Japanese Counter Allomorph

(a) Linguistic phenomenon:

Japanese people use number-counter combinations when talking about the amount of objects. And the pronunciation of both the number and the counter changes when it comes to the certain number.

Rules that I discovered:

1.The last syllable of two-syllable number(S1) and the first syllable of counter(S2) are both aspirated => S1 is replaced by [ʔ]; consonant of S2 becomes [p]

いちほん [i,ti,ho,n] → いっぽん [i,ʔ,po,n];

ろくほん [ro,ku,ho,n] → ろっぽん [ro,ʔ,po,n].

2.For number 10[ʥu,u], the syllable after S1 is replaced by [ʔ];the consonant of S2 becomes [p]

じゅうほん[ʥu,u,ho,n]→じゅっぽん[ʥu,ʔ,po,n]

3.For number 3[sa,n], the consonant of S2 becomes voiced:

さんほん[sa,n,ho,n]→さんぼん[sa,n,bo,n]

Comprehensive list:

| The general form: | ほんho,n  Long and thin object | はい ha,i  Cups of drinks | ひき hi,ki  Small animals |
| --- | --- | --- | --- |
| 1 i,tɕi | i,ʔ,po,n | i,ʔ,pa,i | i,ʔ,pi,ki |
| 2 ni | ni,ho,n | ni,ha,i | ni,hi,ki |
| 3 sa,n | sa,n,bo,n | sa,n,ba,i | sa,n,bi,ki |
| 4 yo,n | yo,n,ho,n | yo,n,ha,i | yo,n,hi,ki |
| 5 go | go,ho,n | go,ha,i | go,hi,ki |
| 6 ro,ku | ro,ʔ,po,n | ro,ʔ,pa,i | ro,ʔ,pi,ki |
| 7 na,na | na,na,ho,n | na,na,ha,i | na,na,hi,ki |
| 8 ha,tɕi | ha,ʔ,po,n | ha,ʔ,pa,i | ha,ʔ,pi,ki |
| 9 kʲu,u | kʲu,u,ho,n | kʲu,u,ha,i | kʲu,u,hi,ki |
| 10 ʥu,u | ʥu,ʔ,po,n | ʥu,ʔ,pa,i | ʥu,ʔ,pi,ki |

(b) Impetus :

I always make mistakes when using number-counter phrases when I speak Japanese so I want to figure out the rules on how the pronunciation of counters changes according to different numbers.

(c) Relation to course material:

This phenomenon is similar to the English plural example. In some cases, the pronunciation change is phonologically conditioned, like rule 1. In other cases, it’s lexically conditioned, like rule 2 and 3.

(d) Query:

japanese/1:

japanese(A). %to get all valid japanese including numbers and number-counter phrases, excluding counters with no numbers.

japanese([list\_of\_syllables]). %to check if the list is valid japanese.

Examples:

?- japanese([[n, i], [h, i], [k, i]] ).

true .

?- japanese([[i], [ʔ], [h, i], [k, i]] ).

false.

japanese/3:

japanese(DesiredPhrase,digit,counter\_general\_form).%to get the correct phrase for a particular combination.

Example:

?- japanese(A,3,hiki).

A = [[s, a], [ɴ], [b, i], [k, i]] .

underjpn/2:

underjpn([Syllable\_list],[Type,value]). %to get number lexicons

?- underjpn(A,[number,\_]).

A = [[i], [ʨ, i]] ;

A = [[n, i]] ;

A = [[s, a], [ɴ]] ;

A = [[j, o̞], [ɴ]] ;

…

underjpn([Syllable\_list],[Type,basic\_form]).% to get counter lexicons (allomorphs)

?- underjpn(A,[counter,hon]).

A = [[h, o̞], [ɴ]] ;

A = [[p, o̞], [ɴ]] ;

A = [[b, o̞], [ɴ]] ;

(e) Challenges:

It took a long time to build the Japanese phones and syllables from scratch so I omitted some consonants and their related syllables that are not present in this model. Some IPA symbols with affixes like o̞ and kʲ need atom\_concat/3 in their definition to be printed out properly.

And I had a difficult time figuring out the logic of the default case of number-counter pairing for japanese/1. I either got invalid pairing or no result at all. I tried to find the complement set of the rules (japanese1-3) defined earlier and finally succeeded.

(f) Principles and frameworks.

Since the Japanese writing is based on syllables, I formatted the data in units of syllables instead of units of phone. Properties like being aspirated and homorganicity were defined at syllable level.

underjpn(A,[counter,basic\_form]) is under specified to contain allomorphs of the counter.

The surface form of Japanese only contains numbers and valid number-counter combinations.