Approches linguistiques comparatives
du grec moderne 2
INaLCO, Paris
September 13–14, 2024

Predictable aspects of lexical stress in nouns

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This presentation is part of ongoing research within the project

***GRADIENCE**: Modeling the limits of grammar: Integrating lexical frequency in a Gradient Harmonic model of lexical stress; Evidence from young and adult Greek speakers' grammars*

The research project with the title “Gradience" is being implemented within the framework H.F.R.I call “Basic research Financing (Horizontal support of all Sciences)” under the National Recovery and Resilience Plan “Greece 2.0” funded by the European Union – NextGenerationEU (H.F.R.I. Project ID: 15053, AUTh RC ID: 76809)

H.F.R.I.
Hellenic Foundation for Research & Innovation

Greece 2.0
NATIONAL RECOVERY AND RESILIENCE PLAN

Funded by the European Union
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Introduction

Greek

- Standard view: stress assignment is **not predictable**
- The only restriction: **trisyllabic window**

(1)

a.	**U**:	a.na.ˈ**nas**	'pineapple-SG.NOM'
b.	**PU**:	ka.ˈ**no**.nas	'rule-SG.NOM'
c.	**APU**:	ˈ**pi**.na.kas	'writing board-SG.NOM'

(see, among others, Malikouti-Drachman & Drachman 1989; Ralli & Touratzidis 1991; Drachman & Malikouti-Drachman 1999; Revithiadou 1999, 2007; Apoussidou 2003; Burzio & Tantalou 2007; van Oostendorp 2012)

Introduction

Russian

- Russian stress assignment is also **not predictable**
- No window restriction

(2) a. **U**: ko.le.ˈ**so** ‘wheel-SG.NOM’

b. **PU**: bo.ˈ**lo**.to ‘swamp-SG.NOM’

c. **APU**: ˈ**pra**.vi.lo ‘rule-SG.NOM’

(see, among others, Halle 1973, 1997; Kiparsky & Halle 1977; Melvold 1990; Idsardi 1992; Alderete 1999, 2001a, b; Revithiadou 1999)

Introduction

- **Main question**: Are there predictable aspects in Greek and Russian nominal accentuation? Are all permissible stress patterns equally likely to occur?
- **Experimental evidence**: Speakers exhibit stress biases when asked to pronounce pseudo-nouns
- **Aim of the paper**: To offer a theoretical account of the experimental findings
- **Theoretical framework**: *Gradient Symbolic Representations / Gradient Harmonic Grammar* (Smolensky & Goldrick 2016)

Roadmap

1. The Greek nominal system
2. Distribution of stress patterns: Evidence from experiments and the Lexicon
3. Our analysis
4. Extension of analysis to Russian nouns
5. Conclusions

1. Greek nominal system

- Mostly **fusional**
- Grammatical features:
  - **gender** (masculine/feminine/neuter)
  - **number** (singular/plural)
  - **case** (nominative/accusative/genitive/vocative)
- Various inflectional paradigms – **inflection classes** (Ralli 2000; Alexiadou & Müller 2008; Anastassiadis-Symeonidis 2012; cf. Markopoulos 2018)
- In most cases, inflection class is indicated by a **theme vowel/element** (see Thomadaki 1994; Revithiadou & Spyropoulos 2016; Markopoulos 2018)

1. Greek nominal system

- Feminine – neuter nouns

(3) a. paˈre-**a**-Ø
company-**TH**-SG.NOM/ACC
‘company (FEM)’

b. ˈvutir-**o**-Ø
butter-**TH**-SG.NOM/ACC
‘butter (NEUT)’

- Masculine nouns

(4) a. ˈðaskal-**o**-s
teacher-**TH**-SG.NOM
‘teacher (MASC)’

1. Greek nominal system

- Revithiadou & Spyropoulos (2016):
  - Root exponents are accentless

    evidence: compounds, e.g. *maçe**r**-o-'p**i**run-o* 'knife-and-fork'; cf. the relevant categorized nouns *ma'çe**r**-i* 'knife' and *pi'run-i* 'fork'
  - Exponents of F-morphemes (ThV/Es, DerSs, InflSs) are accent-bearing

⇒ all root exponents are assigned metrical representations once combined with exponents of grammatical morphemes (Revithiadou & Spyropoulos 2016)

1. Greek nominal system

- GRADIENCE project: Focus on the distribution of stress patterns within/across 7 inflection classes

– *-os*	(MASC)	e.g.	ˈðaskalos	‘teacher’
– *-is*	(MASC)		plaˈnitis	‘planet’
– *-a*	(FEM)		paˈrea	‘company’
– *-i (-η)*	(FEM)		ˈzaxari	‘sugar’
– *-o*	(NEUT)		ˈvutiro	‘butter’
– *-i (-ι)*	(NEUT)		piˈruni	‘table’
– *-ma*	(NEUT)		ˈprovlima	‘problem’

1. Greek nominal system

- Today's talk: Focus on 3 inflection classes
  - -*os* (MASC) e.g. ˈanθropos 'human'
  - -*is* (MASC) plaˈnitis 'planet'
  - -*a* (FEM) kaˈrekla 'chair'
  - -*i* (-*η*) (FEM) ˈzaxari 'sugar'
  - -*o* (NEUT) ˈprosopo 'face'
  - -*i* (-*ι*) (NEUT) traˈpezi 'table'
  - -*ma* (NEUT) ˈmaθima 'lesson'

2. Experimental evidence

- Apostolouda (2018)
  - 2 tasks: **production/perception**
  - 2 age groups: **children** (7-8 y.o.) / **adults** (18-23 y.o.)
  - **pseudo-nouns** (pseudo-stems + actual suffixes), e.g.:

(5) *Production task*

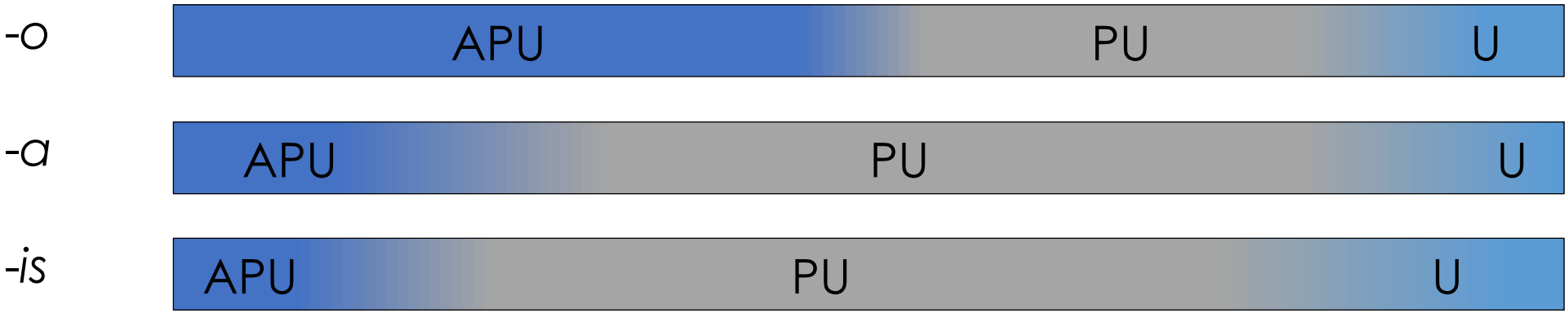
ΛΕΡΙΧΟ (/lerixo/)

Possible realizations

i. ˈlerixo
ii. leˈrixo
iii. leriˈxo

2. Experimental evidence

- Adult speakers: Overall results



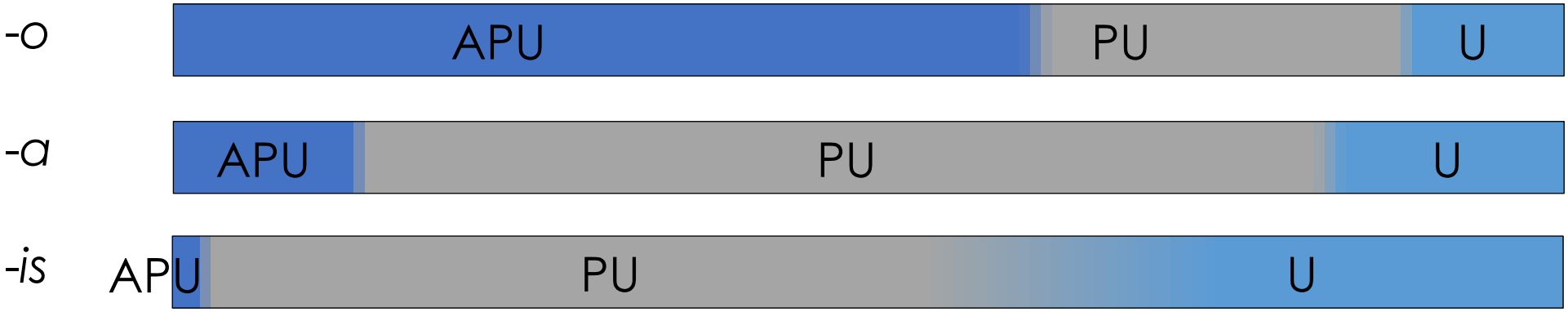
2. Experimental evidence

- Adult speakers: Overall results
  - preference for **APU** or **PU** stress is determined by the particular suffix at hand (***-o*** → **APU**; ***-a***, ***-is*** → **PU**)
  - **U** stress seems to be the **most marked option**

- Further evidence: Revithiadou & Lengeris (2016) – perception task
  - preference for **APU** stress is stronger in pseudo-nouns with ***-o*** compared to pseudo-nouns with ***-a***
  - **U** has been found again to be the **most marked option**

2. Experimental evidence

- Interestingly, the experimental findings mirror the distribution of stress patterns in **written corpora***:



**A-Clean*, based on Protopapas et al. (2012), and the *Reverse Dictionary* (Anastassiadis–Symeonidis 2002); see Apostolouda (2018)

2. Experimental evidence

- Preliminary results of ongoing experimental research within the GRADIENCE project seem to confirm that

  a. adults' stress preferences are close to the frequency of each stress pattern in the lexicon

  b. children exhibit a consistent preference for **PU** stress

2. Experimental evidence

- Main conclusions
  - **PU** → **default** stress position for the phonological grammar (as reflected in children's responses)
  - **APU** → the overrepresentation of APU stress in **certain inflection classes** affects adult speakers' grammars
  - **U** → **least preferred** stress position overall (except for ***-is***)
  - **Desideratum** → a formal analysis that models the **probability** for each stress position to emerge

3. Analysis

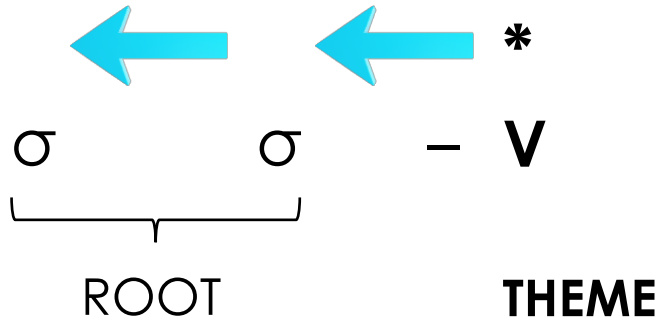
- In a nutshell:
  - Greek theme elements (ThE) are **inherently specified** to require **APU stress**
  - This stress property is **stronger** in some ThEs and **weaker** in others
  - High strength → it can **dominate** over default PU stress
  - Medium strength → APU stress comes **second**
  - Low strength → APU is the **least preferred** option
  - **Desideratum** → a formal analysis that models the **probability** for each stress position to emerge

3. Analysis

3.1. The stress property of ThEs

- ←←*V_{Th}

(6)



3. Analysis

- **Pre-pre-stressing representation**

(6) (* .)

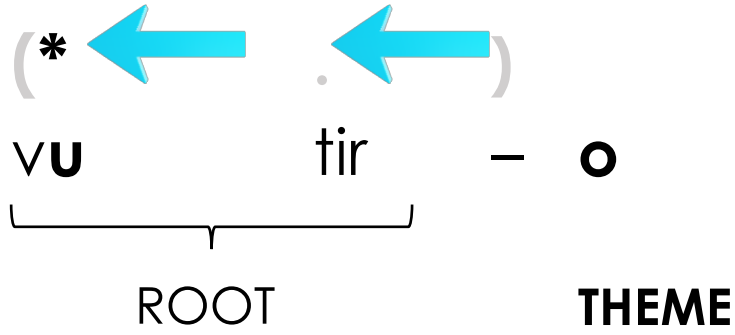
σ σ – **V**

ROOT **THEME**

3. Analysis

- Example: '*vutir*-o 'face'

(7)



3. Analysis

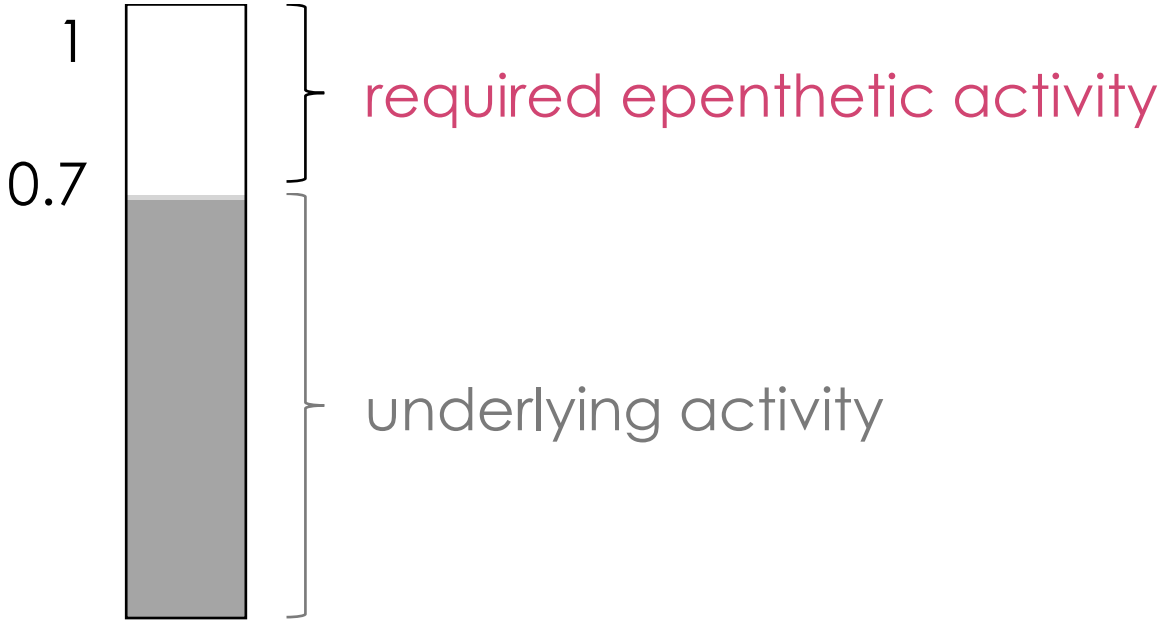
3.2. Gradient Symbolic Representations

- The APU stress property is **not equally strong** in all ThEs
- Formalization of strength differences → ***Gradient Symbolic Representations*** (Smolensky & Goldrick 2016; see also Rosen 2016; Faust & Smolensky 2017; Revithiadou et al. 2019; Zimmermann 2018, 2021, among others)
  - phonological elements bear an inherent ***Activity Level* (AL)**
  - **0 ≤ AL ≤ 1**
  - Required AL value for realization: **1**

3. Analysis

- Weak (low-AL) elements require **epenthetic activity**
- E.g. /*$^{0.7}$/

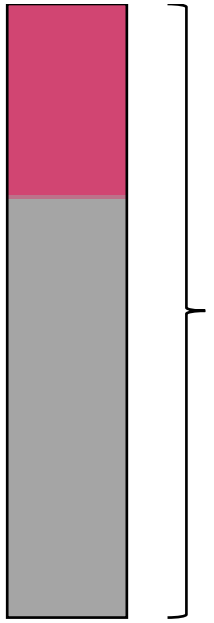
(8)



3. Analysis

- /*0.7/ → [*0.7**+0.3**]

(9) 1

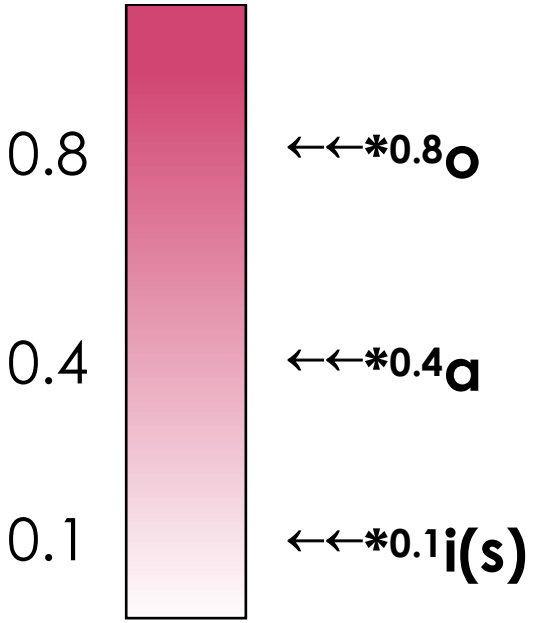


underlying + epenthetic activity

3. Analysis

- APU stress properties of ThEs:

(10)



3. Analysis

3.3. Gradient Harmonic Grammar

- Activity epenthesis → violation of DEP

  DEP: Pronounce **only** what's in the input!

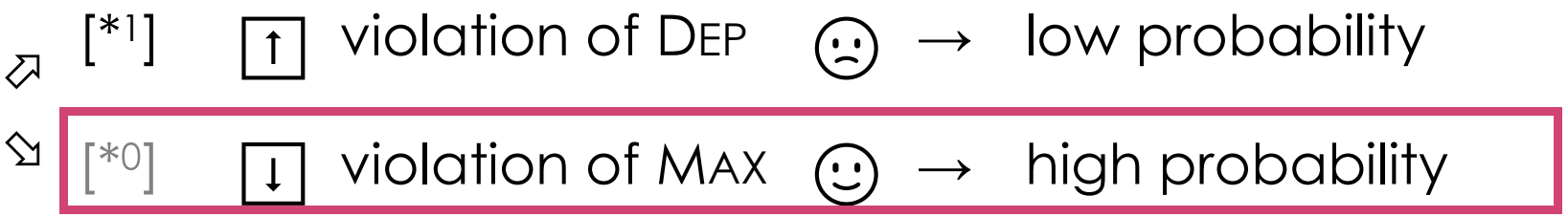
- Non-realization of underlying activity → violation of MAX

  MAX: Pronounce **everything** that's in the input!

3. Analysis

(11) /*0.8/

(12) /*0.2/



3. Analysis

- ←←*0.8**o**
  - little amount of epenthetic activity
  - **APU stress** is the **most probable** choice

(13)	/lerif-←←*0.8**o**/	DEP 2	MAX 3	TROCHEE 2	ALIGN-R 3	H
1	ˈ**le**rifo ☺	–0.4			–3	**–3.4**
2	leˈ**ri**fo 😕	–2	–2.4			**–4.4**
3	leriˈ**fo** ☹	–2	–2.4	–2		**–6.4**

3. Analysis

- **←←*0.4a**
  - large amount of epenthetic activity
  - default **PU stress** is the **most probable** outcome (**APU** follows)

(14)	/lerif-←←*0.4a/	DEP 2	MAX 3	TROCHEE 2	ALIGN-R 3	H
2	ˈlerifa 😟	–1.2			–3	**–4.2**
1	leˈrifa 🙂	–2	–1.2			**–3.2**
3	leriˈfa ☹	–2	–1.2	–2		**–5.2**

3. Analysis

- **←←*0.1i(s)**
  - **APU stress** is too "costly" and becomes the **least probable** choice

(15)	/lerif-←←*0.1**is**/	DEP *2*	MAX *3*	TROCHEE *2*	ALIGN-R *3*	H
3	'lerifis ☹	–1.8			–3	**–4.8**
1	le'rifis ☺	–2	–0.3			**–2.3**
2	leri'fis 😟	–2	–0.3	–2		**–4.3**

4. Extension of the analysis to Russian nouns

Experimental research in search of the **phonological default**:

- **PU stress in V-ending nouns** and **U stress in C-ending nouns** (Nikolaeva 1971; Crosswhite et al. 2003; Fainleib 2008; Lavitskaya & Kabak 2014; Lavitskaya 2015)

(16) a. CV.'**CV**.CV

b. CV.CV.'**CVC**

4. Extension of the analysis to Russian nouns

- Lavitskaya & Kabak (2014) and Lavitskaya (2015): **PU stress** reveals presence of a **trochee** constructed at the right edge of the word

(17)

	(*	.)
CV.	**CV**.	CV

- For C-ending nouns an **empty/ghost vocalic slot** is assumed

(18)

	(*	.)
CV.	**CV**.	C(V)

4. Extension of the analysis to Russian nouns

Can we attribute the above findings to the frequency of existing stress patterns in the lexicon?

Problem 1: Both existing and non-existing suffixes were used

Data with non-existing suffixes showed higher percentages of U stress (Fainleib 2008: 24)

Problem 2: We don't have data on the preferred stress pattern per inflection/class

4. Extension of the analysis to Russian nouns

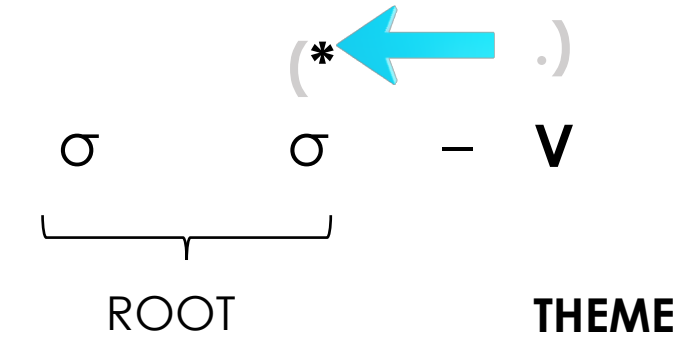
- More importantly, the experimental results do not seem to be fully aligned with the corpus data
  - In most Russian nouns, stress is fixed on some vowel of the **stem** (92% in Zaliznjak's 1977 corpus, as reported by Lavitskaya & Kabak 2014: 381–382)
  - BUT there is **no predominance of stem-final stress** in the lexicon that could explain the speakers' preferences (Crosswhite et al. 2003, based on Tornow 1984, argue that **fixed stem-final stress occurs only in 30%** of the 1360 most common Russian nouns)

4. Extension of the analysis to Russian nouns

Proposal

- Structure of Russian nominal stems: root + **theme element (vowel)** (Halle 1994; Bachrach & Nevins 2008; Halle & Nevins 2009)
- Theme vowels (ThV) have a **pre-stressing accent**, i.e. they are inherently specified to require **PU stress**

(15)



4. Extension of the analysis to Russian nouns

- Theme vowels (ThV) may be **strong** or **weak**; in the latter case, they do not surface in certain environments

  – Strong ThV (V_1): the vowel is realized – stress falls on **PU**

(16)

4. Extension of the analysis to Russian nouns

– Weak ThV ($V_{0.1}$): the vowel is not realized – stress falls on **U**

(17)

5. Conclusions

Predictable stress patterns:

The analysis shows that there are predictable aspects of nominal accentuation in both Greek and Russian, with **certain stress patterns being more likely than others**

5. Conclusions

Greek nominal stress:

⇒ Greek theme elements (ThEs) have **inherent stress properties** that differ in strength

⇒ The **higher** the **Activity Level value** of the stress property, the **higher** the **probability of APU stress**

5. Conclusions

Russian nominal stress:

⇒ **Preference for PU stress**

⇒ Russian is a more **'unmarked'** stress system compared to Greek

5. Conclusions

Theoretical implications:

⇒ The study highlights the role of **lexical frequency** and **morphological structure** in modeling the distribution of stress patterns

⇒ Gradient Symbolic Representations and Gradient Harmonic Grammar provide a formal framework to capture the **probabilistic nature** of stress assignment

⇒ Future research should further investigate the variability in the **strength of Theme elements** and their role in stress, especially with respect to Russian nouns

Acknowledgements

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Thank you for your attention!

(ongoing project → feedback is welcome ☺)