6 Tracking stylistic variation over a very long lifespan

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6.1 Introduction

Longitudinal sociolinguistic research has found that many language users can change some aspects of their language after the critical period has passed.[1] These include: variant rates of use, both in cases of community change and community stability (e.g., Raumolin-Brunberg 2005; Sankoff and Blondeau 2007; Wagner 2012); gradient changes to vowel articulation (Harrington et al. 2000) and voice onset time (Hickey 2017); and constraints on variation (Buchstaller et al. 2017; Mechler and Buchstaller 2019). But many lifespan studies have stylistic confounds, including changes of interviewer, changes of interview location, changes of topic, and changes in the relationship between interviewer and interviewee (Rickford and Price 2013; Gregersen et al. 2018; Wagner and Tagliamonte 2018; Rickford 2021; Wagner 2021). Without longitudinal data that is stylistically controlled, it can be difficult to disentangle lifespan change from style-shifting.

This being said, perfectly controlling the interview context at multiple timepoints is difficult. An alternative way to circumvent the problem of stylistic confounds is to intentionally probe as much of a speaker's stylistic range as possible during data collection. Rickford and Price (2013) and Gregersen et al. (2018a, 2018b) all describe longitudinal studies in which early-period data collection targeted multiple styles by varying the topic of conversation, the familiarity of the interviewer, the interview location, and so on. This allowed researchers to capture the speaker's stylistic range, which in turn helped them interpret the data collected at a later timepoint.

In this chapter, I suggest that deliberately eliciting data from multiple styles – at all timepoints of a longitudinal study – has benefits beyond simply helping to control for stylistic confounds. Specifically, it can shed light on how older speakers use socially meaningful variants, something we know little about (Pichler et al. 2018). It can also help us better understand whether and how stylistic range can change over the lifespan. In

DOI: 10.4324/9781003357438-8

other words, I argue that style-shifting over the lifespan is in itself an inherently interesting object of study.

I demonstrate this through a case study of the nature documentary narrator Sir David Attenborough, sampling his speech at 17 points across his 60-year career. Looking at one particular socially-marked variant – tapped /ɹ/ – in two distinct speaking styles, I ask two research questions:

1. Does Attenborough show stylistic differentiation of this variable, as expected given its social profile?
2. If so, does he show this stylistic differentiation consistently over his lifespan?

Using generalized additive mixed models to capture non-linear trajectories in the data, I find that Attenborough remains a stylistically dynamic speaker across the 60-year time period studied, though his stylistic range does diminish after the earliest years of his career have passed. I address three possible reasons for this diminished stylistic range: changes in television broadcasting norms since the 1950s, real-time community change away from [ɾ], and decreased pressure for older speakers to use formal linguistic variants in later life. Though I think the first of these three explanations is unlikely, ultimately adjudicating between the second two interpretations of the findings will require data from additional variables.

6.2 Background

6.2.1 Style-shifting in later life

Few studies have probed style-shifting within the same individual(s) over multiple timepoints, much less in later life. Renn (2011) is perhaps the only longitudinal study to make use of controlled multi-style data at multiple timepoints, but the subjects of this study are followed only until adolescence. Other longitudinal work, despite studying speakers at multiple timepoints, provides data from multiple styles at only one of those timepoints (e.g., Rickford and Price 2013; Gregersen et al. 2018a, 2018b) or analyzes multiple but non-comparable styles across several timepoints (Sankoff and Blondeau 2013). Sankoff and Wagner (2020) come closest to tracking stylistic range across the lifespan by analyzing style-shifting among members of a longitudinal panel, but do not directly interact style and year of recording in their analyses, as would be necessary to determine whether an effect of style emerged or disappeared as panel members aged. This means that we still know little about whether and how a speaker's stylistic range can change over their lifespan.

We can, however, make some predictions. One commonly cited line of thought is that later life brings "a weakening of the pressure to conform to societal norms" (Coulmas 2013: 72). This can be seen in the increased vernacularity often shown by speakers who are post-retirement age when compared to those who are still active in the workforce, whether studied in apparent time (Labov 2001: 102) or in real time (Mechler and Buchstaller 2019). Since those same societal norms presumably also drive style-shifting (Labov 1966/2006: 58–9), this would lead us to expect a decrease in style-shifting among elderly speakers; specifically, their careful speech coming to more closely approximate their casual speech as they increase their use of vernacular variants.[2]

On the other hand, there is evidence that, at least for some variables, speakers become more formal as they age. This has been well demonstrated in the case of the inflected future in Québec French. The inflected future is a variant whose use is "skewed […] toward careful (formal, polite) language" (Sankoff and Wagner 2020: 265) and which speakers of high socio-professional status have been found to use at increased rates as they age (Sankoff 2019, Sankoff and Wagner 2020). In fact, Sankoff and Wagner find that it is only older members of their panel and trend samples who show stylistic differentiation with this variant, and they suggest that deploying this variant "for formal stylistic purposes is a skill that speakers, especially high [socio-professional status] speakers, employ more freely when they have acquired senior status" (Sankoff and Wagner 2020: 266). In other words, the opportunity to style-shift this variable may only arise when speakers enter a certain stage of life, creating the context for high-formality registers that necessitate shifting toward high-formality variants. This would suggest that, for this variant and any others like it, stylistic range increases over the lifespan.

These two sets of predictions contradict each other: on the one hand, we have increased vernacularity accompanying a plausible decrease in stylistic range; on the other hand, we have speakers gaining access to high-formality registers and, hence, increasing their stylistic range. Knowledge of speakers' sociodemographic backgrounds, as well as the social meaning and diachronic trajectory of the variants under study, is essential for teasing apart these two plausible directions of change. In the case of Mechler and Buchstaller (2019), the speakers who became more vernacular were stably working class, and the form they shifted toward was one variant of a stable variable with a clear social meaning of casualness. In the case of Sankoff (2019) and Sankoff and Wagner (2020), the speakers who show stylistic differentiation were of high socio-professional status, and they showed increased use of a variant associated with formality. To appropriately contextualize the present study, the following subsections turn to the speaker and variables studied here.

6.2.2 The speaker and corpus

The speaker studied here is Sir David Attenborough, a White British male narrator of televised nature documentaries whose career spans over 60 years. Attenborough was born in London in 1926, raised in Leicester, where his father was Principal of the University College, and (like his father) educated at Cambridge (Attenborough 2010). Attenborough is a speaker of Received Pronunciation (RP), a high-prestige supralocal variety of British English (Hughes et al. 2012: 3–4).

The data presented in this chapter come from a corpus of 18 documentary series sampled at roughly five-year intervals across Attenborough's career from 1956 to 2015.[3] Every series consists of multiple episodes (ranging from two, for *David Attenborough's First Life*, to 13, for *Life on Earth*, and ranging in length from 30 minutes to an hour); every episode of all 18 series was included in the corpus.[4] Films were accessed through streaming services, including BBC iPlayer, Box of Broadcasts, and Kanopy, or were extracted from DVD. Audio was extracted using Audio Hijack (Rogue Amoeba Software 2015), orthographically transcribed and annotated for style in ELAN (Wittenburg et al. 2006), and phonetically transcribed and time-aligned with the speech signal using FAVE-align (Rosenfelder et al. 2014). In total, the corpus comprises 504,697 words (50.4 hours of speech).

The majority of Attenborough's speech (402,779 words of the corpus) comes from scripted narration, which was recorded in a sound studio and then superimposed on the picture (Attenborough 2010: 23, 309). However, in all series except *The Miracle of Bali* (1969), *Planet Earth* (2006), and *Life* (2009), Attenborough also appears on-screen at some point. His on-screen speech typically takes the form of him "breaking the fourth wall" and speaking directly to the camera, either from a television studio or on location, although in some early films, his on-screen speech is directed to interlocutors instead (animals, animal handlers, or locals he meets on his travels). This on-screen speech can be described as (semi-)extemporaneous: Attenborough suggests in his memoir that in some cases it was scripted (e.g., "I delivered my lines" from the canopy of a rain forest, Attenborough 2010: 304), but in other cases he mentally prepared it in advance of speaking without using a written script (e.g., "I started to think of the words that I might say" and "I did my best to work out a piece in my head," Attenborough 2010: 245–246). No script is ever visible in these on-screen segments, and the rarity of teleprompters in the early years of broadcasting (Attenborough 2010: 86), combined with the inhospitable nature of many of his filming locations (Antarctica, rainforest canopies, and caves), makes it unlikely that he was reading his words from a teleprompter. Accordingly,

Attenborough's on-screen speech provides a useful stylistic contrast to his read narration. On-screen speech constitutes the remaining 101,918 words of the corpus.

This distinction between read narration – henceforth "narration" – and (semi-)extemporaneous, on-screen speech – henceforth "on-screen" – constitutes the stylistic difference probed in this chapter. Though other work on televised language has also made use of a binary stylistic opposition (e.g., Eberhardt and Downs 2015), I recognize that this does not go all the way toward "plumbing [Attenborough's] sociolinguistic competence and performance" (Rickford 2014: 591), and it is not intended to. The advantage of choosing these two registers is that they are controlled across time in a way that is otherwise difficult to achieve in longitudinal work. Attenborough's most vernacular speech is a missing piece of the picture; however, as I show in Section 6.4, a substantial stylistic difference is still evident even with these two televised styles. Moreover, the two styles studied here are actually reminiscent of those elicited in more canonical sociolinguistic interview-based research, where read speech is compared to extemporaneous speech that approaches, but does not reach, a speaker's most vernacular (Labov 1972). As a result, the findings of the present study are relevant to even those researchers who work with more canonical sociolinguistic data.[5]

6.2.3 The dependent variable

The dependent variable in this study is the variable realization of /ɹ/ in Received Pronunciation (RP) as either an approximant ([ɹ]) or a tap ([ɾ]). /ɹ/-tapping in RP occurs intervocalically (or after a vowel and before a syllabic consonant) in both word-internal (as in *very, squirrel, forest*) and linking (hiatus) position (as in *our equipment, anywhere else*). Word-internal /ɹ/ can only surface as [ɾ] before a non-primary stressed syllable; linking /ɹ/ can surface as [ɾ] before a syllable of any stress (Rubach 1996). In this chapter, I focus only on word-internal /ɹ/ and save Attenborough's patterns in linking /ɹ/ for future work.[6]

Since the social meaning and diachronic trajectory of /ɹ/-tapping may shape Attenborough's use of it over his lifespan (Section 6.2.1), I review those factors here. The realization of /ɹ/ as [ɾ] in RP is in decline. Cruttenden (2014: 83) describes the loss of word-internal /ɹ/-tapping as among the "changes almost complete" in Received Pronunciation, i.e., changes "which are now typical of almost all speakers" of that variety. Wells (1997) dates the loss of intervocalic tapped /ɹ/ to the "early twentieth century," and Fabricius (2017: 59), studying /ɹ/-tapping in a corpus of mid-20th century BBC radio broadcasts, finds that "by the time of the 1970s recordings, tapped /ɹ/ was peripheral and largely dispreferred,"

surfacing at a rate of approximately 35% in word-internal position. In the same discussion, she describes the [ɾ] variant as "archaic."

Unsurprisingly given its obsolescing trajectory, tapped /ɹ/ has taken on a particular social profile: specifically, it is heard as old-fashioned, posh,[7] and potentially even pretentious. Cruttenden (2014: 81) and Wells (1982: 282) both identify tapped /ɹ/ as a feature of a particular obsolescing variety of RP, which Cruttenden calls "Conspicuous General British" and Wells calls "Upper-Crust Received Pronunciation" (see Fabricius 2018 for more on RP nomenclature). This variety "is commonly considered to be 'posh', to be associated with upper-class families, with public schools[8] and with professions which have traditionally recruited from such families, e.g., officers in the navy and in some army regiments"; moreover, its speakers are "often regarded as affected and a figure of fun" (Cruttenden 2014: 81). Hughes et al. (2012: 46–47) associate tapped /ɹ/ with

> the speech of the frequently lampooned art critic Brian Sewell, who was once described by the British *Independent* newspaper as 'the poshest man in the world', and by John Humphrys [a BBC television presenter] as 'the only man I have ever met who makes the Queen sound common.'[9]

Fabricius (2006) discusses how older styles of RP speech can carry negative associations of arrogance, elitism, and snobbery, potentially because they hearken back to an earlier era of more overt class differentiation and accent prejudice against non-RP speakers (see also Mugglestone 2003, Chapter 8; Lindsey 2019: 3–4). Examining social media commentary on /ɹ/-tapping, Fabricius finds that, to some listeners, /ɹ/-tapping may "convince and seem authoritative, elegant, or noble," but to others, "it can seem over-played, outdated and over-the-top" (Fabricius 2022: 178).

6.3 Methods

6.3.1 Data extraction and coding

Tokens of /ɹ/ within the envelope of variation for tapping – in both internal and linking positions – were automatically identified in the time-aligned phonetic transcripts using a Praat script (Boersma and Weenink 2017). Each token was coded in a binary fashion as a tap or approximant by either the author or a trained postgraduate research assistant with experience in coding rhotics.[10] Tokens were coded auditorily while consulting the waveform and spectrogram, which helped the analyst identify whether decreased amplitude and absence of vocal fold vibration – suggesting the intermittent

closure that accompanies a tap (Cruttenden 2014: 30) – were present.[11] Tokens that could not be categorized with certainty were omitted.

To check for coding reliability, the author and research assistant coded 30 episodes in parallel. These thirty episodes represented 18% of the corpus. The parallel-coded data came from four early series (*Zoo Quest for a Dragon*, 1956; *The People of Paradise*, 1960; *Zoo Quest to Madagascar*, 1961; *The Miracle of Bali*, 1969) and one later series (*Planet Earth*, 2006). Interrater agreement on these episodes was 85%, equating to a kappa statistic of 0.71.[12] This is just at the 0.7 threshold that Clopper (2011) identifies as "good reliability." However, calculating separate reliability statistics by series revealed that reliability was much better for *Planet Earth* (91% agreement, kappa = 0.82) than for the four early series, where reliability rates ranged from a low of 78% (kappa = 0.56) to a high of 86% (kappa = 0.73). This is likely attributable to the poorer sound quality in the earlier recordings than in the later recordings, making coding decisions difficult. Given this, the author and the research assistant went through all the tokens from the four early series on which they had initially disagreed (n = 271) and reconciled their coding. Tokens for which the two coders could not come to an agreement were discarded.

All told, the final data set – comprising /ɹ/ in both internal **and** linking positions – consisted of 11,760 tokens, of which 12% had been agreed on by both coders, 75% had been coded by the research assistant only, and 13% had been coded by the author only. Narrowing down the data to only word-internal /ɹ/ left 7,704 tokens. The distribution of these word-internal tokens by series air date and style is provided in Figure 6.1.

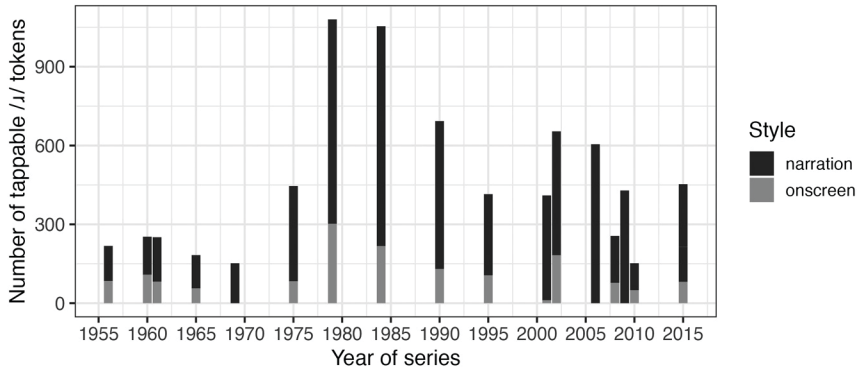

Figure 6.1 Number of word-internal /ɹ/ tokens within the envelope of variation for /ɹ/-tapping, over time and by style (total n = 7,704).

6.3.2 Independent variables

Every datapoint in the present study was annotated for the following independent variables, the first two of which are critical predictors for the present study and the rest of which are control variables:

- the critical predictor of style (narration vs. on-screen, as described in Section 6.2.2);
- the critical predictor of the year of broadcast, treated continuously;
- morphological position of /ɹ/, given attestations of morphological sensitivity in other instances of variable phonology (e.g., Bailey 2021); this predictor is operationalized as morpheme-internal (e.g., *variation, area, character*) vs. morpheme-final (e.g., *disappearing, nearest, storage, porous*);
- speaking rate, given evidence that it conditions other instances of variable phonology (e.g., MacKenzie and Tamminga 2021); this predictor is calculated as vowels per second in a seven-word window centered on the target word (excluding pauses)[13] and treated continuously;
- timestamp of token, given that use of high-formality variants may taper off as a recording session elapses and a speaker grows more relaxed (e.g., Ashby 1981: 681); this predictor is normalized by recording length to give the proportion of the recording that had elapsed when token was produced, and treated continuously;
- durations of vowels immediately preceding and following the /ɹ/, residualized by speaking rate (because vowel duration significantly negatively correlates with speaking rate), and treated continuously;
- frequency of word containing the /ɹ/, given its role in conditioning other phonological alternations (e.g., Purse et al. 2022); this measure is taken from SUBTLEX-UK (van Heuven et al. 2014) and treated continuously;
- realization of previous tappable /ɹ/ token (approximant vs. tap), given evidence of persistence in other instances of variable phonology (e.g., Tamminga 2016);
- stress pattern of syllables immediately surrounding the /ɹ/, given evidence that syllable stress conditions other instances of variable phonology (e.g., MacKenzie and Tamminga 2021); this predictor is operationalized as primary-unstressed vs. all other patterns (unstressed-unstressed, primary-secondary, secondary-unstressed);
- coder (research assistant, author, or both together);
- episode number in series, treated continuously, in case narrations for a series were recorded in a single session, and later episodes were subject to the same relaxation of formality that later segments of an episode might be.

The above-listed predictors were treated as fixed effects in modeling. Categorical predictors were treatment coded, with the first-listed level as the reference level. Two additional predictors were coded to serve as random effects:

- lexical item containing the /ɪ/, given evidence of word-specific effects in other cases of variable phonology (e.g., Hay and Foulkes 2016);
- episode, in case one episode's recording session differed from others in idiosyncratic factors, such as director or location, in a way that influenced tapping rate.

Interactions between predictors were also tested, where there was a reasonable hypothesis to support them. The following interactions were tested:

- the critical interaction of style by year to test whether any stylistic differentiation is shown consistently over the lifespan;
- token timestamp by year, under the hypothesis that the segments of some series may have been recorded in a different order than they aired, so a timestamp effect may not surface consistently throughout the corpus;
- speaking rate by year and style, under the hypothesis that Attenborough's speaking rate has slowed as he ages (Duchin and Mysak 1987), creating less room for variability in speaking rate, and hence less potential for speaking rate to affect tapping later in life; this slowing may be most evident in on-screen speech, where there may have been more opportunity for speaking rate variability to begin with, due to its extemporaneous nature.
- speaking rate by episode, in case any effect of speaking rate on tapping was not shown consistently across individual episodes of the corpus – for instance, if some episodes' narrations showed little variability in speaking rate (again due to potential idiosyncratic factors such as director or location), preventing detection of a speaking rate effect on tapping in those episodes.

The final interaction listed above, since it involves the random effect of episode, is operationalized as a random slope: that is, it models a linear effect of speaking rate that potentially varies across episodes.

6.3.3 Statistical modeling

To model Attenborough's /ɪ/-tapping, I use generalized additive mixed models (GAMMs, Wood 2006). Like other types of regression models,

GAMMs capture the relationship between a response variable and some number of categorical or continuous predictor variables. The advantage of GAMMs is that continuous predictors can be modeled in a non-linear fashion. That is, rather than attempting to fit a line to capture the relationship between a continuous predictor and the response, as in (generalized) linear models, GAMMs can fit wiggly curves.

Underlying a GAMM are a number of polynomial functions (called *basis functions*) which are stretched or shrunk, then smoothed over, to capture any wiggliness in the trajectory. The analyst sets the number of basis functions – an upper bound on the wiggliness – and the model chooses the amount of smoothing to apply, penalizing over-fitting. The number of basis functions set for a given smooth can be as high as the number of measurement points, but a model with, say, 19 measurement points is not likely to show 19 bends unless that degree of wiggliness is supported by the data. As Sóskuthy (2017: 7) explains, "the number of basis functions has little bearing on the shape of the smoother provided that there are enough of them to represent the degree of wiggliness in the data, so a smooth with a high number of basis functions will often look very similar to one with a lower number." This is because GAMMs produce "a curve that – all things being equal – avoids under/overfitting and is generalizable beyond the sample" (Sóskuthy 2017: 7). Indeed, GAMMs "will only identify a non-linear effect if there is substantial support for such a pattern in the data, but will instead detect a linear effect if there is only support for a linear pattern […] [M]ore complex non-linear patterns will generally be more heavily penalized" (Wieling 2018: 90). The *mgcv* package used here to fit GAMMs contains some functions (*gam.check()* and *choose.k()*) to help the analyst choose an appropriate number of basis functions. These were used in the present study; I also followed guidance on setting basis functions from Sóskuthy (2017: 8), Wieling (2018: 90), and Baayen and Linke (2020: 576).

Like other mixed-effects regression models, GAMMs can incorporate both fixed and random effects; the random effects may take the form of random intercepts, random slopes, or random *smooths*, that is, distinct non-wiggly trajectories for the different levels of the random effect predictor being modeled.[14] GAMMs also allow for interactions between the wiggly predictor(s) and other predictors in the model. Sóskuthy (2017), Wieling (2018), and Baayen and Linke (2020) provide tutorials on using GAMMs in linguistic research.

Recent uses of GAMMs in sociolinguistics have modeled, among other phenomena, diphthong trajectories (Beaman and Tomaschek 2021), vowel dynamics over the course of an interview (Tamminga 2021), and variable coronal stop deletion over the several episodes of a reality television show (Sonderegger et al. 2017). The ability of GAMMs to fit non-linear trajectories is ideal for long-term lifespan data, given that longitudinal

sociolinguistic studies making use of more than two timepoints often find "roller coaster"-like, wiggly trajectories (e.g., Van Hofwegen and Wolfram 2010; Stefánsdóttir and Ingason 2018), which cannot be adequately captured by (generalized) linear models.

When fitting a GAMM, the analyst has to decide which continuous predictors to fit as non-linear, "smooth" terms (as opposed to linear terms). In the present study, all continuous predictors (year of broadcast, speaking rate, token timestamp, durations of flanking vowels, word frequency, episode in series) were initially tried as non-linear smooths. When one of these smooth predictors was found to have an estimated degrees of freedom (EDF) value of 1.00, which indicates a linear trajectory, the predictor was changed from being treated as a non-linear smooth term to being treated as a linear predictor, following a suggestion from Baayen and Linke (2020: 582).

The present study uses a logistic GAMM predicting the probability of /ɹ/ being realized as [ɾ]. GAMMs were fitted using the *bam()* function from the *mgcv* package (Wood 2011) in R (R Core Team 2021). Model-building proceeded as follows: first, a simple model was fit containing only random intercepts of lexical item and episode and one fixed-effect predictor (year); additional predictors were added one by one, beginning with those that were likely to have the strongest effect on the variation based on exploratory data analysis. Significance of a predictor was determined based on the significance values given in the model output and by comparing pairs of nested models with and without the predictor in question using the *compareML()* function (Sóskuthy 2017: 20). The final model presented in Section 6.4 contains only predictors and interactions that were significant and/or significantly improved model fit or lowered the Akaike Information Criterion (AIC) compared to a model without the predictor/interaction. Following a precedent set by Stanley et al. (2021: 401), I give the specification for that final model in Table 6.1.

6.4 Results

Table 6.2 gives the output of the GAMM. Guidance on interpreting the different components of the table can be found in the table caption, but the key columns to look at are *Estimate* (for parametric coefficients), *edf* (for smooth terms), and the *p*-value columns. Note that the *edf* values for the smooth terms cannot be interpreted in the same way as the estimates for the parametric coefficients and require visualization to interpret. In both cases, though, a p-value < 0.05 indicates that the value in the *Estimate/edf* column is significantly different from zero.

I discuss the model results in prose in the rest of this section: after running through the significant non-critical effects on Attenborough's /ɹ/-tapping

Table 6.1 Final model specification in R (left) with interpretation of code (right)

Model specification in R	*Interpretation*
`mgcv::bam(`	Function call.
`dep.var ~`	Dependent variable: approximant vs. tap.
`style +`	Fixed effect of style.
`morphological.position +`	Fixed effect of morphological position of /ɹ/.
`speaking.rate +`	Fixed linear effect of speaking rate.
`token.timestamp +`	Fixed linear effect of token timestamp (normalized for recording duration).
`s(prec.vowel.duration, k = 10) +`	Smooth for (residualized) preceding vowel duration.
`s(foll.vowel.duration, k = 10) +`	Smooth for (residualized) following vowel duration.
`ti(speaking.rate, year, by = style) +`	Tensor product interaction of speaking rate and year, by style.
`ti(token.timestamp, year) +`	Tensor product interaction of (normalized) token timestamp and year.
`s(year, k = 10, by = style) +`	By-style smooths for year.
`s(episode, speaking.rate, bs = "re") +`	Random slope of speaking rate by episode.
`s(item, bs = "re") +`	Random intercept of lexical item.
`s(episode, bs = "re"),`	Random intercept of episode.
`data = DA_r_internal,`	Data specification.
`family = "binomial",`	For modeling a binomial response variable.
`method = "ML")`	For allowing comparisons between nested models.

(Section 6.4.1), I present the critical predictors of year of broadcast and style (Section 6.4.2).

6.4.1 Control predictors

The GAMM finds that /ɹ/-tapping is more likely in morpheme-internal than morpheme-final position, an effect that is consistent with other examples of domain narrowing in phonological change (e.g., Bailey 2021). Tapping is also more likely at faster rates of speech, an effect that is consistent with taps being very short in duration and potentially having incomplete tongue contact (Cruttenden 2014: 224), characteristics that are presumably facilitated by rapid speech. Speech rate weakly interacts with year and style such that the favoring effect of tapping at faster speaking rates is slightly less evident in the on-screen style early in Attenborough's career (contrary to what was predicted). Preceding and following vowel durations both

Table 6.2 Output of the GAMM specified in Table 6.1

Parametric coefficients:	*Estimate*	*Std. Error*	*z value*	*Pr(>|z|)*	
INTERCEPT	–1.820	0.134	–13.6	<0.001	***
STYLE (ref: narration)					
Onscreen	–0.990	0.090	–11.000	<0.001	***
MORPHOLOGICAL POSITION (ref: morpheme-internal)					
Morpheme-final	–0.625	0.196	–3.180	0.0015	**
SPEAKING RATE	0.280	0.025	11.300	<0.001	***
TOKEN TIMESTAMP	–0.246	0.121	–2.04	0.0417	*
Approximate significance of smooth terms:	*edf*	*Ref.df*	*Chi.sq*	*p-value*	
S(PRECEDING VOWEL DURATION)	3.481	4.371	40.120	<0.001	***
S(FOLLOWING VOWEL DURATION)	6.261	7.385	101.940	<0.001	***
TI(SPEAKING RATE, YEAR) × NARRATION	5.171	7.051	9.150	0.261	
TI(SPEAKING RATE, YEAR) × ONSCREEN	1.012	1.023	2.924	0.089	.
TI(TOKEN TIMESTAMP, YEAR)	4.616	6.218	24.311	<0.001	***
S(YEAR) × NARRATION	8.103	8.559	117.760	<0.001	***
S(YEAR) × ONSCREEN	1.000	1.000	1.584	0.208	
S(EPISODE, SPEAKING RATE)	39.614	128.000	96.360	<0.001	***
S(ITEM)	321.257	855.000	1857.416	<0.001	***
S(EPISODE)	18.985	128.000	32.876	0.095	.

Notes: R-sq.(adj) = 0.471; Deviance explained = 43.3%; ML = 10537; Scale est. = 1; n = 7704

Model predicts occurrence of [ɾ]. Parametric coefficients can be interpreted as in generalized linear regression output: for instance, values in the *Estimate* column represent the expected change in log-odds of use of [ɾ] in the non-reference level as compared to the reference level, with positive coefficients indicating greater likelihood of tapping in the indicated environment. For the smooth terms, the values in the *edf* (estimated degrees of freedom) column indicate the amount of non-linearity of the smooth, with *edf* = 1 indicating a linear pattern and *edf* > 1 indicating non-linearity (i.e., wiggliness). The values in the *Ref.df* column indicate the reference number of degrees of freedom used for hypothesis testing. Significance codes: $^{\cdot}p < 0.1$; $^{*}p < 0.05$; $^{**}p < 0.01$; $^{***}p < 0.001$.

have significant non-linear effects; visualization of these effects reveals that both predictors show some likelihood of decreased tapping with increased vowel duration, but the patterns are complex.

The timestamp of the token shows a complex interaction with the year of recording. Visualizing the interaction reveals that, at the beginning and end of Attenborough's career, tapping shows a negative linear association with token timestamp, such that his tapping rate decreases as an episode elapses. However, this relationship does not hold in the middle of his career. A consistent negative effect of the token timestamp on tapping could have been interpreted as Attenborough becoming less guarded and thus less formal as an episode elapses, but the inconsistent nature of the effect over

the course of his career is difficult to interpret. One point to bear in mind, though, is that the order in which segments of an episode aired may not be the order in which they were recorded. Indeed, Attenborough, in his memoir, makes clear that this is the case for on-screen segments in *Life on Earth* (Attenborough 2010: 281, 294). At least for on-screen passages, then, token timestamps are not likely to correlate with the amount of speech produced in a sitting. And though Attenborough does not indicate whether narration passages were ever recorded discontinuously in the same way, the uncertainty on this point means that this predictor should be interpreted with a grain of salt.

The best-fit model also includes a significant random intercept of lexical items, indicating that different lexical items carry different likelihoods of being tapped, as well as a significant random slope of speaking rate by episode, indicating that the linear effect of speaking rate on tapping is differently evidenced across different episodes in the corpus. The following factors did not significantly improve the model: realization of previous tappable /ɹ/ token, stress pattern of syllables immediately surrounding /ɹ/, word frequency, episode number in series, and coder.

6.4.2 Critical predictors

Style is one of the strongest parametric predictors affecting the variation, with significantly less /ɹ/-tapping in on-screen speech than narration (β = -0.990, $p < 0.001$). Additionally, the two smooths over year for the two styles look very different, as evidenced in Figure 6.2. This figure plots the two smooths over year for the two different styles, with dashed lines marking Attenborough's age at each decade and gray-shaded token counts below the smooths reflecting the number of datapoints in each style at each timepoint studied. This plot was generated using the *plot_smooth()* function from the *itsadug* package (van Rij et al. 2020), plotting summed effects from the model output, and excluding random effects.

Figure 6.2 shows that the smooth-over-year in narration style (dark gray) is very wiggly. This is underscored by the high EDF value (8.103) and low p-value ($p < 0.001$) for the year-by-narration smooth term in Table 6.2. By contrast, the lack of a significant p-value for the smooth over year in on-screen style ($p = 0.208$) indicates that the on-screen smooth (light gray) is indistinguishable from a flat line. It is apparent from Figure 6.2 that Attenborough modulates his tapping rate in narration style considerably over his lifespan. Notably, narration-style tapping peaks about a decade into his career, then recedes. Though it shows two more peaks in the early 1990s and the mid-2000s, it never returns to its 1960s level.

We can also assess the extent to which the two styles significantly differ from one another at each timepoint. Figure 6.3, generated using the

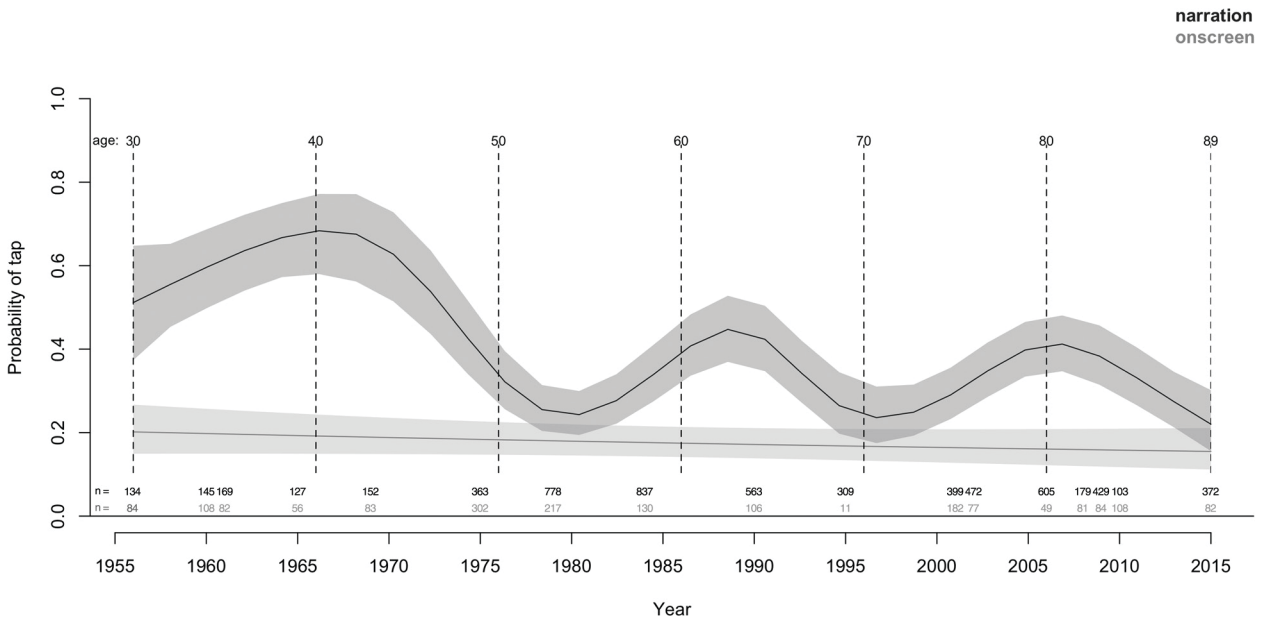

Figure 6.2 Non-linear smooths over year for narration (dark gray) and on-screen (light gray) styles. Notes: Dashed lines mark Attenborough's age at each decade. Gray-shaded token counts below the smooths reflect the number of datapoints in each style at each timepoint studied (dark gray = narration, light gray = on-screen).

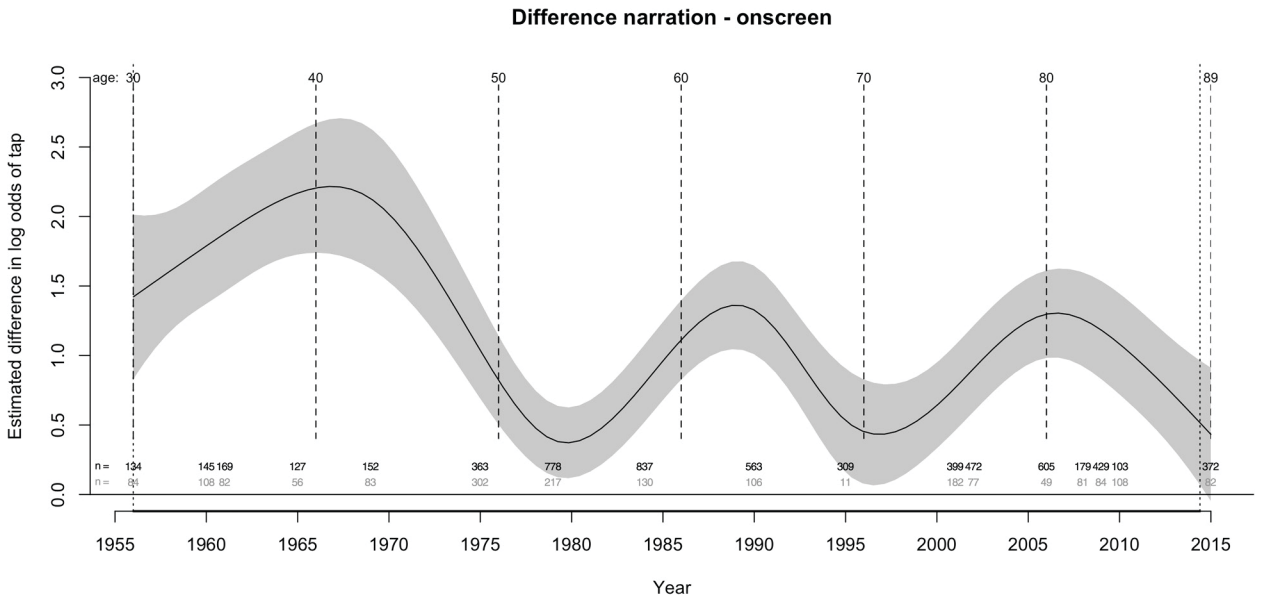

Figure 6.3 Difference between the two smooths in Figure 6.2. Notes: The heavy black line on the x-axis, bounded by black vertical small-dashed lines, marks the areas in which the difference is significantly non-zero. Dashed black lines mark Attenborough's age at each decade. Gray-shaded token counts below the difference smooth reflect the number of datapoints in each style at each timepoint studied (dark gray = narration, light gray = on-screen).

plot_diff() function from the *itsadug* package (van Rij et al. 2020), plots the difference over time between the two non-linear by-style smooths from Figure 6.2. In Figure 6.3, the height of the curve on the y-axis indicates the estimated difference in log odds of tapping between narration and on-screen styles. Attenborough's age at each decade and token counts are marked as in Figure 6.2. The heavy black line along the x-axis, bounded by vertical small-dashed lines, indicates where the difference between the two smooths is significantly different from zero, and hence where there is a meaningful difference in /ɹ/-tapping between the two styles.

Figure 6.3 shows that Attenborough remains a stylistically dynamic speaker across his lifespan. The only timepoint at which he shows no significant difference in tapping between the two styles is the very last one, 2015. The fact that the values on the y-axis are all positive indicates that the difference between the two styles always goes in the direction of narration having more tapping than on-screen speech (as would be expected given Figure 6.2), rather than the other way around.

This being said, the considerable stylistic differentiation Attenborough shows early in his career – the large gap between narration and on-screen speech in the 1960s in Figure 6.2, also shown by the 1960s-era peak in Figure 6.3 – is not in evidence later in his career. At no point after the 1960s does the difference curve in Figure 6.3 reach so high a level, and indeed the stylistic difference is not in evidence at the very last timepoint. Attenborough's stylistic range for /ɹ/-tapping thus decreases across his lifespan, culminating in a 2015 datapoint that shows no significant difference between the two styles at all. This decrease in stylistic range is driven entirely by a reduction in his tapping rate in narration style, without any concomitant increase of his on-screen tapping rate.

6.5 Discussion

The two research questions that opened this chapter were:

1. Does Attenborough show stylistic differentiation of /ɹ/-tapping as expected, given its social profile?
2. If so, does he show this stylistic differentiation consistently over his lifespan?

We can say that the answer to the first is definitively yes: Attenborough shows the expected stylistic differentiation, using [ɾ] more in narration than in the on-screen style. This is seen in the significant main effect of style in the regression output (Table 6.2). But the answer to the second question is no. After showing sizable stylistic differentiation in /ɹ/-tapping for about the first decade of his career, the difference between styles for

this variable decreases, vanishing entirely by the final timepoint. Although Attenborough has a greater stylistic range in some post-1970 series than others, no post-1970 series has as great a stylistic range as he shows in his mid-1960s series *Adventure: Zambezi* and *The Miracle of Bali*.

Why does Attenborough's stylistic range contract from its mid-1960s peak? Put differently, why does his rate of /ɹ/-tapping in narration style decrease over the course of his career? In the following three subsections, I consider three possible explanations: changes in television broadcasting norms since the 1950s (Section 6.5.1); real-time community change away from [ɾ] (Section 6.5.2); and decreased pressure for older speakers to use formal linguistic variants in later life (Section 6.5.3). The post-1970 bumps in stylistic range are harder to find explanations for, but I consider some possibilities in Section 6.5.4.

6.5.1 Changing broadcasting conventions

It is tempting to look to changes in BBC broadcasting conventions for an explanation of Attenborough's decreased tapping rate over his career. The BBC is famously prescriptive about pronunciation, so perhaps Attenborough's high tapping rate in his early series was imposed on him by broadcasting norms. However, the history of BBC language policy, as detailed by Schwyter (2016), casts some doubt on this potential explanation.

Before World War II, the BBC Advisory Committee on Spoken English dictated norms of general pronunciation to its announcers – for example, that they should attempt to avoid vowel reduction (Schwyter 2016: 32) – and enumerated preferred pronunciations of variable words, such as rhyming *again* with *then* rather than *rain* (Schwyter 2016: 41). After the war, this committee was reborn as the BBC Pronunciation Unit, which continues to this day, and primarily advises on the pronunciation of place names and personal names. This would suggest that the BBC in the 1950s and 1960s – when Attenborough was tapping the most – was not dictating pronunciation norms, at least not where /ɹ/-tapping was concerned. Schwyter (2016: 194–195) also observes that the 1950s brought a relaxation in the BBC's expectation that its on-air staff use "Standard Received Southern English": an expectation that "changed quite suddenly, not least under the influence of Independent Television," which "was and is a great deal more populist and less stuffy than the 'Beeb.'" (Britain's Independent Television [ITV] was launched in 1955.) This again is inconsistent with the peak of Attenborough's /ɹ/-tapping falling in the mid-to-late 1960s. Finally, even if Attenborough's high tapping rate was the result of some top-down pronunciation mandate by the BBC, it is unclear why this would not extend to his on-screen speech too. By contrast, as we saw from Figure 6.2, Attenborough's /ɹ/-tapping rate in on-screen speech is stably low across his entire career.

Though there is no evidence that Attenborough's high tapping rate in early read speech is attributable to a top-down BBC pronunciation directive, potentially it stems from some other characteristic of television culture at the time. Scannell (1989: 147) describes what he and others perceive as the "sheer awkwardness" of early British broadcasting, with presenters and announcers figuring out how to establish the norms of this new medium. Moreover, Attenborough describes in his memoir how his entry into television presenting was effectively accidental: he had been primarily working behind the camera as a producer, but ended up having to step in to present the first and second *Zoo Quest* series when the dedicated presenter became unavailable due to illness. This relative lack of familiarity with television presenting (though not a complete lack: he had occasionally been asked to serve as an on-screen interviewer prior to this) may have contributed to greater unease, more attention to speech (Labov 1966/2006: Chapter 4), and thus a higher rate of formal forms like taps.

It seems most likely, though, that any awkwardness or unease that Attenborough experienced when presenting his early series would have manifested when he was on-screen, rather than recording his narrations away from the cameras: so, again, this explanation still leaves the wide gap between narration and on-screen speech unaccounted for. It also fails to explain why the peak in Attenborough's tapping rate comes in the 1960s, after he has already presented several series.

One final point to consider is that the logistics of how Attenborough recorded his narrations changed over his career, and the change can be dated to the mid-to-late 1960s, coinciding with the peak of his tapping (David Attenborough, personal communication, June 10, 2022). Prior to this point, Attenborough had recorded his narrations simply by speaking into a microphone in a sound booth, but at this point, he started recording his narrations while listening over headphones to the background music that would eventually be overlaid on the picture. The effects of speaking in noisy conditions are well known and include increased amplitude, duration, and pitch (Summers et al. 1988). There is also evidence that speakers who have acquired a second dialect revert to their original dialect when speaking alongside frequency-altered or time-delayed echoes of their own speech (Howell et al. 2006). However, it is not clear to what extent these effects also characterize speech produced alongside quiet background music, or why they would prompt a higher rate of tapping, particularly one that recedes over time, even while the recording conditions remain constant.

Instead, I propose two alternative explanations: participation in community change (Section 6.5.2) and reduced social pressure to use high-formality forms in later life (Section 6.5.3).

6.5.2 Participation in community change

As detailed in Section 6.2.3, /ɹ/-tapping in RP showed a considerable decrease over the 20th century. A straightforward explanation is that Attenborough mirrors this in his narration, in keeping with a number of other studies that show individuals participating in language changes in progress even after the critical period for language acquisition has passed (e.g., Harrington et al. 2000; Raumolin-Brunberg 2005; Sankoff and Blondeau 2007). More specifically, in the 1950s and 1960s, when /ɹ/-tapping was still prevalent in the community (Fabricius 2017), it would have served as a useful stylistic marker, differentiating read from spontaneous speech in Attenborough's case. As the 20th century progressed and as /ɹ/-tapping became obsolete – not to mention gained the negative social associations with old-fashionedness and outdatedness that it did – it may have become less useful as a stylistic marker, resulting in its decreased use in narration and eventual erasure of a stylistic difference.

Other work has also found stylistic range to decrease as a change goes to completion. One example can be seen in Hernández-Campoy's (2021) study of the orthographic change in the history of English by which <þ> was replaced by <th>. He studied letters written by members of the Paston family over the course of eight decades, during which the change reached the asymptotic portion of the S-curve (Osgood and Sebeok 1954: 155). Though Hernández-Campoy did not examine each speaker's stylistic range in real time (unlike the present study), he did find that speakers who were writing closer to the completion point of the change showed a decreased stylistic range compared to those writing earlier in the change. Hernández-Campoy (2021: 175–176) described this as "a generational-based reduction of stylistic variation in the choices of innovative <th>, such that earlier writers [...] display more heterogeneous usage whereas later generations move towards categoricity as the ongoing language change expands to completion." This decreased stylistic range across generations is presumably a mathematical necessity for a change to ever go to completion. By definition, the completion of a change means that the outgoing variant must cease to be used, even for stylistic purposes. Whether the longer-lived writers in Hernández-Campoy's study similarly decreased their stylistic range as they aged remains to be seen.

An alternative explanation for Attenborough's reduced stylistic range attributes it to him no longer needing a high-formality style in later life. I address this possibility in Section 6.5.3.

6.5.3 Reduced social pressure to use high-formality variants in later life

As discussed in Section 6.2.1, speakers often become more vernacular as they age. This can be seen in the V-shaped pattern shown by stigmatized

stable variants in apparent time, by which speakers who are post-retirement age (as well as adolescents) show relatively high rates of non-standard forms compared to middle-aged speakers (e.g., Labov 2001: 102–103). This is typically explained with reference to the linguistic market (Sankoff and Laberge 1978): post-retirement, speakers experience less pressure to use the standard language than they did when they were active in the workforce (see, for instance, Mechler et al. 2022).

Attenborough conspicuously has not retired: he continues presenting and narrating nature films to this day. Retirement cannot explain his decreased use of high-formality forms. But it is possible that very high-profile speakers like Attenborough may begin their career paying considerable attention to standard language norms and then reduce their attention to those norms after they have established themselves. This is what Shapp et al. (2014) propose to account for the increased vernacularity in the speech of Supreme Court Justice Ruth Bader Ginsburg over her career. Specifically, they find that Ginsburg became more non-rhotic later in her career; since Ginsburg was from New York City, non-rhoticity was a locally non-prestigious feature (Labov 1966/2006). They suggest that this increased vernacularity could be due to Ginsburg having achieved so much during her career that "[h]er position is utterly secure and does not depend on the continued use of standard features" (Shapp et al. 2014: 157).

By 2015, the last timepoint in this study, Attenborough's accolades included knighthood in 1985, and the Order of Merit – described as "quite possibly, the most prestigious honor one can receive on planet Earth" by the *National Post*'s Editorial Board (2009) – in 2005. His work received several BAFTA awards, and in 2014, he received a Peabody Award.[15] As of 2010, he held more honorary academic degrees from Britain's universities than anyone else in the world (Herrmann et al. 2010), and, though it postdates the last timepoint in this study, polling in 2018 by the data and analytics group YouGov found him to be the "most popular person in Britain" (Smith 2018). It is plausible that, after enough of his career has elapsed, Attenborough no longer recognizes – consciously or unconsciously – narration as a register necessitating high-formality variants or no longer needs the cachet associated with those variants.

This explanation can potentially also account for the timing of the peak in Attenborough's /ɹ/-tapping, localized in the mid-to-late 1960s. As Attenborough describes in his memoir (Attenborough 2010), his documentary work during this period of his life was a sideline as he tried to figure out his career trajectory. In 1963, when he filmed *Adventure: Zambezi*, he had recently stepped down from his role as a producer for the BBC in order to pursue a part-time postgraduate degree in Anthropology at the London School of Economics, making films for the BBC as a freelancer the rest of the time. By the time *Adventure: Zambezi* aired in 1965, he had taken on the role of head of the new BBC2 television station. He took a

sabbatical from this job in 1967 to film *The Miracle of Bali*; by the time it aired, in 1969, he was in the middle of a four-year stint as BBC Television Director of Programmes. In other words, the era of his highest tapping rates was characterized by Attenborough either pursuing postgraduate education or holding high-level administrative jobs. Being immersed in these high linguistic market-value worlds may have increased the extent to which high-register forms constituted part of his linguistic repertoire (see Riverin-Coutlée and Harrington, this volume).

After he stepped down as Director of Programmes in 1972, Attenborough continued to serve as writer and presenter of the programs he appeared in but gave up some of the control he had enjoyed in previous programs. On the first program he was involved with after resigning from his administrative duties, in 1973, he says the producer assigned him to be "what is called these days a 'presenter' " and reveals that "[i]t was a bit of a come-down, after having devised, directed, scripted and researched programs as I had done in the early *Zoo Quest* days" (Attenborough 2010: 243). Indeed, none of the films used in this study that aired after 1970 was produced by Attenborough (by contrast, all of the pre-1970 films were). His reduced level of responsibility at this stage of his career, both on his programs and as a result of his move away from administration, may explain the precipitous decrease in his /ɹ/-tapping in narration style by the mid-to-late 1970s. Attenborough no longer needed to prove himself or establish himself in his career; he had settled in.

Under this interpretation, establishment in his career reduced the need for Attenborough to use the high-formality style containing /ɹ/-tapping that narration work elicited from him in the early days of his career. Indeed, his /ɹ/-tapping rate in narration converges with his rate in on-screen speech by the final timepoint in this study, suggesting the erasure of a stylistic difference. This raises the possibility that at least some cases of later-life change are instances of speakers permanently shifting into a register they have always controlled. To draw a connection to previous work, this seems to be the case also for the speaker Foxy Boston, demonstrated by Rickford and Price (2013) to have drastically reduced her use of certain African American Vernacular English variants in middle age. Foxy showed considerable style-shifting as a teenager, becoming dramatically more vernacular when talking to familiar interlocutors about engaging topics, and dramatically more standard when conversing with an unfamiliar interlocutor. Despite being interviewed by a friend in middle age, her vernacular forms only surface at a rate comparable to the level at which she used them with the unfamiliar interlocutor when younger. This shift could be interpreted as abandonment of her high-vernacular style in middle age: exactly the opposite of the potential explanation for Attenborough's contraction of

stylistic range suggested here, by which he seems to largely retreat from his high-formality style – at least, as manifested in /ɹ/-tapping – in later life.

It is difficult to disentangle this explanation for Attenborough's lifespan shift from the one presented in the previous subsection. In the case of /ɹ/-tapping, both participation in the community change toward obsolescence and abandonment of high-formality forms due to biographical changes would decrease his /ɹ/-tapping rates. More data from additional variables – including those that are not involved in community changes in progress – will be essential to disambiguate the two.

6.5.4 Explaining the post-1970 bumps

After Attenborough's /ɹ/-tapping in narration has descended from its mid-1960s peak, why does it still show some relatively high points? The post-1970 peaks in Figure 6.2 are specifically in 1990 (represented by *The Trials of Life*) and the mid-2000s (represented by two series, *Planet Earth* and *Life in Cold Blood*). No clear explanation for these peaks presents itself.

The Trials of Life (1990) was the third "sledgehammer" wildlife program that Attenborough wrote and presented for the BBC's Natural History Unit, following *Life on Earth* (1979) and *The Living Planet* (1984). These three programs are comparable in length and format (consisting of 12–13 episodes of 50–60 minutes in length, with a mix of recorded narration and "two-shot" scenes where Attenborough addresses the camera alongside the wildlife of interest), so these attributes are not likely to be the source of the difference. *Life on Earth,* made in 1979, is widely viewed as "groundbreaking" and "a game-changer" in the television industry, having garnered 14 million viewers at the time of airing (Barkham 2019), but any prestige boost that such an achievement would have given Attenborough seems unlikely to have shown up in his language a decade later.

Life in Cold Blood (2008), similarly, is the last of a series of programs, in this case a set of five documentaries each of which explores a different group of living things in detail (*The Private Life of Plants*, 1995; *The Life of Birds*, 1998; *The Life of Mammals*, 2002; *Life in the Undergrowth*, 2005). Though they vary in length, they all, again, are of a similar format and contain a mix of on-screen and narration speech. *Planet Earth* (2006), likewise, was a sequel to the earlier *Blue Planet* (2001); both programs had the same producer and are similar in containing very little, if any, on-screen speech. Both the post-1970s bumps then come from programs that represent the end of a thematic series, but it is unclear why that should result in greater /ɹ/-tapping. Moreover, the fact that these "bump" programs are all joined with earlier programs as part of a series makes the discontinuities in Attenborough's /ɹ/-tapping trajectory more mysterious.

Both of the bumps do follow accolades in Attenborough's professional life. *The Trials of Life*, the source of the 1990 bump, is the first series included in this study after Attenborough was knighted in 1985 (though not the first series he filmed after knighthood – that would have been *The First Eden* (1987), not included in this study). The mid-2000s bump is proximal to his being named to the Order of Merit, in 2005. The prestige of these honors could have prompted Attenborough to use more formal linguistic forms. But given that he has received accolades throughout his career, the timing of these bumps with respect to those honors is more likely a coincidence.

Though the post-1970 bumps are not easily explained, they underscore that Attenborough remains a stylistically dynamic speaker throughout his career. He reduces his stylistic range after 1970, but, with the exception of the very last timepoint, when he is 89, does not eliminate it.

6.6 Conclusion

In this chapter, I carried out a longitudinal study of /ɹ/-tapping in the nature documentaries of Sir David Attenborough using 18 documentary series spanning six decades. The goal of the study was to better understand whether and how stylistic range can change over the lifespan; accordingly, Attenborough's speech was examined in two styles: scripted narration and (semi-)extemporaneous on-screen speech. I found that Attenborough's stylistic range diminishes after the earliest years of his career, a change that is driven entirely by his /ɹ/-tapping rate decreasing in narration style. I determined that there are two plausible explanations for this decrease: (1) participation in community change away from [ɾ] and (2) reduced pressure to use high-formality forms as his career develops. In the former case, Attenborough is tuned in to the changing social meaning of [ɾ] in the community, including its late 20th-century negative associations with old-fashionedness and pretension. Under the latter explanation, [ɾ] continues to preserve (positive) posh associations for Attenborough, but his changing relationship to his career makes him less likely to need to draw on those associations in his narration. Data from additional variables – ideally ones that are socially meaningful, like /ɹ/-tapping, but not involved in change – will be necessary to disentangle these. One such variable may be the tapping of /t/ (Alderton 2022).[16] An alternative possibility could be to look at variables that have undergone change but do not carry strong social associations, such as, potentially, voice onset time in voiceless stops (Hickey 2017).

An additional way forward could be to expand the study to other features of conservative Received Pronunciation that have been lost over the 20th century (Wells 1997). Little is known about the "routes

to obsolescence" that outgoing linguistic variants undergo (Fabricius 2017: 58), and the Attenborough corpus could be used to investigate whether outgoing variants linger on as stance markers after a speaker ceases to use them more widely – see Fabricius (2022) for evidence of [ɾ] as a stance marker. Broadening the set of variables examined will also shed light on whether variants covary over the lifespan. If variants covary synchronically and diachronically, we may have support for the proposition presented in Section 6.5.3 that later-life change can take the shape of a speaker permanently shifting into a style or register that they have always had in their repertoire. The unique 60-year, multi-style dataset presented here thus has the potential to speak to a number of questions about when, why, and how later-life change takes place (MacKenzie 2017).

A final advantage of the present dataset is that Attenborough's language production can be cross-referenced with his reflections on his career trajectory, thanks to his published memoir (Attenborough 2010). Stefánsdóttir and Ingason (2018) similarly use a speaker's reflections on his career to interpret that speaker's longitudinal language production. In their case, these reflections were elicited in an interview they carried out with their subject. Given the known importance of career-related factors to language use (e.g., Grama et al. 2023), future researchers may want to include questions about career trajectory in their slate of sociolinguistic interview prompts. These can include questions about how an interview subject's work responsibilities have changed (for instance, new duties, gaining subordinates) and how they may have changed their relationship to their work (for instance, feeling less pressure to prove themselves as their career has progressed). Longitudinal studies with multiple timepoints, like this one and that of Stefánsdóttir and Ingason (2018), are likely to find complicated diachronic patterns, which speakers' qualitative observations on these topics may go a long way toward explaining.

Notes

1 For comments on this work, thank you to Anne Fabricius, Raymond Hickey, Sandra Jansen, Jose A. Mompean, Márton Sóskuthy, two anonymous reviewers, the editors of this volume, and audiences at New York University, Universitat Duisburg-Essen, and Columbia University. And thanks, for transcription and research assistance, to Alicia Chatten, Ann Dang, Thomas Devlin, Emily Driscoll, Lucy Giannasi, Maddie Gilbert, Jill Harper, Sarah Lee, Marilena Onisiforou, Grace Ormerod, Allison Shapp, Aimee Smith, Martha Tomlinson, and Alía Warsco. Funding for this research was provided by University of Manchester Learning through Research and Strategic Investment Funds, and NYU Faculty Research Funds.

2 Potentially contradicting this, the elderly speakers in Labov's (2001: 102) apparent-time study do seem to show a sizable stylistic difference between

careful and casual speech, but we have no data on whether that difference is smaller than it was earlier in their lives.

3 The series are: *Zoo Quest for a Dragon* (Attenborough 1956), *The People of Paradise* (Attenborough 1960), *Zoo Quest to Madagascar* (Attenborough 1961), *Adventure: Zambezi* (Attenborough 1965), *The Miracle of Bali* (Attenborough 1969), *The Tribal Eye* (Collison and MacIntyre 1975), *Life on Earth* (Parsons 1979), *The Living Planet* (Kelly et al., 1984), *The Trials of Life* (Jones 1990), *The Private Life of Plants* (Nightingale 1995), *The Blue Planet* (Fothergill 2001), *The Life of Mammals* (Salisbury 2002), *Planet Earth* (Fothergill 2006), *Life in Cold Blood* (Ford 2008), *Life* (Gunton 2009), *Attenborough's First Life* (Geffen 2010), *David Attenborough's Natural Curiosities: Series 3* (Dunleavy 2010), *The Hunt* (Fothergill 2015).

4 With one exception: Episode 4 of *The Living Planet* (1984) could not be obtained.

5 Thanks to a reviewer for this point.

6 /ɹ/-tapping can also occur in word-initial position and in some onset clusters. Fabricius (2017) finds it to be very rare in these environments, so they were not included in data collection.

7 Coupland (2007: 40) defines posh as "a rather disapproving representation of 'standard' establishment demeanour."

8 See Mugglestone (2003: Chapter 7) for a detailed history of British public schools and their role in setting and enforcing language norms. Briefly, these schools, which are actually private, are now "seen as emblematic of an elite, and its attendant social (and linguistic) values" (Mugglestone 2003: 221).

9 Common, in this usage, is "of course a social class related attribution" (Coupland 2007: 118), and specifically a pejorative one.

10 Trilled tokens, which were rare, were coded as taps – as done by Fabricius (2017) in a similar study.

11 See MacKenzie (2017: 4, Figure 1), for a comparison of the acoustic signature of a tap vs. that of an approximant.

12 The kappa statistic is a more conservative measure of reliability than the percentage of tokens that coders agreed on. It corrects for the rate of agreement that would have occurred by chance (Clopper 2011).

13 Vowels per second is the closest available approximation to syllables per second when working with transcripts in which syllables are not marked. Syllables per second, in turn, is "a more precise unit of measure than words per minute" (Kendall 2013: 60). The seven-word window ensures that only the speech rate local to the target word is captured.

14 See van Rij et al. (2019: Figure 6) for visualization of these random effect types.

15 BAFTA awards are bestowed by the British Academy of Film and Television and honor "the very best in British and international television" (BAFTA 2023). The Peabody Awards are bestowed by the University of Georgia's Grady School of Journalism and Mass Communication and "celebrate excellence in entertainment in documentary, news, podcast/radio, arts, youth, and public service programming" (University of Georgia 2023).

16 It is not known whether /t/-tapping in RP is truly a stable variable. Hannisdal (2007: 198) suggests that it may be a change in progress, based on its social and linguistic patterning. Still, it has been observed in RP since at least the 1980s (Wells 1984: 56). Diachronic work on this variable is needed.

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