional vs. alternating segments

- o Variation in exceptional segments was rated less natural than variation in alternating segments.
  - ▪ Main effect of *type* ($F(1, 73) = 80.073$, $p < .001$)

- ▪ Interaction between *type* and *allophone* ($F(1, 73) = 18.707$, $p < .001$)
- ▪ Both *position* and *allophone* contributed to the acceptability of variation in exceptional segments.
  - o Main effect of *position* ($F(2, 72) = 40.481$, $p < .001$)
  - o Main effect of *allophone* ($F(1, 73) = 767.518$, $p < .001$)
  - o Interaction between the *position* and *allophone* ($F(2, 72) = 57.094$, $p <.001$)
    - ▪ Tokens with the target segment in post-consonantal *position* drove the main effect of *position* and the interaction of *position* and *allophone*.

(8) Acceptability of variation in exceptional segments
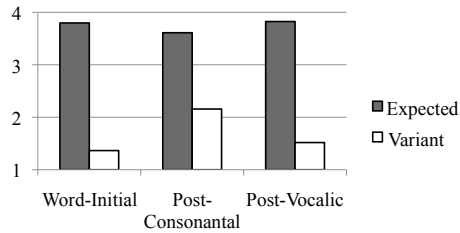
Remaining questions

- ▪ What does variation look like within verbal paradigms?
  - o Are there preferences for segment type within roots?
  - o What does this tell us about the underlying representation for alternating roots?

- ▪ What does the higher rate of acceptability of variation in post-consonantal position tell us about the preference for fricatives?
- ▪
- ▪ In exceptional segments, is the variation pointing to a move to make exceptional segments behave like alternating segments?

IV. Trends within verbal paradigms with alternating segments

To determine patterns of acceptability within individuals' ratings and within verbal paradigms, the four-point scale was divided in two (3 or 4 = acceptable, 1 or 2 = unacceptable).

Possible patterns

- ▪ Tokens were randomized and therefore rated independently from others stemming from the same root.
  - o There were 16 possible patterns of acceptability for each verbal paradigm.
    - ▪ None of the tokens are acceptable
    - ▪ Only 1 token is acceptable (4 possibilities)
    - ▪ Only 2 tokens are acceptable (6 possibilities)
    - ▪ Only 3 tokens are acceptable (4 possibilities)
    - ▪ All 4 tokens are acceptable

(9) Possible patterns for each verbal paradigm

	none	1 acceptable				2 acceptable						3 acceptable				all
Expected (fricative conjugation)	u	a	u	u	u	a	a	a	u	u	u	a	a	a	u	a
Stop variant	u	u	a	u	u	a	u	u	a	a	u	a	a	u	a	a
Expected (stop conjugation)	u	u	u	a	u	u	a	u	a	u	a	a	u	a	a	a
Fricative variant	u	u	u	u	a	u	u	a	u	a	a	u	a	a	a	a

Patterns Observed

- ▪ Preliminary analysis looks at 25 participants' ratings of 12 verbal paradigms.
- ▪ Most common pattern – only the two expected forms are acceptable.
- ▪ When three forms are acceptable, there is no preference for stops over fricatives.
  - o 45 instances of preference for both expected forms and the variant containing stop.
  - o 47 instances of preference for both expected forms and the variant containing fricative.
- ▪ There were 30 instances of acceptability of all tokens within a verbal paradigm.

(10)   Observed patterns across participants and verbal paradigms (alternating segments)

	none	1 acceptable				2 acceptable						3 acceptable				all
Expected (fricative conjugation)	u	a	u	u	u	a	a	a	u	u	u	a	a	a	u	a
Stop variant	u	u	a	u	u	a	u	u	a	a	u	a	a	u	a	a
Expected (stop conjugation)	u	u	u	a	u	u	a	u	a	u	a	a	u	a	a	a
Fricative variant	u	u	u	u	a	u	u	a	u	a	a	u	a	a	a	a
Observed	0	4	0	2	0	0	159	7	3	0	0	45	2	47	1	30

- ▪ Overall, there is no preference for stops or fricatives.
  - o In verbal paradigms with three acceptable tokens, what determines whether a stop or fricative is preferred?

Stops or Fricatives?

- Is the preference for stops or fricatives predictable?
    o What is it dependent upon?

(11)   Sample roots for stop/fricative preferences

Preference for stops		Preference for fricatives	
Root	Uninflected	Root	Uninflected
/**p**gʃ/	**p**agaʃ	/m**k**r/	ma**χ**ar
/**b**nh/	**b**ana	/ʃp**χ**/	ʃa**f**aχ
/**k**tv/	**k**atav	/s**p**r/	sa**f**ar

- Is the preference dependent on root position?
- Is the preference dependent on uninflected form (3rd person singular past masculine)?
    o If so, could this preference predict variation in exceptional segments as well?

V. Trends within verbal paradigms with exceptional segments

Observed patterns

- Preliminary analysis looks at 25 participants' ratings of 8 verbal paradigms.
- Looking at acceptable variants to see whether there is a preference for root position
    o Used spirantization distribution (SD, from (1)) to determine this

(12)   Observed patterns across participants and verbal paradigms (exceptional segments)

	none	1 acceptable			2 acceptable						3 acceptable				all
Expected (conforms with SD)	u	a	u	u	a	**a**	a	u	u	u	**a**	a	**a**	u	a
Variant - doesn't conform with SD	u	u	a	u	a	**u**	u	a	a	u	**a**	a	**u**	a	a
Expected (doesn't conform with SD)	u	u	u	a	u	**a**	u	a	u	a	**a**	u	**a**	a	a
Variant – conforms with SD	u	u	u	u	a	**u**	a	u	a	a	**u**	a	**a**	a	a
Observed	0	2	0	0	0	**142**	2	0	0	0	**15**	0	**10**	0	4

- When three forms are acceptable, there is no preference for whether the segment type conforms with spirantization distribution for alternating segments.
    o 10 instances of preference for both expected forms and the variant that conforms with the spirantization distribution.
    o 15 instances of preference for both expected forms and the variant that does not conform with the spirantization distribution.

(13)   Sample roots for preferences in exceptional segments

Preference conforms with SD		Preference does not conform with SD	
/**f**dχ/	**p**ideaχ	/**f**ʃl/	mepa**ʃ**el
/**t**vh/	lit**b**ot	/d**k**r/	lid**χ**or

- Acceptability of variants in exceptional does not depend on root position.
- It does not appear that the variation in exceptional segment is due to a move toward toward conforming with the spirantization distribution.

V. Further Directions

- Theoretical implications
    o What is the variation dependent on? Can we determine directionality?
- Production experiments in Hebrew with pre-literate children.
- Diachronic data – examine directionality of variation.
- Corpus study (CoSIH) to determine occurrences of variation in natural speech.

VI. Selected References

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