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journal: Proceedings of Fonetik, TMH-QPSR
volume: 44
number: 1
year: 2002
pages: 137-139

http://www.speech.kth.se/qpsr
From articulatory phonetics to the fail-safe rule system of natural language

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Abstract
A turn-over from descriptive theory to one of applied practice was found to open a gapfree way to a fail-safe rule system, fast-acting, deeply underlying. Empirically safe elementa were used, joined in close fit by rational explanation. These rules were isolated from a mass of parameters (the relevant characteristics of man and natural language). After upgrading a number of obsolete and/or misleading terms, this rule system was found to be fast, universal, in principle holographic (If not, why so fast?).

Introduction
This is a condensation of a long-time project backed up by more than forty years of foreign-language study and teaching. They have shown that phonetic linguistics is closer to practice and reasonable explanation than are its distant relatives, linguistic theories, all descriptive, all "too abstract to be explained".

Still, or perhaps for those very reasons, none of those has been able to reach the golden land of fail-safe rules. Nor is it very rational to concentrate on the product but exclude the producing machinery. Natural language is not likely to be well understood without a broad cross-scientific study. For full control, elementa-based, explanatory, gap-free articulatory phonetics, directly connected with practice, was found to be the ideal center.

We begin from some elementary facts:
1. Man owns and operates a biocomputer-governed speech generator.
2. The task of natural language is to transmit meaning (pictures and feelings) to one or more listeners.
3. Natural language is rational (if not, penalties).
4. Speech is natural, print and writing are not.
5. Ambiguous, obsolete, or misleading terms and anti-realistic notation should be upgraded to modern standards.

Terms
- **Alternation**: The neural wiring of the human body operates electro-chemically, with pulsed direct current (discharge, charge, etc.). Chemical decay calls for recuperation time. Hence alternation between nerves and nerve groups, hence linguistic contrast.
- **Generative**: To do with generators. Man is the generator of natural language.
- **-ism**: Get out before you are locked in!
- **Parameter**: Governing factor in the architecture or program of a generator. The supradental tongue-tip position for BE tr- in try or dr- in dry is one, yields a jackpot of "rules": No word-initial k or g followed by n, word-final dark l, no r pronounced if immediately followed by a consonant. The General American more retroflex tongue tip makes porridge of the BE laBORat(o)ry: "laBORRery", while GA LABoratory makes a British listener ask: What tory? A Dane, with his retracted tongue body, cannot make himself understood if trying to say "poodle". They say "puddelhund" (poodle-hound).
- **Proto unit**: Alone in an utterance, pronounced slowly and carefully.
- **Prosody**: Intonation (speech melody). stress/-mora.
- **Rule**: A command, member of a fail-safe rule system.
- **Standard**: “Rule”. A speaker first tries the most usual product, then the secondary, third, etc. until OK.
- **Standardization**: A rational device. Sequential or paradigmatic, it saves time and effort.
Stress: An energy pulse from the brain to the syllable. Graded for rational control. As such, runs from 0 to strong. This means a 0 syllable, controlled, communicative.

Syllable: The smallest potentially interpausal communicative unit.

Underlying: About sub-systems: Subconscious. Most deeply underlying is what is first and longest trained: Intonation, the main conveyor of feelings, experienced from more than 2 months before birth via the uterai fluid (Johansson et al. 1992). Consequently, the cry of the newborn infant is completely informative. Loaded with contagious feelings, it is a perfect servo system. Next comes stress (Moon, C.M. and Fifer, W.P. 2000). Strong stress, preceded by a 0.

Zero: 0, a communicative gap, from discourse (complete silence) to sequential distinctive feature in stops. The only speech entity that offers both digital and analog contrast. Due to this fact, it can also be an efficient boundary signal, “open juncture”. A warning: Tree diagrams are OK if we know that each point of ramification is a 0.

Discussion
Some practical explanatory devices:
• Tongue configuration and movement,
• the effects of acceleration from prototype to everyday speech,
• those of training,
• a numerically controlled sub-system,
• the number of triggered neural receptors,
• task analysis,
• tracing subconscious operations from their effects,
• the questions “Why?” and “If not?”

Numerical Calibration of English Stress
English stress, deeply underlying, was calibrated from its tasks, effects and connection (joint neural receptor triggering) with intonation:

Tasks: Make rational use of the neural need for alternation and serve as
• a major contrast system
• a multidimensional unit identifier
• a grader of info importance
• a perception sharpener
• a tempo adapter
• a tone carrier.

One degree is definite: 0. Conventional weak: 0+1=2. Standard main stress (nuclear): x.

Task: Construct the smallest necessary stress scale, from 0 to x.

We begin with the slow and clear prototype:

Monosyllabic: Preceded by a silence, 0:  

Disyllabic:

Sentence x-1 0 x
Phrase x-2 0 x
Compound x 0 x-2
Word x 1
2 x
x 3
3 x

In these slow and clear proto patterns, the contrast-maximizing 0’s can actually be heard down to compound level. Without them, drastic loss of sequential contrast, in the sentence an almost total clash. The 0 is a full member of these patterns, a stress on a 0 syllable.

The two weak degrees 1 and 2 keep alternation going in words like loiterer x 1 2, strikingly x 1 2, and better perception with word-initial weak 2. Their low energy makes them usually carry reduced-vowel syllables, the 3 and higher full-vowel ones.

Obviously, x–2 = 4, x-1=5,  x = 6 QED

S 5 0 6 (11) See King
P 4 0 6 (10) C. King
Cp 6 0 4 (10) Sea king
W 6 1 (5) seeking
2 6 (4) cement
6 3 (3) import N 
3 6 (3) import V  Strong paradigmatic connections (-ant.-er, -ing, etc.).

Sequential (internal) contrast is shown within brackets. High sequential contrast and alternation make for good perception. Paradigmatic contrast is not neglected.

S 5 and 6 are reinforced (more neural receivers engaged) by the most important and agile intonation (F0) curves, conveyors of feelings. The 5 slot takes the initial rise from bass to treble (degree of speaker involvement), while the 6 takes the final F0 curve that governs lilter reaction, from high rise “Act!” to strong fall “Freeze!”

The tendency of stress to favor strong neural alternation and thus contrast indicates a rule that orders best possible sonic perception. The “possible” indicates a blocking rule ensuring safe paradigmatic contrast, the constraints on stress assignment that the same rule blocks
misunderstanding: No 5 except S-prenuclear, no postnuclear 4 in the W-type pattern, nor any 0. No kind of error is allowed, speech production is blocked until the message is a perfect copy of the piece of meaning that the speaker wants to convey. The blocking rule rests at “task done”, speech production is released.

To avoid listener confusion, the disyllabic standards are preserved in the sentence initial and final position, where the two most important and agile intonation curves occur irrespective of sentence length. We get 5 0 4 0 6, 5 0 4 0 4 0 6, etc. and phrase 4 0 4 0 6, etc. Compounds and words are less sensitive to variation with individual feelings. This fact makes for easier rule hunting at that level.

Longer word patterns:

<table>
<thead>
<tr>
<th>Pattern</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 6 1 (9)</td>
<td>13</td>
</tr>
<tr>
<td>4 1 6 1 (13)</td>
<td>15</td>
</tr>
<tr>
<td>2 6 1 3 (12)</td>
<td>15</td>
</tr>
<tr>
<td>4 1 6 1 3 (15)</td>
<td>15</td>
</tr>
<tr>
<td>6 1 3 (7)</td>
<td>11</td>
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<tr>
<td>2 4 1 6 (11)</td>
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<tr>
<td>2 6 1 3 1 (10)</td>
<td>13</td>
</tr>
<tr>
<td>4 1 3 6 1 (12)</td>
<td>15</td>
</tr>
<tr>
<td>6 1 3 1 3 (11)</td>
<td>15</td>
</tr>
</tbody>
</table>

Acceleration

Everyday speech runs faster. Speed takes energy. 0 stresses and 1’s are the first to go. English family names sometimes offer striking examples of tongue twister effects. With the E tongue tip supradentally in the tr-, dr- position, a front stressed CHOLmondeley must end in the sound picture CHUMly, BROUGham becomes Broom (-ham 1-stress as locked below 3 where it becomes a piece of pork) will have to go. Compounds drop their 0, 6 0 4 becomes 6 3.

Conclusion

Children are not born with grammars in their heads, but with neural alternation, feelings and prosody. These three form the governing base of natural language. A fail-safe rule system blocks speech production until correct. This very fact proves its existence. For all-the-way progress, linguistics cannot do without natural phonetics.

References

