

Intuition, intonation, inconsistency, and innateness

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Abstract

Macaulay has performed a great service by pointing out unfounded leaps of logic in the syllable sections of descriptive grammars, but the auxiliary hypotheses that underlie such leaps require close scrutiny everywhere, including in his own argument: intuitions are more reliable than he claims, intonation is less reliable than he assumes, inconsistencies cannot be resolved by simply ignoring certain types of evidence, and innateness considerations qualify all linguistic argumentation.

Keywords: syllables, linguistic intuition, intonation, philosophy of science

1. Introduction

Let us assume, for the sake of argument, that phonology is a natural science. This means that it must face the Duhem-Quine problem (Duhem 1914; Quine 1951; Gillies 1993): no hypothesis can be tested in isolation, since there will always be auxiliary hypotheses intervening between the main hypothesis and the evidence. The paradigm example is Galileo's claimed discovery of moons around Jupiter, believable only if we trust his telescope, and we can only do that if we have a trustable theory of optics, and so on, ad infinitum. The main hypothesis in Macaulay's target article is that syllables in Budai Rukai are always monomoraic, and the most novel auxiliary hypothesis is that intonation provides intrinsically more reliable information about syllables than do native-speaker intuitions. The auxiliary hypothesis is necessary because of the inconsistent implications of intonation and intuitions, respectively for and against the monomoraic hypothesis. Macaulay's proposal here (p. xxx) is "that in the case of such a clash, it is the syllable as defined by the language's phonological rules that is the 'true' syllable, and that language-external factors shape the divergent results of direct elicitation tasks." This auxiliary claim ends up doing most of the work, since if we reject it, we are free to reject his main claim as well.

While the philosophers debate whether the Duhem-Quine problem threatens science as a whole, we putative scientists can still benefit from trying to distinguish main hypotheses from auxiliary ones, and the latter from each other. I start by discussing what we can learn from the auxiliary hypotheses associated with intuitions and intonation in general, and from their apparent inconsistency in this case, and then turn to the main hypothesis of Budai Rukai monomoraicity and the relevance, as I see it, of innateness. In the end I come down in favor of Macaulay's conclusions anyway, but only after demonstrating that none of the above is as straightforward as he seems to imply.

2. Intuitions

Not being a fieldworker myself, I will leave to others the question of how intuitions are actually used in the field, though in my spot checks I found a standard structuralist argument for the status of Atayal glides in Rau (1992: 9), while a series of papers by Huang (2005, 2006, 2008) give some of the analytical background to the Bunun syllable structures listed in Huang and Shih (2016: 16). Even when Macaulay (p. xxx) criticizes Pan (2012) for merely stipulating Saaroa syllable structure, he acknowledges that the proposed structure "feeds into"

analyses of stress and vowel deletion, so stress and vowel deletion are at least consistent with the claimed syllable structure. One may not be satisfied by such arguments, but the arguments are there. Fieldworkers also seem unlikely to rely on linguistic terms like “syllable” when prompting native speakers, as Macaulay says he did with his Budai Rukai consultant (p. xxx); compare, for example, his p. xxx description of Casali (1995) as asking his Moghamo consultant “to parse sequences ... into syllables” with the actual instruction in the original source (p. 164) to divide them “into natural parts.”

Instead what I want to address in this section is the overall reliability of intuitions, starting by noting that the term is a terrible misnomer: they are not mere “hunches” but systematic reactions to stimuli, no different in kind from the raw experimental data that underlie the best-established models of cognitive psychology. This obvious point has been made numerous times (see review in Myers 2017). Nor must linguistic intuitions involve introspection into linguistic structure itself; no self-respecting syntactician would (I hope) argue that a sentence must have such-and-such a structure just because it feels like it does. More subtly, while Casali (1995) did ask his Moghamo consultant to parse words, performing this task seems to require one to consider not abstract parses but alternative surface realizations, perhaps distinguished by the location of a pause, which makes it a standard forced-choice acceptability judgment task. That is, the consultant is being asked which alternative surface form feels more natural in the mouth and/or ear.

We can link such judgments to abstract linguistic structure via a couple of plausible auxiliary hypotheses. The first is that grammar is not an isolated module but simply is what processing does (see e.g. Neeleman and van de Koot 2010; Lewis and Phillips 2015), which means that grammatical forms are easier to process than ungrammatical ones. The second auxiliary hypothesis is that linguistic forms “feel good” when they are easy to process (see e.g. Topolinski and Strack 2009; Gross 2020). Put together, grammatical forms tend to be acceptable. Of course, despite being causally linked, grammaticality and acceptability are famously not identical, so grammarians collecting and analyzing acceptability data still have to be careful to control for confounds and whatnot, just as all experimental psychologists do.

Phonological judgments are indeed somewhat noisy, as Macaulay rightly notes with regard to interference from language contact and education. In Budai Rukai, as perhaps universally, both of these biases are mediated by literacy; not only does Mandarin script consist of syllable-sized units, but in Taiwan, Mandarin textbooks are the medium of instruction for metalinguistic concepts like “syllable.” Even in English, Bailey and Hahn (2001) found that graphotactics had a statistically distinct effect from phonotactics on the acceptability of spoken nonwords. However, orthographic influences also extend to less metalinguistic phonological processing. For example, picture naming times in Mandarin seem to be affected by phoneme-sized units in young children in China, who only know alphabetic Hanyu Pinyin, but by syllable-sized units in older children, who have learned morphosyllabic Chinese script (Li and Wang 2017); in adults even character-internal components seem to influence picture naming (Wang et al. 2022). Laboratory experiments are necessarily artificial, of course; Mitterer and Reinisch (2015) found spelling influences on the perception of spoken German and Maltese with careful speech stimuli but not with casual speech stimuli. Nevertheless, literacy has such pervasive effects on cognition and the brain (Dehaene et al. 2015, Huettig et al. 2018) that its effects may be unavoidable, at least to some degree, in any linguistic, psychological, or neurological study on literate speakers. Since such speakers comprise the vast majority of all humans alive today (Wolhuter and Barbieri 2017), who, by the way, also tend to be multilingual (De Houwer 1995), one has to ask: when do confounds like language contact and education become simple facts of life?

When proper experimental protocols are followed, naive native-speaker judgments generally turn out to match those of professional linguists (e.g., Sprouse 2011 for syntax;

Kawahara 2011 for phonology), thereby converting subjective intuitions into objective data (as in the title of Cowart 1997). Calling the alternative to intuitions “external evidence,” as Macaulay does (p. xxx, fn 3), is thus another misnomer (as well as having almost the opposite import of the “corpus-external evidence” that Kenstowicz and Kisseberth 1979 advocate as supplementing traditional transcription-based data in phonology). Macaulay himself recognizes the systematic nature of prosodic intuitions when he suggests that his fellow native English speakers probably share his judgment that subsyllabic moras cannot be tapped out (p. xxx, fn 6). He even reports evidence that intuitions can reflect what he considers genuine phonology, with his Budai Rukai consultant offering a parse that splits /ai/ into two separate syllables, consistent with the monomoraicity hypothesis (p. xxx); I doubt a monolingual Mandarin speaker would ever do that.

In short, rather than throwing out intuitions entirely because they are somewhat tainted by the realities of language use, what is needed is a better understanding of what drives them, including all those irritating non-phonological realities. This will not only improve our methodological tools but also our theories of language, as we learn what works where and why.

3. Intonation

I have less to say about intonation, knowing less about it, but two issues seem worth unpacking. First, even though Macaulay’s argument seems to require that intonation be phonological, the only auxiliary hypothesis that he actually needs here is that intonation, whatever it is, is sensitive to syllables and not to subsyllabic moras. In the same way, despite his dismissal of phenomena like jaw oscillations and acoustic intensity as mere “phonetic correlates” of phonological syllables (p. xxx), something does not have to be phonology itself to provide evidence for phonological things. The revised version of this auxiliary hypothesis then has exactly the same structure as the one I gave above for intuitions, namely that this concrete thing (the f_0 peak) correlates with that abstract thing (the phonological syllable).

Nevertheless (and this is the second issue to unpack), just as we might trust intuitions more if we better understood how they worked, we also need to know exactly how phonological syllables link to f_0 contours and why moras cannot have such links. After all, intonation also has its fair share of noise. Macaulay himself alludes to peak delay, which can obscure what the intonation peak is actually anchored to. Even Ladd (2008), one of the most influential advocates for the phonological treatment of intonation, admits that “it is genuinely difficult to tell paralinguistic and intonational messages apart” (p. 40), and surely paralanguage is also influenced by language contact and education. Ladd (2008: 176-179) also backs off from his own earlier autosegmental analysis of the alignment of pitch at syllable edges, concluding from further experiments that the data look too phoneticky for categorical phonology to handle. The English H*!H calling contour (Ladd 2008: 118) also suggests to me that intonation-based evidence for syllables is not direct, since with this contour, *MAR-ry!* and *JO-ohn!* are both coerced into disyllabicity. Of course we may posit an intervening prosodic template here, but that would be yet another auxiliary hypothesis requiring independent motivation. I also wonder about the possible role of intrinsic pitch, whereby high vowels tend to have high f_0 , even in connected speech (Ladd and Silverman 1984); if glides, which are also high, can also show this, we might see a subsyllabic f_0 peak even when the intonation peak per se is anchored to the syllable as a whole. Intonation peaks in Budai Rukai do not always fall on high vowels, and even seem to shift in a stress-like way when a final clitic is added (pp. xxx), but since we are also told that “Budai Rukai has unpredictable stress” (p. xxx), we would need to know more about non-stress influences on intonation variation before we can interpret this particular observation.

4. Incompatibility

Macaulay's methodological argument is essentially that intonation has a greater winnowing capacity than intuitions, to use the useful concept from Ohala (1986), where what is winnowed is the proportion of competing hypotheses. Namely, the intonation data seem to be consistent only with the monomoraic hypothesis, whereas his consultant's intuitions are also partly consistent with the tautosyllabic diphthong hypothesis. As I argued above, however, the latter failure is at least partly due to unnecessary limitations in his experimental procedure; as Ohala advises (p. 10), "if the feature of the experiment that is suspected of distorting the data is identified, then a new experiment can be designed that controls for this source of error." The same point weakens the support given by intonation, since we need a better understanding of all the things that affect the f_0 contour besides syllables.

I think a more fruitful way to think about data incompatibilities is that they do not actually exist. By definition all facts are true, and so all must ultimately be incorporated into a single coherent model. Do Cantonese syllables like Ca:t obey a constraint against overly short syllables or a constraint against combining contour tones with obstruent codas (p. xxx)? Both. Does pitch accent in Japanese require mora-like units while a jazz musician language game requires syllable-like units (pp. xxx)? Yes. We just have to figure out how to make it all work. In the same way, in the ultimate theory of phonology, intonation and intuitions must both find a place.

Ironically, perhaps, it is such theoretical rather than empirical considerations that lead me to share Macaulay's intuition that intonation provides relatively reliable evidence about syllabification. Syllables and intonation are both prosodic, both in abstract phonology and in concrete phonetics; together they help generate (among other things) a single complex f_0 contour. In the ultimate theory of phonology, then, the module devoted to syllables and the module devoted to intonation are probably quite close. By contrast, the module for syllables and the module for intuitions about them are probably a bit more separated, because intuitions are merely based on, rather than being part of, the prosodic, articulatory, and/or acoustic form.

5. Innateness

The move I made at the end of the previous section leads into the one I make in this one, namely highlight the role of a priori assumptions (like that of overall theoretical coherence) in dealing with auxiliary hypotheses. If the term has a somewhat Bayesian flavor, this is not coincidental; Bayesian reasoning is commonly applied in philosophical solutions to the Duhem-Quine problem (see e.g. Strevens 2001). I highlight innateness in particular because of all the a priori assumptions in linguistics, it probably ranks near the top; even if not all linguists accept everything that has been written about it, they mostly seem to agree that babies must be cheating somehow or other in order to make language acquisition look so easy.

Innateness is relevant here because after Macaulay acknowledges that Budai Rukai has too many high+nonhigh and nonhigh+high vowel sequences, like /a.i/ and /i.a/, to have arisen by chance given his monomoraic analysis, he suggests that this is only because Budai Rukai preserves the phonotactics of historical diphthongs, like /ai/ and /ia/, before they were reanalyzed as heterosyllabic (p. xxx). Yet babies do not like the onsetless syllables that this historical reanalysis would require (Levelt and Van de Vijver 2004), which is presumably why adult languages generally do not like them either (Blevins 1995). Macaulay might respond that we have absolutely no idea whatsoever what syllable typology is actually like given fieldworker neglect of proper syllable analysis, but my spot checks, not to mention the

corroboration from child language data, suggest that this might be a difficult argument to make. Moreover, he knows what I mean, since in his discussion of the minimal pair tests for phonemes that fieldworkers do not neglect to make, he notes (p. xxx) that such tests are presented even for “cases in which the modern linguist would assume contrast without extraordinary evidence to the contrary.” That is, he knows that linguists depend on a priori assumptions about what a plausible human language looks like. Eventually, then, we need to determine what sorts of language-internal data should count as sufficiently “extraordinary” to override universal defaults like the anti-hiatus bias (perhaps formalized in a fully Bayesian manner).

At the same time, however, innateness considerations also provide an interesting way to back up Macaulay’s intonation-based argument for syllables. While babies do seem to have strong opinions about what makes a good syllable, in the higher levels of the prosodic hierarchy they tend to work their way downward, from utterances and clauses to phrases (Jusczyk and Kemler Nelson 1996). If, for whatever reason, adults start modulating their articulatory implementation of intonation in way that could be misconstrued as favoring a hiatus analysis, babies might be particularly well-equipped to pick up on such cues and override their innate anti-hiatus bias. A linguist arguing for Budai Rukai syllable structure based on intonation evidence in adult speech may therefore be mirroring what previous generations of children might actually have done to give rise to Budai Rukai syllable structure in the first place; elicited adult intuitions, by contrast, presumably never play any role whatsoever in natural language acquisition. Even if children are not literally little linguists, then, linguists may benefit from thinking more like children, since what they learn is the real grammar, not just our attempted reconstruction.

6. In conclusion

As a pseudo-philosophical work, this commentary is probably not something that fieldworkers will find particularly useful to consult when out in the field documenting understudied languages, but I still hope it helps shift perspectives a bit. In real-life science, the main hypotheses that we think we are disagreeing about are far outnumbered by innumerable auxiliary hypotheses, most of which fail to receive nearly as much scrutiny as they deserve. Macaulay has performed a great service by pointing out unfounded leaps of logic in the syllable sections of descriptive grammars, but such leaps are everywhere. Phonologists, and linguists more generally, should spare some time from their theoretical stargazing to seek a deeper understanding of their own telescopes.

References

- Bailey, Todd M. & Ulrike Hahn. 2001. Determinants of wordlikeness: Phonotactics or lexical neighborhoods? *Journal of Memory and Language* 44 (4). 568-591.
- Blevins, Juliette 1995. The syllable in phonological theory. In John Goldsmith (ed.) *Handbook of phonological theory*, 206-244. London: Basil Blackwell.
- Casali, Roderic F. 1995. NCs in Moghamo prenasalized onsets or heterosyllabic clusters. *Studies in African Linguistics* 24 (2). 151-165.
- Cowart, Wayne. 1997. *Experimental syntax: Applying objective methods to sentence judgments*. London: Sage.
- De Houwer, Annick. 1995. Bilingual language acquisition. In Paul Fletcher & Brian MacWhinney (eds.), *The handbook of child language*, 219-250. London: Blackwell.

- Dehaene, Stanislas, Laurent Cohen, José Morais, & Régine Kolinsky. 2015. Illiterate to literate: Behavioural and cerebral changes induced by reading acquisition. *Nature Reviews Neuroscience* 16 (4). 234-244.
- Duhem, Pierre. 1914 [1954]. *La théorie physique: son objet, sa structure*, 2nd edition. Paris: Marcel Rivière. Translated by Philip P. Wiener as *The aim and structure of physical theory*. Princeton, NJ: Princeton University Press.
- Gillies, Donald. 1993. *Philosophy of science in the twentieth century: Four central themes*. Oxford: Blackwell.
- Gross, Steven. 2020. Linguistic intuitions: Error signals and the Voice of Competence. In Schindler, Samuel, Anna Drożdżowicz & Karen Brøcker (eds.) *Linguistic intuitions: Evidence and method*, 13-32. Oxford: Oxford University Press
- Huang, Hui-chuan. 2005. On the status of onglies in Isbukun Bunun. *Concentric: Studies in Linguistics* 31.1: 1-20.
- Huang, Hui-chuan. 2006. Resolving vowel clusters: A comparison of Isbukun Bunun and Sqliq Atayal. *Language and Linguistics* 7.1:1-26.
- Huang, Hui-chuan. 2008. Competition between syllabic and metrical constraints in two Bunun dialects. *Linguistics* 4.1: 1-32.
- Huang, Hui-Chuan & Chao-Kai Shih. 2016. 布農語語法概論 [Outline of Bunun Grammar], volume 6 of 台灣南島語言叢書 [Taiwan Austronesian Language Collection]. Council of Indigenous Peoples 原住民族委員會, New Taipei City, Taiwan.
- Huetting, Falk Régine Kolinsky & Thomas Lachmann. 2018. The culturally co-opted brain: How literacy affects the human mind. *Language, Cognition and Neuroscience* 33 (3). 275-277.
- Jusczyk, Peter W. & Deborah G. Kemler Nelson. 1996. Syntactic units, prosody, and psychological reality during infancy. In James L. Morgan & Katherine Demuth (eds.), *Signal to syntax: Bootstrapping from speech to grammar in early acquisition*, 389-408. Lawrence Erlbaum Associates.
- Kawahara, Shigeto. 2011. Experimental approaches in theoretical phonology. In Marc van Oostendorp, Colin J. Ewen, Elizabeth Hume, & Keren Rice (eds.), *The Blackwell companion to phonology*, 2283-2303. Oxford: Wiley-Blackwell.
- Kentstowicz, Michael & Charles Kisseberth. 1979. *Generative phonology: Description and theory*. San Diego, CA: Academic Press.
- Ladd, D. Robert. 2008. *Intonational phonology*, second edition. Cambridge, UK: Cambridge University Press.
- Ladd, D. Robert & Kim E. A. Silverman. 1984. Vowel intrinsic pitch in connected speech. *Phonetica* 41. 31-40.
- Levelt, Clara C. & Ruben van de Vijver. 2004. Syllable types in cross-linguistic and developmental grammars. In René Kager, Joe Pater, and Wim Zonneveld (eds.) *Constraints in phonological acquisition*, 204-218. Cambridge, UK: Cambridge University Press.
- Lewis, Shevaun & Colin Phillips. 2015. Aligning grammatical theories and language processing models. *Journal of Psycholinguistic Research* 44(1). 27-46.
- Li, Chuchu & Min Wang. 2017. The influence of orthographic experience on the development of phonological preparation in spoken word production. *Memory & Cognition* 45 (6). 956-973.
- Mitterer, Holger & Eva Reinisch. 2015. Letters don't matter: No effect of orthography on the perception of conversational speech. *Journal of Memory and Language* 85. 116-134.
- Myers, James. 2017. Acceptability judgments. In Mark Aronoff (ed.) *Oxford research encyclopedia of linguistics*. Oxford: Oxford University Press.
<https://doi.org/10.1093/acrefore/9780199384655.013.333>

- Neeleman, Ad & Hans van de Koot. 2010. Theoretical validity and psychological reality of the grammatical code. In Martin Everaert, Tom Lentz, Hannah De Mulder, Øystein Nilsen, & Arjen Zondervan (eds.), *The linguistics enterprise: From knowledge of language to knowledge in linguistics*, 183-212. Amsterdam: John Benjamins.
- Ohala, John J. 1986. Consumer's guide to evidence in phonology. *Phonology Yearbook* 3. 3-26.
- Pan, Chia-Jung 2012. *A grammar of Lha'alua, an Austronesian language of Taiwan*. PhD thesis, James Cook University.
- Quine, W. V. 1951. Two dogmas of empiricism. *Philosophical Review* 60. 20-43.
- Rau, Victoria Der-Hwa. 1992. *A grammar of Atayal*. Taipei: Crane Publishing.
- Sprouse, Jon. 2011. A validation of Amazon Mechanical Turk for the collection of acceptability judgments in linguistic theory. *Behavior Research Methods* 43. 155-167.
- Strevens, Michael. 2001. The Bayesian treatment of auxiliary hypotheses. *The British Journal for the Philosophy of Science* 52 (3). 515-537.
- Topolinski, Sascha & Fritz Strack. 2009. The architecture of intuition: Fluency and affect determine intuitive judgments of semantic and visual coherence and judgments of grammaticality in artificial grammar learning. *Journal of Experimental Psychology: General* 138 (1): 39-63.
- Wang, Man, Zeshu Shao, Rinus G. Verdonshot, Yiya Chen & Niels O. Schiller. 2023. Orthography influences spoken word production in blocked cyclic naming. *Psychonomic Bulletin & Review* 30 (1). 383-392.
- Wolhuter, Charl C. & Nicola Barbieri. 2017. Is the ideal of universal adult literacy in the world by the year 2030 statistically attainable? *Rivista internazionale di scienze sociali* 1. 87-102.