

## Preliminary MaxEnt analysis

- The simple variable ranking approach assumed in the poster incorrectly predicts that the Reciprocalized Applicative ([[[Rt]A]R]) should attest a doubling output.
- This same problem arises in MaxEnt if we assume a 50/50 frequency distribution for both variable patterns: MaxEnt does not do a good job matching the probabilities. This is shown in Figure 1.

**Figure 1:** 50/50 frequency distribution in MaxEnt

[[[Rt]Rec]Caus]	Freq	Pred	[[[Rt]Rec]Appl]	Freq	Pred
CARP	.50	.33	CARP	.50	.69
Cyclic	.50	.53	Cyclic	.00	.00
Doubling	.00	.13	Doubling	.50	.28

- Various possible *uneven* frequency distributions yield a much better match between input frequencies and the frequencies predicted by MaxEnt. One such distribution is given in Figure 2 (full analysis in Figure 3 on the following page).

**Figure 2:** One possible frequency distribution

[[[Rt]Rec]Caus]	Freq	Pred	[[[Rt]Rec]Appl]	Freq	Pred
CARP	.60	.54	CARP	.80	.89
Cyclic	.40	.40	Cyclic	.00	.00
Doubling	.00	.05	Doubling	.20	.09

- I am not aware of any reports regarding the actual relative frequency of the respective variants within each of the two patterns.
- Therefore, we may be able to derive a *testable prediction* from the MaxEnt analysis about what (ranges of) frequencies we should observe in the actual data.
- Namely, we predict that the real attested frequencies should be the set of input frequencies that provide the best match to the MaxEnt predicted frequencies.

## References

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**Figure 3:** Full MaxEnt analysis for input frequencies in Figure 2

Input	Candidate	Harmony	exp(-H)	Predicted	Observed	APPL-REC	INTEG-IO	CAUS-REC	CONTIG-BD
Rt R]A] (B: [Rt-R])						50.00	4.05	2.04	1.74
	Rt-AR	1.74	0.17	<b>0.89</b>	<b>0.80</b>				*
	Rt-ARA	5.79	0.00	0.02	0.00		*		*
	Rt-RA	50.00	0.00	0.00	0.00	*			
	Rt-RAR	4.05	0.02	<b>0.09</b>	<b>0.20</b>		*		
Rt A]R] (B: [Rt-A])						50.00	4.05	2.04	1.74
	Rt-AR	0.00	1.00	<b>0.98</b>	<b>1.00</b>				
	Rt-ARA	4.05	0.02	0.02	0.00		*		
	Rt-RA	51.74	0.00	0.00	0.00	*			*
	Rt-RAR	5.79	0.00	0.00	0.00		*		*
Rt R]C] (B: [Rt-R])						50.00	4.05	2.04	1.74
	Rt-CR	1.74	0.17	<b>0.54</b>	<b>0.60</b>				*
	Rt-CRC	5.79	0.00	0.01	0.00		*		*
	Rt-RC	2.04	0.13	<b>0.40</b>	<b>0.40</b>			*	
	Rt-RCR	4.05	0.02	0.05	0.00		*		
Rt C]R] (B: [Rt-C])						50.00	4.05	2.04	1.74
	Rt-CR	0.00	1.00	<b>0.96</b>	<b>1.00</b>				
	Rt-CRC	4.05	0.02	0.02	0.00		*		
	Rt-RC	3.78	0.02	0.02	0.00			*	*
	Rt-RCR	5.79	0.00	0.00	0.00		*		*

Probability of data = **-1.37396710992879**