



Challenge 1: Morphological generation

Your task is to design and implement a system for generating the inflected forms of Hebrew adjectives. Given a base form, the system should output four inflected forms: the masculine singular, feminine singular, masculine plural and feminine plural.

Here are some examples of the possible inputs and expected outputs of the system:

Fem Plural	Masc Plural	Fem Sing	Masc Sing	Base Form
אחרות	אחרים	אחרת	אחר	אחר
גבוהות	גבוהים	גבוהה	גבוה	גבוה
גדולות	גדולים	גדולה	גדול	גדול
חגיגיות	חגיגיים	חגיגית	חגיגי	חגיגי
ידידותיות	ידידותיים	ידידותית	ידידותי	ידידותי
יפות	יפים	יפה	יפה	יפה
מאושרות	מאושרים	מאושרת	מאושר	מאושר
מרוצות	מרוצים	מרוצה	מרוצה	מרוצה
צהובות	צהובים	צהובה	צהוב	צהוב
קרחות	קרחים	קרחת	קרח	קרח
שלוות	שלוים	שלוה	שלו	שלו
שלמות	שלמים	שלמה	שלם	שלם

1. Look at more data. Try to find as many examples as are needed to obtain a full picture of the morphological and orthographic processes which govern the formation of the inflected forms.
2. Formulate the rules for Hebrew adjective generation.
3. Design a lexicon. What lexical information must be stored for each base form?
4. Implement the lexicon. Think of extensions and modularity: the lexicon must interact with the generation program, but for ease of maintenance and conceptual simplicity, is best kept separated from the rules. Which data structure is best for this application?
5. Implement the rules. Think of extensions and modularity. You may be asked to extend the system such that more inflected forms are accounted for (for example, the construct state forms, as in *שיעור*, *שיעורי*, *שיעורית* etc.)
6. Test the system on all the examples above, as well as other examples you collected in (1). Make sure that the output is satisfactory. Design a thorough testing plan.
7. Suppose now that we are interested in *analysis* rather than generation. How reversible is your system? What would it take to adapt it the new task? How declarative are your rules? How important is it to keep the linguistic knowledge separated from the processing software?