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Sociophonetics and Intonation

A proposal for Socioprosodics

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Abstract

In this chapter we address sociophonetics and intonation. We note complementary trends among scholars of intonation to delve into social factors as a source of variability and among variationists and sociophoneticians to research intonational components of speech. We propose placing sociophonetics and intonation under the same umbrella, in a new field of "socioprosodics." This will allow for dialogue between fields—which up to now have led separate lives—and foster insights about intonational variation and the social indexicality of intonation. We review the progress that has been made so far in socioprosodics and we outline central questions, key theories, prominent approaches, and major findings. We end the chapter with a presentation of two case studies which showcase synchronic and diachronic approaches to socioprosodic analysis.

Introduction

Intonation refers to the modulation of parameters such as the fundamental frequency of the voice (f0), duration, and intensity, over domains such as the phrase and the utterance. It delineates phrases and encodes different kinds of meaning, including semantic, pragmatic, affective, and social. The focus of this chapter is the social meaning of intonation as an index of regional or social differences which have been documented in many languages.

Fine-grained differences in the synchronization of f0 turning points with segmental material have been shown to be perceptually salient in distinguishing between different tunes such as declaratives and questions (Arvaniti, Ladd & Mennen 2006) and additional attention has been paid to the social factors that may contribute to the variation within these tunes. Sociophonetic approaches to the study of intonation have been developed recently and are beginning to emerge as a focused area of inquiry.

In our survey we have found a number of articles that investigate the effect of some sociolinguistic factor on intonation, for example gender, age, level of education, or social status, but in most of these articles the sociolinguistic aspect is incidental rather than programmatic. That is, the main focus is variation in intonation rather than what we would like to term "socioprosodics."

The phrase "socio-prosodic variation" does appear in Yaeger-Dror & Fagyal (2011) in their discussion of best practices in prosodic analysis. The hyphenated use of the term demonstrates the juxtaposition of fields that are beginning to be recognized as related concepts. This trend of marrying social factors with intonation is also present, albeit to a lesser degree, from the reverse direction of sociolinguists or sociophoneticians who incidentally also consider intonation, among other factors (see Eckert 2019:765-777). We view socioprosodics as a nascent field, in the sense that there is an increasing trend among scholars of intonation to delve into social factors as a source of variability, or among variationists and sociophoneticians to research intonational components of speech. We believe that pointing out the common ground covered by these so far disparate areas of study

and placing them under the same umbrella allows for comparison and dialogue between them. This in turn can lead to further insights about sources of intonation variation on the one hand and the social indexicality of intonation on the other.

Research on prosody and sociophonetics has flourished in separate but parallel directions. Within phonetics, there has been an increasing focus on prosody. As early as the 6th International Congress of Phonetic Sciences (ICPhS) in 1967, a quarter of the papers presented (53 out of 213) were on prosody and this trend increased to 41.8% (214 out of 511) in the 17th ICPhS, 44 years later (Šturm 2015). As for sociophonetics, after the 1990s a growing number of sociophonetic studies have appeared and there are collections of studies, journal special issues, handbooks, and textbooks dedicated to this area of research.

Socioprosodics as a new field needs to follow the trajectory of the significant amount of work being done at the segmental level. Here are a few examples of recent collections that have appeared in the past 10 years with no or very little content on intonation, which may be due in part to some of the challenges we note in this chapter. We offer these remarks merely as a recognition of the status quo, rather than a critique of any one volume or line of research. The *Oxford handbook of sociolinguistics* (Bayley, Cameron & Lucas 2013), contains two paragraphs on intonation within its literature review of sociophonetics, the *Routledge handbook of phonetics* (Katz & Assmann 2019), one page. In more specialized volumes, such as *Advances in sociophonetics* (Celata & Calamai 2014), there is examination of consonantal variation without mention of intonation (see also Díaz-Campos, Lacorte & Muñoz-Basols 2021). *The handbook of language variation and change* (Chambers & Schilling 2013) contains, within Thomas (2013), two paragraphs on the challenges in studying variation within intonation and a short discussion of dialectal differences reported in intonation. As late as the *Oxford handbook of language prosody* (Gussenhoven & Chen 2020), there is no separate chapter on work that could be considered socioprosodic. In the 18th ICPhS held in 2015 (Scottish Consortium for ICPhS 2015), 13 of the 770 papers presented (1.7%) were on socioprosodics in the more than 20 sessions devoted to sociophonetics and prosody. In the 10th International Conference on Speech Prosody in 2020 (Minematsu 2020), three out of 208 papers covered socioprosodics. The 2021 New Ways of Analyzing Variation (NWAV49) conference had nine sessions on sociophonetics, and one on prosody. Across the conference 11 papers would be considered to fall within the domain of socioprosodics.

However, we have yet to see a combination of these two recognized as one field. As recently as 2020, the literature on what we term "socioprosodics" has not been examined closely. In what follows, we review work that has appeared either within sociolinguistics or within the phonetics/phonology of intonation which could be characterized as socioprosodic research, in the sense that it is either essentially sociolinguistic work that also examines intonation to a lesser or greater degree, or that it is essentially work on intonation variation that also examines some social factors that contribute to this variation. "Socioprosodic" is used (provisionally) hereafter as a term to cover this range of approaches and perspectives. We will also frequently juxtapose approaches taken by sociolinguists with approaches taken by prosodists to highlight areas where these two approaches converge or differ.

Adopting the term socioprosodics is also a deliberate choice for another reason, to avoid the use of "sociophonetics of intonation," which we believe is imprecise in at least two ways. One way is that intonation has both continuously varying characteristics, its phonetics, as well as categorically varying ones, its phonology (Ladd 1996, 2008; Gussenhoven 2004). Another reason is that socioprosodics extends beyond intonation, to interlinked phenomena of pitch modulation, speech rate, rhythm, and lexical tone, to name a few. The focus of this

chapter is intonation. More detailed treatments of other aspects of socioprosodics can be found in other chapters of this volume (see Davidson; Stanford & Yang; and Kendall). In what follows, we will employ the term socioprosodics in reference to this potentially emergent field even though we recognize that the work we discuss (which we consider to contribute to the field) has been conducted before said field has fully formed.

Socioprosodic theory

Central research questions

A field is defined to some extent by the questions it addresses, along with the methodologies employed to approach them. Works by Labov (1966, 2001), Tagliamonte (2006, 2011, 2015), and others (e.g., Foulkes & Docherty 1999; Silva-Corvalán 2001; Chambers 2003; Trudgill 2011; Eckert 2012, 2019; Silva-Corvalán & Enrique-Arias 2017) demonstrate the types of questions and approaches used within sociolinguistics. Socioprosodics, and the study of intonation as part of that, may have the following questions, among others, of central interest:

1) How does intonation vary according to social factors within a speech community?

2) Are intonation features used differently among social groups to express the same meaning?

3) Is any observed intonation variation stable or indicative of a change in progress?

4) How do individual speakers operationalize intonation to construct and navigate their social identities?

A significant amount of work on intonation has been conducted up to this point in many of these areas such that there is now a growing wealth of literature to be drawn upon for looking at sociolinguistic variation within intonation. Socioprosodics may also complement research at segmental levels (e.g., Sóskuthy & Stuart-Smith 2020; Stuart-Smith 2020) and provide opportunities for intersection with other areas such as word recognition, vocal quality, and f0 range (e.g., Kim & Sumner 2017; Esling et al. 2019; Signorello et al. 2020; Gold et al. 2021).

Congosto Martín & Morgenthaler (2019:326), recognizing the momentum of the field, bring together nine studies related to languages in contact in a special issue on prosody, and note that "sociolinguistic implications should be taken into consideration since they may affect differently the acquisition, use, prestige, stigmatization, and contextualization of the language." In the issue, one of the papers, titled "Prosody: A feature of languages or a feature of speakers?" brings into focus the presiding empirical question, indicating that "prosody is the convergence point of linguistic information, on the one hand, and sociolinguistic and geolectal information, on the other" (Muñiz-Cachón 2019:464).

Key theories and frameworks

We approach our discussion on socioprosodics in part by how it relates to the field of sociolinguistics. Bell (2016:401-402) recognizes the importance of Eckert's "three waves" model (2012, 2019) of variationist sociolinguistics, which moves from an initial focus on language variation within social categories, to the use of ethnographic approaches to define categories, to the foregrounding of style in the expression of variation. Importantly, socioprodics has the potential to be studied adopting the approaches from each of these waves, although the fact that it still remains (a small) niche speaks to the degree of development that is needed in the field. This delay in development is also at least in some part due to challenges in analyzing intonation and intonational variation. These challenges include speed and reliability of transcription methods (Pitrelli, Beckman & Hirschberg 1994), the issue of mapping many pragmatic interpretations to one form and vice versa (Baltazani, Gryllia & Arvaniti 2020), the fact that a number of phonetic parameters encode intonational meaning beyond f0 (Arvaniti 2020), as well as the different frameworks employed for intonation analysis, as described below.

Traditionally intonation has been analyzed within different frameworks and a distinction is frequently made between the so-called "configurations" versus "targets" models (for more details, see Ladd 1996, 2008; Prieto 2003; Gussenhoven 2004; Arvaniti & Ladd 2009; Xu et al. 2015). In the British School of intonation (e.g., O'Connor & Arnold 1973), the units of analysis are f0 configurations—trajectories such as rise, fall, rise-fall, thought to be melodic units, and phonetic detail such as the precise alignment between tones and segments is lacking. Other configurational frameworks employ a phonetic approach to the analysis of intonation which focuses on the phonetic detail but lacks phonological abstraction (e.g., Fujisaki & Ohno 1995; Xu 2005).

The model of intonational analysis which seems to be the most widely used today is the Autosegmental-Metrical (AM) approach (Pierrehumbert 1980; Ladd 1996, 2008). In this framework, the units of intonational analysis are H and L tones which are independent from segments (thus the "autosegmental" part of the AM label) and which are associated with tone-bearing units in the segmental string, such as stressed syllables or phrase edges, prosodic heads, or boundaries of metrical constituents respectively (hence the "metrical" part of the AM label). Unlike the configurations models mentioned above, AM combines phonological theory (i.e., categorical contrasts between different tones or tone combinations such as L*, H*+L over the same segmental string associated with differences in meaning) with phonetic realization rules (i.e., the same phonological category, e.g., H*+L, may have a different phonetic realization depending on the context).

Some, but not all of the socioprosodic work covered in this chapter is cast within the AM framework. Other work uses more phonetic prosody metrics, which are global measures of f0, such as pitch range, pitch level, and "dynamism." Typically in such studies, no intonational analysis of prosodic structure is given in terms of f0 tunes, tonal inventory, or prosodic phrasing. This methodological difference in intonational analysis makes comparisons of results and typological generalizations difficult.

Questions addressed in literature

The social meaning of variation in intonation has been approached by some researchers through demographic traits of speaker communities, such as age, gender, dialect, and socioeconomic status (e.g., Fletcher, Grabe & Warren 2005; Warren 2014). Others aim to

describe the intra-speaker use of intonation as an index of a social attitude or a persona (e.g., Podesva 2011).

An important question that we believe should be addressed in socioprosodics regards the methods best suited to study variation. The lack of such a unified methodological approach and its consequences have been noted before. For example, Queen (2001:57) attributes the dearth of studies on intonation in language contact to the difference of methodological frameworks between phonological studies of intonation, which mostly employ controlled laboratory experiments, and sociolinguistic studies of language contact, which rely typically on natural speech and observational data: "Because these differences may be epistemological as well as methodological, bringing together such divergent strands of research presents a formidable task, which is, nonetheless, crucial for understanding the phenomena at hand." This tension between the need for quantifiable measurements of controlled experiments on one hand and socially appropriate observational studies of behavior on the other exists beyond the realm of language contact to all aspects of socioprosodics.

The role of language contact on intonation change and the mechanisms through which this is achieved are among the most frequent research questions. Several mechanisms have been explored, which have been borrowed from the literature on contact in other grammatical levels. These include "direct transfer" (i.e., of features from L1 to L2 through "imperfect" learning), "fusion" (mixing of two systems into one that differs from those used by monolinguals), "accommodation" (adopting characteristics used in one social group of speakers by another), "borrowing," "convergence," and "divergence" (see Sankoff 2013 for discussion of potential results of language contact) though it is still unclear what the definitions of these terms are, regarding intonation, and which characteristics of intonation they target (for discussion see, e.g., Roseano et al. 2015; Mascaró & Roseano 2020; also for a discussion of convergence vs borrowing see Colantoni & Gurlekian 2004 or Mennen 2004). Further questions on language contact involve the direction of transfer—that is, from native (L1) to non-native (L2) or the reverse, whether there are specific borrowability scales whereby some intonational characteristics are more prone to change than others (Kireva 2016:246), what factors facilitate change, such as genetic and typological similarity between languages, intensity of contact, attitudes towards L2, as well as how well the effects of historical contact survive after contact ceases.

A special case of language contact, New Englishes, has brought to focus questions about whether and to what degree individual postcolonial varieties progress towards endonormativity in developing, using, and publicly sanctioning their own distinctive linguistic forms (Meer & Fuchs 2021). One hypothesis examined in this literature is that after the establishment of political independence, speakers of these varieties increasingly adopt and produce local forms of English even in formal contexts, such that the emerging New English variety is "recognizably distinct" from the former (British) colonial standard in a number of respects (Schneider 2007:50-51) and also that these local forms are viewed positively (2007:49).

Apart from the small-scale studies mentioned so far, in the new millennium several large-scale studies have appeared which have created online corpora and intonational atlases, such as the *Interactive atlas of Romance intonation* (Prieto, Borràs-Comes & Roseano 2010-2014), *AMPER* (Martínez Celdrán et al. 2003-2020), and the *IViE* corpus (Grabe 2004). Studies like these concentrate on typological and dialectometric questions, incorporating social aspects beyond dialect and gender in their exploration of intonational variability, thus contributing to the field's knowledge of socioprosodics.

Questions within third-wave approaches to variation explore style as intra-speaker variation rather than the more traditional view of style as inter-speaker variation (e.g., Podesva, Roberts & Campbell-Kibler 2002; Fagyal & Stewart 2011; Podesva 2011; Fine 2019a; Holliday, Bishop & Kuo 2020). Style in this sense expresses a fluid construction of identity which depends on communicative context. For example, researchers have examined the connection between f0 contour patterns and the expression of more- versus less-animated personas (Podesva 2011) or between f0 height and personas expressing different sexual orientation (Fine 2019a).

Several interesting questions arise in connection to the perception of intonation in socioprosodics, although the perceptual side of socioprosodic research is lagging behind research on production. In general, there is an imbalance in the amount of research devoted to specific questions within broader questions. More work has been done in socioprosodics through essentialist views of inter-speaker social categories such as gender, dialect (crossed with socioeconomic status), and ethnic background (e.g., contact studies, bilingualism, L2) than through intra-speaker third-wave approaches such as social networks, sexual orientation, and expression of gender identity.

Prominent methods and approaches

Despite the different methodological approaches between sociolinguists and prosodists outlined above, lately there is a trend towards bridging the gap in at least one respect, that is, between natural/conversational speech and controlled speech by combining tasks that elicit controlled, semi-spontaneous, and naturally occurring speech (e.g., Grabe, Post & Nolan 2001; Vella 2003; Elordieta & Calleja 2005; Aly 2017; Bleorţu & Cuevas Alonso 2017; Correa 2017; Baltazani, Przedlacka & Coleman 2019). Collection methods include sociolinguistic interviews (Barrera-Tobón 2013; Romera & Elordieta 2013; McLarty 2018), Map Task dialogues (Queen 2001; Grabe & Post 2002; Dalton & Ní Chasaide 2003, 2005; Grice & Savino 2003; Fletcher, Grabe & Warren 2005; Simonet 2008; Savino 2012; Henriksen 2013; Hellmuth 2014), story-builder cards (Queen 2001; Muntendam & Torreira 2016; Fenton, Bustin & Muntendam 2020), Discourse Completion Tasks (Prieto & Roseano 2010; Astruc, Vanrell & Prieto 2016; Fernández Rei 2016; Kireva 2016; Aly 2017; Gryllia, Baltazani & Arvaniti 2018), retelling of a familiar story (Grabe, Post & Nolan 2001; Barnes & Michnowicz 2013; Stewart 2015; Takano & Ota 2017), and interactive card games (Lai & Gooden 2018a, b). Despite the frequent warning against lab-controlled speech and the recommendation for spontaneous speech, systematic comparisons of the two are few (for examples of comparisons, see e.g., Silverman et al. 1992 on rising contours in American English; Blaauw 1995 on Dutch; Face 2003 on Spanish; Serra 2009 on Brazilian Portuguese; Barnes & Michnowicz 2015 on Veneto-Spanish contact; Peng et al. 2005 on comparisons across dialects of Mandarin and code switching).

One area where differences do exist between prosodists and sociolinguists is in which features of intonation are measured. We focus on acoustic approaches to measurement of intonation which involve measuring the fundamental frequency (f0) of the pitch contour and how that relates to the segmental material. While these approaches are most frequently used currently, we recognize that prior approaches included auditory coding (e.g., Bolinger 1972) and that other non-acoustic instrumental approaches are also beginning to appear (e.g., articulatory analyses of intonation, Katsika et al. 2020). On one hand, prosodists typically attend to phonological aspects of intonation and their local, fine-grained, contextually

influenced phonetic realization, such as alignment (the temporal synchronization of tones with segmental tone bearing units), scaling (the absolute f0 value of particular tones), downstepping (the scaling of tones relative to preceding ones), or truncation and compression of tones due to tonal crowding. These measures have been used to examine intonational variability due to dialects, socio-economic status, and bilingual speech. For instance, Fletcher, Grabe & Warren (2005) examine the high rising terminal (HRT) tune which accompanies syntactically marked declarative utterances as well as yes/no questions in Australian and New Zealand English. They present new data on HRT in Australian English which show that the use is not only found in speech of young adolescent females (where it was associated with low prestige varieties and was stigmatized) but has extended to both genders and "it is often used as a floor-holding device" (2005:399) (for other studies using such intonational measures to examine intonational variability, see Guy et al. 1986 for HRT in Australian English; Grabe et al. 2000 for British English varieties; van Heuven & Haan 2000 for Dutch; Atterer & Ladd 2004 for German varieties; Warren 2005 for HRT in New Zealand English; Vion & Colas 2006 for French; Arvaniti & Garding 2007 for American English varieties; Baird 2015 for K'ichee'-Spanish bilinguals; Maxwell & Payne 2018 for Indian Englishes).

On the other hand, sociolinguists often employ global phonetic metrics of f0, which can be thought of as more "traditional" in the sense that they predate the advent of the AM framework and sometimes even the advent of sociolinguistics (e.g., Mysak 1959, investigating differences in such global measures between age groups; McGlone & Hollien 1963, looking into differences in pitch range among women after puberty, which does not vary significantly, even in advanced age groups). These include speech rate and variation in intensity (Rodero Antón 2013), global pitch range over a whole utterance (e.g., Henton 1995; Podesva 2011; Fine 2019b), phonetically-defined pitch movements (Stanford 2010; Fagyal & Stewart 2011; Fine 2019b), pitch variability around the pitch mean and "dynamism" (Henton 1995; Stanford 2010; Lee & Van Lancker Sidtis 2017; Meer & Fuchs 2021). In a number of these studies no correlation has been possible between the continuous/global phonetic intonation measures and the sociolinguistic variables, which may indicate that such coarse-grained measures are not appropriate and should be counterbalanced with more fine-grained measures, such as those within the AM framework.

A similar imbalance between prosodists and sociolinguists relates to the social factors employed to account for intonational variation, with the former lagging behind in their adoption of the latest theoretical developments in sociolinguistics. With some exceptions, many phonological papers on intonation only included sex, dialect, and level of education (e.g., Martínez Celdrán et al. 2003-2020; Prieto, Borràs-Comes & Roseano 2010-2014; Clopper & Smiljanic 2011; Gabriel, Feldhausen & Pešková 2011; Barrera-Tobón 2013; Stewart 2015; Muntendam & Torreira 2016). Lately, however, studies have included more nuanced divisions in the sociolinguistic variables they examine as explanatory factors of intonational variation, such as intensity of language contact (Kireva 2016; van Buren 2017; Kaminskaïa 2018; Baltazani, Przedlacka & Coleman 2020; Elordieta & Romera 2020), race or ethnic identity (Lipski 2010; Holliday 2016; Fenton, Bustin & Muntendam 2020; Elordieta & Romera 2020), social prestige (Colantoni & Gurlekian 2004; Enbe & Tobin 2008; Lleó & Gabriel 2011) or stigmatization (Hualde & Schwegler 2008), social networks (Miller 2007; Correa 2017; McLarty 2018), and social distance (Astruc, Vanrell & Prieto 2016). On the other hand, the social attributes that sociolinguists explore as indices of intonational variation include differences in social category membership, such as gender and sexuality (Podesva 2011; Fine 2019a), generation (Stanford 2010), or political stance (Holliday, Bishop & Kuo

2020), but also changes in style which express the adoption of different personas (Gaudio 1994; Fagyal & Stewart 2011; Podesva 2011; Yaeger-Dror et al. 2010; Slobe 2018; Fine 2019a, 2019b; Holliday, Bishop & Kuo 2020).

The methodology and measures employed in socioprosodics also depend on the specific field of a study. For example, dialectometry, a quantitative method which measures phonetic distance between segments, has been extended to intonation with measurements of f0 alignment and scaling to illuminate historical trajectories in intonation (Sullivan 2011) and to characterize intonation differences between varieties within Romance (e.g., Martínez Celdrán et al. 2003-2020; Moutinho et al. 2011; Roseano, Elvira-García & Fernández-Planas 2017; Elvira-García et al. 2018). Intonational variability has also been the basis of atlases, using parallel corpora which facilitate cross-linguistic comparisons and also include sociolinguistic variables beyond dialect, such as gender, age, and education level (e.g., Prieto & Roseano 2009-2013 for Spanish; Prieto, Borràs-Comes & Roseano 2010-2014 for Romance).

The diachronic development of intonation frequently concentrates on generational differences, using apparent- or real-time data from contemporary (Mzemba 2014 for French-English contact; Lee & Jongman 2015 for Korean; Fenton, Bustin & Muntendam 2020 for Afro-Peruvian Spanish) or archival (Pešková et al. 2012 for Porteño Spanish; McLarty 2018 for African American vs European American English; Baltazani, Przedlacka & Coleman 2019 for Greek-Turkish historical contact) sources. Most of these studies employ AM methods for intonational analysis, while Baltazani, Przedlacka & Coleman (2019) additionally use mathematical modelling of f0 contours.

Pragmatic meanings (see House 2006 for a review) can confound sociolinguistic analysis (Milroy & Gordon 2003:185; Foulkes, Scobbie & Watt 2010:721). Some researchers prefer the use of read speech or map tasks, where the pragmatic interpretation is controlled (e.g., Grabe et al. 2000; Grabe & Post 2002; Dalton & Ní Chasaide 2003; Grabe 2004; Dalton & Ní Chasaide 2005), while others code for pragmatic function in corpora. For example, Stirling et al. (2001) investigated the interplay between prosody and discourse structure in the ANDOSL Australian map task corpus, where the level of familiarity between participants in the map task varied between "known" and "unknown" and the role of each participant varied between "instruction-giver" and "instruction-follower" (see also, Fletcher & Harrington 2001; McGregor & Palethorpe 2008; Ritchart & Arvaniti 2014).

Larger-scale studies spanning more than one variety of a language are typically conducted by prosodists and frequently employ a multi-layered corpus approach, with recordings of read utterances controlled for parameters of interest, narrative retelling of a story, map task (e.g., Grabe, Post & Nolan 2001 for intonational variation in English; Hellmuth 2014, 2020 for variation in Arabic), or variations of these. Further tasks in large-scale projects (e.g., AMPER [Martínez Celdrán et al. 2003-2020]; IARI [Prieto, Borràs-Comes & Roseano 2010-2014]) include Discourse Completion Tasks (DCT), interviews, and what is called a "textual elicitation corpus,"—that is, acted laboratory speech sentences (Romano, Lai & Roullet 2005). The DCT is a common method in intonation studies (e.g., Vanrell, Feldhausen & Astruc 2018) which consists of presenting a daily-life situation to which the speaker is expected to produce an utterance they would use in a target tune, for example a statement or a question. Frequently f0 measurements in such studies are time-normalized and converted to semitones (e.g., Lai & Gooden 2018a; Baltazani, Przedlacka & Coleman 2019).

In comparison, within studies of sociolinguistics and style, several factors have been examined as sociolinguistic reasons for intonational patterns, such as prestige and politeness

(Enbe & Tobin 2008), and gender, sexuality, and expressive affect (Podesva 2011; Henriksen 2013; Esposito 2020). Additionally, formal versus informal speech style as well as interlocutor (e.g., human vs computer screen) have been investigated. Some examples include using gap tasks where participants are asked to fill empty speech bubbles in drawings of characters in different situations (Henriksen 2013), differences between friendly phone calls and recordings versus newscasts (e.g., Kato 2001; Yaeger-Dror, Hall-Lew & Deckert 2002; Takano 2008), societal norms of power and solidarity (Brown & Gilman 1960; Watts 2003), stylized genres such as story-telling, telephone speech, sports reporting, and political or religious speeches (Liberman & McLemore 1992; Hirschberg 2000), speech stances, such as informative, supportive, remedial, and self-protective (Yaeger-Dror, Hall-Lew & Deckert 2003).

Finally, in perception studies addressing language or dialect discrimination (e.g., Gooskens 1997 and van Bezooijen & Gooskens 1999 for Dutch and English; Peters et al. 2002 for varieties of German; van Leyden 2004 for Orkney and Shetland English; Gooskens 2005 for Norwegian), or perceived distance between intonational patterns of distinct dialects or languages (e.g., Gili-Fivela 2012; Simon et al. 2012; Fernández Planas et al. 2013), speech is frequently manipulated, resynthesized, or low-pass filtered to remove segmental information. Forced-choice and discrimination tasks are used and distance matrices are created, based on confusion matrices, which are further submitted to cluster analysis. The Open-Guise Technique (versus the more common Matched-Guise Technique) of using a single speaker known to style shift is discussed in Holliday and Villarreal (2020).

Perception studies from a bilingual perspective have examined the impact of intonation and code switching on the perception of some characteristic, for example narrow focus, via manipulation of H tone (or "peak") alignment and H tone scaling (or "peak height") (Olson & Ortega-Llebaria 2010). The encoding of politeness in intonation is usually examined through pitch height and range in connection with politeness, friendliness, or deference ratings. For example, Gryllia, Baltazani & Arvaniti (2018) found that Greek wh-questions ended in a higher final boundary tone when the interlocutors were non-solidary and when there was a power difference between them, whether the speaker was inferior or superior to the addressee (see also Goodwin, Goodwin & Yaeger-Dror 2002 for Hispanic and African American elementary school girls; Chen, Gussenhoven & Rietveld 2004 for Dutch and English; Orozco 2008, 2010 for Mexican Spanish; Winter & Grawunder 2011, 2012 and Brown et al. 2014 for Korean; Devís Herraiz & Cantero Serena 2014 for Catalan; Brown et al. 2015 for Korean, Japanese, German and Russian).

Summary

In this section we have focused on both phonological and sociolinguistic approaches to the study of intonation, each of which in turn incorporates the other as a secondary consideration. However, it is this juxtaposition that demonstrates the range of perspectives encompassed by socioprosodics.

Socioprosodic insights

Variation across dialects and social groups

Geographic differences in intonation have often been studied in tandem with segmental variation. Advances in intonation dialect research have led to the development of large online databases, which typically include multiple speakers from a large number of locations. These speakers are sometimes differentiated according to social factors such as gender, education, or social class, and may be monolingual or bilingual speakers of a given dialect depending on the corpus. However, the emphasis is on uncovering dialectal differences. Beyond these, a notable amount of intonation studies has included first wave social factors such as gender, age, and education/socioeconomic status (e.g., Moreno Fernández 1999 on Peninsular [Alacalá] Spanish; Froemming 2020 for Ecuadorian [Cuenca] Spanish).

Of the social factors, gender has received the most attention. Females show greater use of final H% and a richer inventory of pitch contours over males in prepared TED talks (Huang & Zhang 2019). More instances of uptalk (final rises) by females compared to males were found in speech in game shows (Linneman 2013 for English; Vergara 2015 for Spanish), with some discourse functions of uptalk having similar frequency of use in both groups ("showing camaraderie" and "softening a command") and some being used more by males ("holding the floor") and females ("flirting"). In Standard Southern British English, among adolescents, H% boundary tones are more frequent among females than males (Jiang 2011; see also Nance, Kirkham & Groarke 2018 for analysis of gender effects in Liverpool English intonation). In Belfast English, considering the indexicality of intonation, Lowry (2011:226) concludes, "the direct association is between expressiveness and nuclear falls, and only indirectly between nuclear falls and females." Lowry's (2011) work aligns with third wave sociolinguistics by not taking social category as the defining characteristic of the prosodic behavior a priori, but rather starting from the intentionality of the speaker to be more expressive, after which correspondences related to gender are observed. Reed (2016, 2020) recasts geographic space as an aspect of identity by looking at the local orientation or "rootedness" of speakers to a region as expressed through their use of intonation patterns.

Some intonation studies include information regarding participants (age, gender, education level, or social class) with no specific socioprosodic research question to be explored, but rather hold one or more variables constant (for example, only reporting data from females or members of the same age group—e.g., Willis 2003; Elordieta & Calleja 2005; Alvord 2010). While this may not afford any immediate claims to social factors for the given study, this information is still important since it allows for comparison with subsequent research. Beyond a binary gender distinction between male/female speakers, there are studies that connect intonation with other gender identification, such as Queer identity (Shar 2018) which shed further light on the ways speakers may leverage intonation in connection with gender performativities.

Fewer studies focus specifically on age differences within a given dialect. No clear intonation differences due to age group were found in Mexican Spanish sociolinguistic interviews by male and female speakers from the lower social class who were distributed evenly between three age groups (Martín Butragueño 2004). Differences are reported in post-focus compression (PFC) between younger, mid-age, and older age groups, who were sequential Southern Min-Mandarin bilinguals (Chen, Xu & Guion-Anderson 2015). Some age-related intonation differences are also reported between young children, mid-age and older adults in Argentinian Spanish (Enbe & Tobin 2008).

Bilinguals and language contact - Historical or synchronic perspective

In bilingualism research, transfer is sometimes reported from the direction of the dominant/majority to the non-dominant/minority language (e.g., Kaminskaïa 2018; Lai & Gooden 2018a; Kim & Repiso-Puigdelliura 2021), sometimes in the reverse direction (e.g., Elordieta 2003; Colantoni & Gurlekian 2004; O'Rourke 2004, 2005; Elordieta & Calleja 2005; Gabriel, Feldhausen & Pešková 2011; Baird 2015; Lai & Gooden 2018b; Maxwell & Payne 2018), and sometimes in both (Bullock 2009; Queen 2012; Kireva 2016). To our knowledge, no typology of intonational changes exists yet, but Kireva (2016:246) proposed a hierarchy of features more (to less) likely to change: "Prenuclear accents > Focus markers > Nuclear configurations > Prosodic phrasing > IP-final lengthening."

Few typological discussions exist on intonation contact outcomes (e.g., divergence, convergence, transfer, interference, shift, borrowing) and how these outcomes relate to observations for other levels of grammar (but see Gooden 2022 for a review of intonation in Creole languages). However, a number of studies have appeared which discuss the effect of contact on the intonation of single languages. For example, Colantoni & Gurlekian (2004) discuss phonetic convergence in peak alignment as the result of Argentinian-Italian contact in Porteño Spanish, a term that McMahon (2004) rejects, in favor of "borrowing," on the grounds that convergence describes bi-directional change, while the change in Porteño involves one-way transfer from Italian to the dominant Argentinian Spanish. Colantoni & Gurlekian opt against "borrowing" because the term usually refers to transfer from a majority to a minority language, not the direction found in Porteño. The need for clear terminological definitions suitable for intonational empirical data emerges from the dialogue between these two papers, "without presupposing they will be similar to the mechanisms of contact-induced change on segments" (McMahon 2004:122).

Some intonational effects of language contact are phonological, as has been reported in Queen (2012), who found that a Turkish-like terminal rise contrasts with a German-like one in Turkish-German bilinguals in Germany, differing in alignment, slope (how fast f0 rises or falls), and pragmatic interpretation from each other (and from those of monolinguals). On the basis of this evidence, Queen (2012) argues that there is no intonational attrition found in Turkish-German bilinguals, who instead have added German phonological categories to their intonational repertoire. Similarly, no attrition of French is found among heritage speakers in Pennsylvania, who, in addition to the French, have also adopted additional pitch accents from the dominant English (Bullock 2009), but compare with Mzemba (2014, 2016) which show increasingly more English-like patterns among younger speakers.

The mechanism of code-switching has been studied in a number of papers in relation to intonational contact and social factors. For example, in Pijal Media Lengua, a Quichua-Spanish mixed language, this mechanism is connected with the predominance of Quichua intonation patterns (Stewart 2015). In code-switching between Occitan and Southern French, more conservative speakers use the Occitan rising-falling pattern with higher frequency while less conservative speakers adopt the standard French pattern (Sichel-Bazin, Buthke & Meisenburg 2012). Differences in pitch accent category in the intonation of adult monolingual Spanish speakers who recently adopted L2 Majorcan Catalan prosodic patterns were attributed to a desire by immigrant L1 Spanish speakers for approval by the native Majorcans (Romera & Elordieta 2013). L1 influences are documented in L2 English termed "World Englishes," such as Cameroon English (Simo Bobda 2004), Nigerian English (Gut 2005; Gussenhoven & Udofot 2010), South African English (Zerbian 2013), and Indian English (Maxwell 2014; Maxwell & Payne 2018).

On the phonetic side, peak alignment differences are reported between contact and non-contact varieties of the same language. The monolingual Spanish late prenuclear peak alignment differs from early peak alignment in contact varieties of Spanish with languages that are either typologically similar, for example, Venetian (Barnes & Michnowicz 2015), English (Alvord 2006, 2010; Barrera-Tobón 2013; Aly 2017; Kim & Repiso-Puigdelliura 2021), and Italian (Colantoni & Gurlekian 2004; Colantoni 2011), or typologically different, such as Basque (Elordieta 2003; Elordieta & Calleja 2005), Quechua (O'Rourke 2004, 2005), Yucatec Maya (Michnowicz & Barnes 2013), and K'ichee' Mayan (Baird 2015). Evidently, typological distance between the source and receiving languages is not a determinant of change, contrary to reports made about typological distance for other aspects of grammar (e.g., Thomason 2008). Several other factors need to be explored to account for such variation, as argued in O'Rourke (2006) who reports that Peruvian Spanish speakers employ level and upstepped prenuclear peaks both in Lima and Cusco, such that several factors (linguistic, pragmatic, and sociolinguistic) may "explain this use in Peruvian Spanish" (2006:72).

Peak alignment differences do not correlate neatly with geographic variety but have been attributed to sociolinguistic factors such as language dominance. For example, Canadian French in contact with dominant English in Ontario displays later peak alignment than French in Québec and Vendée where English is non-dominant (Kaminskaïa 2018). A strong sense of ethnolinguistic Venetian Italian identity is documented as a factor regulating early peak alignment for younger speakers in Chipilo Spanish in Mexico, which distinguishes them from the mainstream Mexican culture (Barnes & Michnowicz 2013). Different intonational patterns among younger generations which serve as identity markers are also cited for Cuban-American speakers in Miami (Alvord 2010), Spanish-English bilinguals in New York City (Barrera-Tobón 2013), and Argentinian-Italian speakers of Porteño (Pešková et al. 2012).

In Afro-Peruvian Spanish, females and older speakers use more delayed peaks and falling tones in prenuclear position compared to males and younger speakers (Fenton, Bustin & Muntendam 2020). In Palenquero, a Spanish-based creole language mixed with the African language Kikongo spoken in Colombia, conservative older-generation speakers use invariant HL word-level contours (Hualde & Schwegler 2008) while younger speakers have generalized the use of an emphatic upstepped final high tone to non-emphatic contexts (Lipski 2010); see also Hernandez (2020) for the effects of age, gender, and language dominance on the intonation of Galician-Spanish bilinguals.

Uptalk in monolingual Mexican Spanish speakers differs phonetically from that of heritage Spanish speakers in the United States; Kim & Repiso-Puigdelliura (2021) found that English-dominant heritage speakers produced higher final rises, smaller pitch excursions, and a flatter slope than monolinguals and less English-dominant speakers. The monolingual uptalk pattern was attributed in Mexican Spanish to a *fresa* elitist style (see also Holguín-Mendoza 2011; Martínez Gómez 2018), while the heritage uptalk pattern was ascribed to influence from English. Peak alignment differences have been detected in nuclear pitch accents of Cuba-born Spanish speakers in Miami between code-switched and monolingual utterances, as well as between the code-switched utterances of Miami-born speakers who produce more English-like pitch accents (e.g., H*) and the Cuba-born ones who prefer the Spanish-like L+H* accent (Aly 2017). Higher H scaling and larger pitch span has been reported in the non-dominant language of K'ichee' Mayan-Spanish bilinguals, attributed to the bilinguals' uncertainty or lower confidence in their less-dominant language (Baird 2019).

Unlike the intonational effects of synchronic contact, there is still scarce evidence regarding how long these persist after contact has ceased. The intonational effects of Italian immigration to Argentina, from 1830 to 1950 mentioned above, are still present today (Colantoni & Gurlekian 2004; Gabriel, Feldhausen & Pešková 2011; Pešková et al. 2012). Similar lasting effects have been reported for the influence of Turkish on Asia Minor Greek heritage speakers, whose contact with Turkish ceased in 1923 (Baltazani, Przedlacka & Coleman 2019, 2020). There are also reports of present effects of past Afro-Spanish contact (Rao & Sessarego 2016, 2018; Fenton, Bustin & Muntendam 2020) and African-English contact (McLarty 2018). Hualde (2003) presents a diachronic reconstruction of intonational patterns of a proto-language in Romance, using Occitan as an intermediate step in the development of prosody, bridging the gap between French and Ibero- and Italo-Romance.

Perception and pragmatics

Perceptual studies have explored which listener characteristics are associated with perceptual differences in intonation. In some studies, characteristics such as gender, race, political affiliation, or bilingual background were not found to be significant. For example, higher peaks in manipulated tokens were associated with black compared to non-black speech, regardless of hearer characteristics (Holliday & Villarreal 2018, 2020) and narrow focus was perceived with the manipulation of peak height and alignment in code-switched utterances (Olson & Ortega-Llebaria 2010). In other studies, listener characteristics did contribute to differences in the perception of intonation. Female listeners judged the high-ending wh-question contours of female talkers (but not male ones) as more polite than the low-ending ones (Arvaniti, Baltazani & Gryllia 2014). The listeners' exposure to non-Salerno dialects was one factor affecting their interpretation of biased questions in Salerno Italian (Orrico & D'Imperio 2020).

Other questions explored in perceptual experiments include whether intonational features are associated with social characteristics and whether these features carry enough information for dialect or language discrimination. Based on prosody alone, English listeners were able to identify dialects of their own language whereas Dutch listeners were not (van Bezooijen & Gooskens 1999) and in Shetland and Orkney speech, peak alignment strongly correlated with dialect classification (van Leyden 2004). In Nijmegen Dutch, pitch variation is strongly associated with dominance, willpower, and self-confidence, but not with education and social position (van Bezooijen 1988). Significant differences in perception of transgender male-to-female speakers were found, with rising contours and larger pitch range being perceived as female (Hancock, Colton & Douglas 2014).

The indexical function of intonation and the assigned social meaning of sociolinguistic stereotypes has been explored in the upper class *fresa* speech style in Mexico where audio clips of uptalk were matched more with photos of stereotypical *fresa* style compared to other photos (Martínez Gómez 2018). Similarly, the interpretation of a sentence-final contour in French as a question or a statement depended on visual cues from the dialect region, that is, a Corsican or Parisian newspaper (Portes & German 2019). Social cues affected the interpretation of final rises in New Zealand English as declaratives or questions, such as whether a SQUARE diphthong preceding the rise was realized as an [iə] or an [eə] (typical of younger or older speakers respectively), indicating a link between older speakers' preference for both [eə] and non-rising statements (Warren 2017).

Intonational variation in Greek was related to politeness (operationalized as levels of power, solidarity, and familiarity) in a DCT where listeners judged rising wh-questions as more polite than falling ones (Gryllia, Baltazani & Arvaniti 2018). Rising Catalan yes/no questions were more likely to encode high-cost offers and requests (which require more politeness) than falling patterns (Astruc, Vanrell & Prieto 2016). Women produced polite requests in Mexican Spanish with a high boundary and wider pitch range more frequently than men (Orozco 2008). Preschool children used intonational and visual cues to interpret rising questions as polite and falling ones as impolite (Hübscher, Wagner & Prieto 2020; see also Brown & Prieto 2017 for the prosodic study of (im)politeness).

This discussion of politeness is just a portion of the work that can be conducted on pragmatics, social factors, and intonation within a socioprosodic framework (see Wharton 2012; Clark 2017; Hirschberg 2017 for overviews of pragmatics and intonation/prosody; see Armstrong & Prieto 2015; Tomlinson, Gotzner & Bott 2017; Baltazani, Gryllia & Arvaniti 2020 for recent experimental work on pragmatics and intonation).

Style

Intonational variation connected to race has been reported between mainstream US English and African American Language (AAL), which contains more pitch accents (McLarty 2018), more frequent use of L+H* pitch accents (Holliday 2016; McLarty 2018), different types of boundary tones (McLarty 2018; Holliday 2019), and a different inventory of tones (Gooden 2009; Thomas 2015). Not all these characteristics of AAL were confirmed when race was combined with style (Holliday, Bishop & Kuo 2020) and the only association found was between the frequency of L+H* pitch accents and a politician's (Barack Obama's) alignment with an AAL-like intonational pattern to express disapproval of a proposition. In political speech, intonational differences have been found to signal a politician's stance for or against specific issues (Mendoza-Denton & Jannedy 2011) as well as a combination of a politician's ethnicity, stance, and affect (Holliday, Bishop & Kuo 2020). Ethnicity combined with age determined the response of Hmong-American speakers in Minnesota to an interviewer (Stanford 2010). Older men style-shifted into an "authoritative voice" (using increased pitch, pitch variance, and acoustic intensity) whereas women and younger men did not use this speech style. In Japanese, younger generations across different dialects use flatter overall pitch contours (Takano & Ota 2017).

Perceived group membership (in-group vs out-group) with the addressee often conditions prosodic variation. Fagyal and Stewart (2011) report that while neutral intonation was used with all groups, a marked intonation contour (connected with working-class youth vernacular in contact with immigrant languages) was reserved to members of the peer group. Formality and prestige are associated with f0 variation, with Belfast English speakers adopting falling pitch accents in formal settings, emulating the prestige variety of British English, but rising pitch accents typically found in both interrogatives and declaratives are associated with informal contexts in the local vernacular (Lowry 2002).

Style has been examined more extensively in studies with a sociolinguistic background. Examination of newscasters' style showed more use of the middle 50% and highest quartile of their pitch range, a lower minimum f0 and more L+H* pitch accents compared to non-newscasters (Rodero Antón 2013). Female newscasters had a lower maximum f0 and larger f0 standard deviation than non-news counterparts. Style is treated recently as an intra-speaker

fluid construction of identity which changes throughout an individual's communicative context (e.g., Podesva, Roberts & Campbell-Kibler 2002; Fagyal & Stewart 2011; Podesva 2011; Slobe 2018; Fine 2019b; Holliday, Bishop & Kuo 2020) rather than as the more traditional view of style as inter-speaker variation which is a function of attention paid to speech in the formality-informality axis (e.g., Labov 1966). In Podesva (2011), style was associated with salience: the least frequent f0 contour patterns, viewed as more salient, were used for indexing social meaning, and more extreme f0 values conveyed more "animated" personas.

In the same vein of fluid construction of identity, Fine (2019a) demonstrated correlations between style and variation in f0 height and range between personas expressing different sexual orientations. The results on the effect of sexual orientation on intonation, though, give a mixed picture. No significant difference in f0 min, max, and pitch range were reported between gay and non-gay speakers (Podesva, Roberts & Campbell-Kibler 2002) and no significant correlations emerged between pitch range and variability with listener ratings of men's speech such as "gay" versus "straight" and "masculine" versus "effeminate" (Gaudio 1994). On the other hand, there are reports that lesbian women had significantly lower mean f0 and less pitch variation than heterosexual women (Camp 2009; van Borsel, Vandaele & Corthals 2013).

Case study
Gender, language dominance, and attitude in intonation

Intonation has been shown to vary across dialects and due to language contact. Recent studies have also begun to consider other contributing factors such as attitude and degree of contact (Elordieta & Romera 2020) and language dominance (Hernandez 2020). In the present study, the intonation of read declaratives in Peruvian Spanish is compared according to gender, language dominance (in Spanish versus Quechua), and linguistic attitudes. The aim is to determine if and how these factors contribute to differences in intonation features.

Peruvian Spanish dialects have traditionally been divided according to highland Andean versus lowland coastal regions (Escobar 1978), with the Amazon as another area in need of investigation (Fafulas 2020, Jara et al. forthcoming). In addition, Quechua-influenced speech is recognised within the speech communities and has been remarked upon in the literature (Escobar 2011). Some prosodic features in Peruvian Spanish have been analyzed for their influence from Quechua, such as pretonic-aligned peaks or lack of downstep (O'Rourke 2004, 2006; Muntendam & Torreira 2016).

Methods

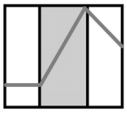
The participants were 19 speakers, ages 20-34, including 4 (3M, 1F) from Lima and 15 from Cusco (9M, 6F), representing coastal and highland varieties respectively. Each participant read a series of 10 pronominal question-and-answer pairs twice. Responses were declaratives with utterance-final narrow focus which contained between three and six stressed syllables and varied according to syllable type and lexical stress pattern (O'Rourke 2020).

The alignment and height of peaks were measured in Praat (Boersma & Weenink 2021). Non-final peaks appearing during the stressed syllable were considered tonic-aligned (TA), while those occurring after the stressed syllable were counted as delayed (Del). Peak-to-peak height differences greater than 7 Hz were considered to be downstepped (Down), whereas differences less than 7 Hz as well as higher subsequent peaks (i.e., level or upstepped) were noted as a suspension of downstep (Spnd) (Klatt 1973; O'Rourke 2006). In all, 1197 prenuclear peaks and 1191 peak pairs were analyzed for alignment and height.

In many (if not most) cases, these peaks may be preceded by a low tone, which has not been the focus here. This bitonal accent would include either a tonic-aligned peak, L+H* or a delayed peak, L+<H* (see Figure 1; Hualde & Prieto 2016). While delayed and downstepped peaks are typical in Spanish under broad focus conditions, aligned and upstepped peaks are found in non-neutral contexts, such as in contrastive focus (Prieto & Roseano 2010). Crosslinguistic and crossdialectal issues arise when these tonic-aligned or upstepped peaks signal marked conditions in one variety but a more neutral interpretation or meaning in another. Elicited utterances are shown in Figure 2, with examples of delayed and downstepped peaks on the left and tonic-aligned and upstepped peaks on the right.

Figure 1. Bitonal pitch accents with tonic-aligned and delayed peaks

a) L+H*



b) L+<H*

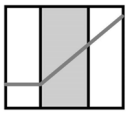
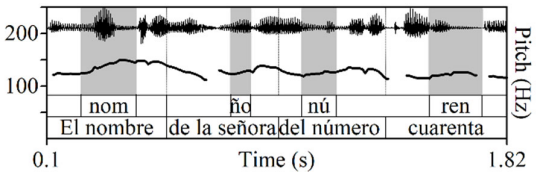
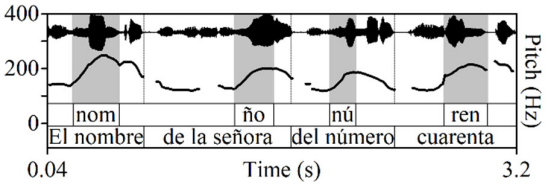


Figure 2. Sample utterance 'El nombre de la señora del número cuarenta es Gabriela' ("The name of the woman of the number forty (apartment) is Gabriela" with stressed syllables in separate tier

a) Lima male monolingual Spanish speaker



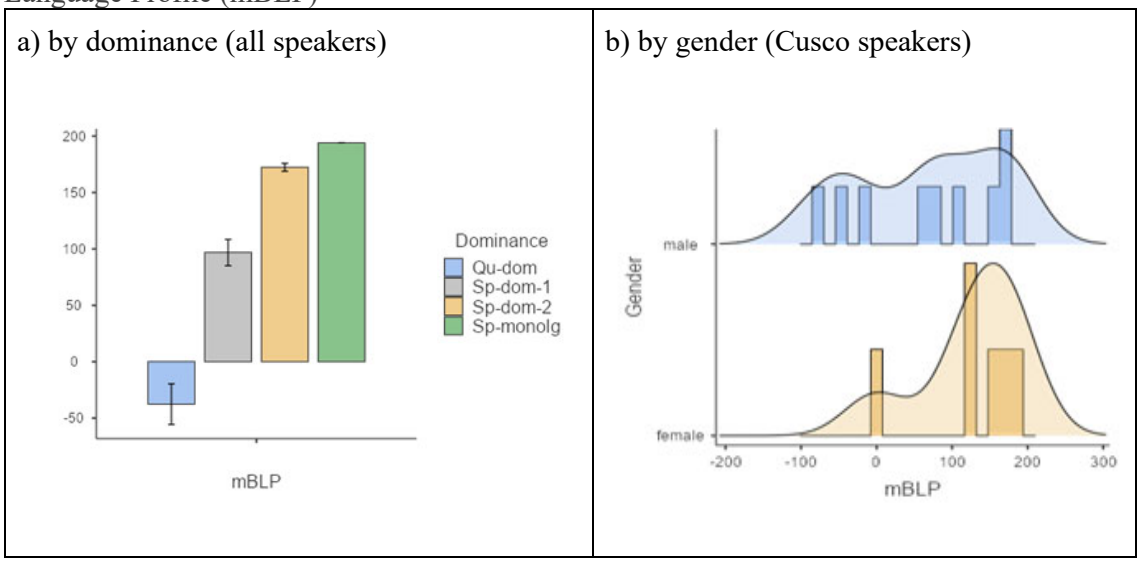
b) Cusco male Quechua-Spanish bilingual



To measure language dominance, a modification of the Bilingualism Language Profile (Birdsong, Gertken & Amengual 2012) or mBLP was used which included three modules weighted so that each contributed a third to the overall score: language history (120 points; weighted 0.539), language use (50 points; 1.29), and language proficiency (24 points; 2.69).

Participants' distribution according to dominance is shown in Figure 3a, where values from 0 to 194 indicate Spanish-dominance and values from 0 to -194 indicate Quechua-dominance. All Lima Spanish speakers scored at 194 and are shown as Spanish monolinguals. Spanish-dominant speakers are subdivided into those closer to the Spanish-monolinguals and those with more intermediate values. Cusco participants' dominance by gender is shown in Figure 3b. Statistical analysis and graphs were created in jamovi (Selker et al. 2022) in R (R Core Team (2022).

Figure 3. Participants' distributionas measured by a modification of the Bilingualism Language Profile (mBLP)



Participants also completed a language history questionnaire and responded to a short attitude survey. Since the language attitude statements were about promotion of language use and language planning, these were analyzed separately from the mBLP. The statements can be subdivided by theme: Castilianization (or a move towards use of Spanish and other Indo-European languages), Maintenance, and Expansion of indigenous languages. Examples are in (1)-(3) below:

(1) It is better that everyone speaks Spanish in order to be able to communicate better. [Castilianization]

(2) It is important to maintain the autochthonous languages (like Quechua or Aymara) in the places where they are spoken. [Maintenance]

(3) Quechua (or Aymara) should be taught to all children, including those in Lima, in order to be able to communicate better with people who speak Quechua (or Aymara). [Expansion]

Responses were scored as "No"=1, "Not sure/It's complicated"=2, and "Yes"=3. Ratings with low scores were considered weak support, intermediate ratings as mid-range support, and high scores as strong support for a given attitude statement. All participants showed nearly categorical support for maintenance, so these will not be further discussed.

Results

Contingency tables for alignment and height were created with the independent variable (IV) being either gender (male, female), language dominance (Qu-dom, Sp-dom-1, Sp-dom-2, Sp-ML), or attitude (weak, mid, strong). A Chi-square test of independence was calculated for each of the tables, along with a Cramer's V Effect Size in cases where significance was found. The results are summarized in Table 1.

Table 1. Results of Chi-square analysis according to alignment and height.

IV	Chi-square, Alignment (TA, Del)	Effect Size	Chi-square, Height (Spnd, Down)	Effect Size
Gender	X^2 (1, 1197) = 1.46, p = .227		X^2 (1, 1191) = 16.2, p = <.001	.118
Dominance (3)	X^2 (2, 1197) = 28.1, p = <.001	.207	X^2 (2, 1191) = 6.85, p = .033	.0758
Dominance (4)	X^2 (3, 1197) = 55.7, p = <.001	.216	X^2 (3, 1191) = 6.96, p = .073	
Attitude - Cast.	X^2 (2, 1197) = 28.1, p = <.001	.153	X^2 (2, 1191) = 5.19, p = .075	
-Expa.	X^2 (2, 1197) = 17.0, p = <.001	.119	X^2 (2, 1191) = 0.375, p = .829	

Analysis of the speaker characteristics shows the following. Regarding gender, males produced more suspended peaks than expected. Analysis of dominance showed that Spanish-dominant speakers produced more TA peaks compared to Spanish monolinguals, and that Quechua-dominant speakers produced more suspended peaks than expected. Those with strong support of Castilianization showed more use of delayed peaks, an unmarked feature common in other Spanish varieties, whereas weak and mid-range support groups showed greater than expected TA. Mid-range support of expansion also showed greater than expected TA. Medium effect sizes (.2-.4) are found for alignment by dominance, whereas small effect sizes (.1-.2) are found for alignment by attitude and height by gender.

Discussion

This case study has found different intonation features to be significant depending on which social factor is considered: gender was significant for peak height, attitude for peak alignment, and dominance for both features. Attitude statements more directly related to the speaker's identity as in the BLP may reveal larger effects. Nonetheless, strong support of Castilianization showed greater instances of delayed peaks. Analysis of social factors in combination with linguistic factors may provide a more complete picture of the variation present in a speech community, along with a direction of potential change.

Case study
Historical intonation and contact in Asia Minor Greek

This study investigates the diachronic development of the continuation rise tune in a variety of Greek originating in the area of Cappadocia in Asia Minor: Asia Minor Greek (AMG), where Turkish was the dominant language. AMG and Turkish speakers cohabited for eight centuries until 1923 when under the Convention Concerning the Exchange of Greek and Turkish Populations, two million people were forcibly displaced, based on religion: 1.5 million Anatolian Christians to Greece and half a million Hellenic Muslims to Turkey.

A continuation rise is a phrase with an H tone on its right boundary, indicating the speaker has not finished speaking. The f0 movement from the nucleus to the end of the phrase has a different shape in the two languages: in Turkish it is a rise-fall-rise, with an H*+L accent before the H boundary (Figure 1a; see also Ipek & Jun 2014); in Athenian it is a simple rise, with an L* accent before the H- boundary (Figure 1b; see also Arvaniti & Baltazani 2005).

The first-generation AMG speakers in the analysis were born in Turkey prior to 1923, while second-generation speakers, born in Greece, no longer had contact with Turkish. These speakers are bi- or multi-dialectal, in AMG local Greek varieties and Standard Modern Greek as spoken in Athens (Janse 2009; Karatsareas 2011).

The study hypothesizes that the continuation rise tune in AMG differs from Athenian and resembles Turkish and, further, that intonation patterns of AMG speakers born before 1923 in Turkey (AMGgen1) resemble Turkish more than those of the second generation of AMG speakers born in Greece (AMGgen2). See Baltazani, Przedlacka & Coleman (2019, 2020), and Baltazani et al. (accepted) for fuller exploration of these data.

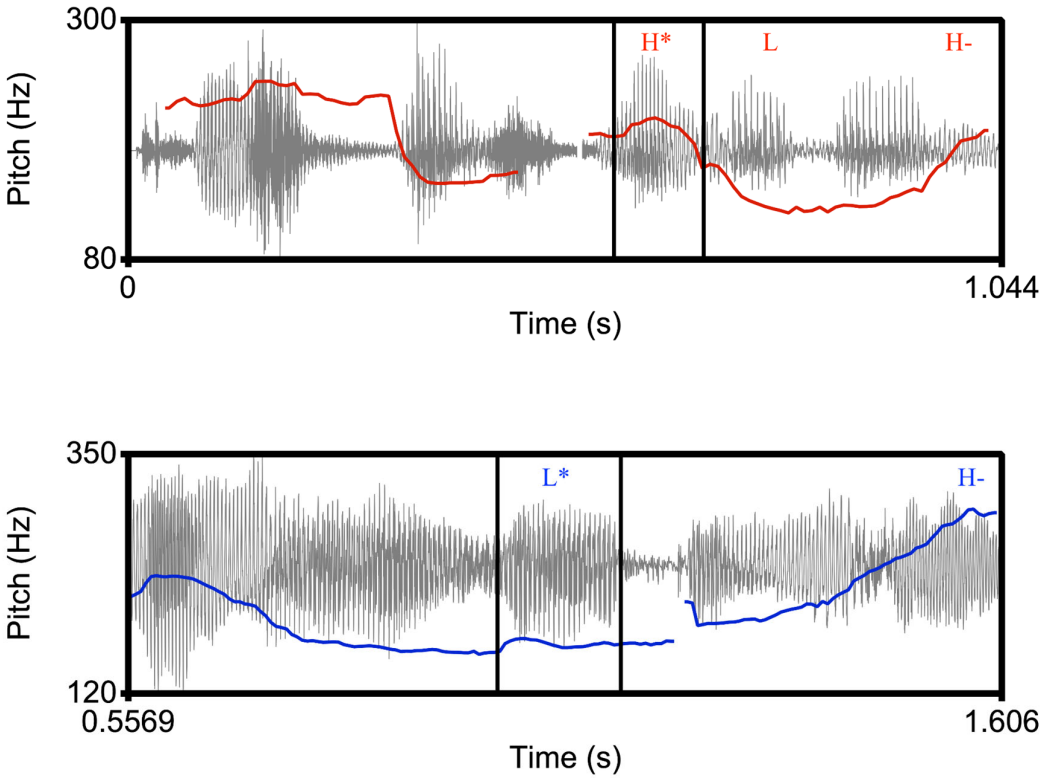
Methods

The analysis was based on data from pre-existing natural speech corpora of contemporary and archival recordings from the 1930s produced by 24 speakers (Athenian: 3F, 4M, μ age = 46.2y; AMGgen1: 3F, 5M; AMGgen2: 1F, 2M; Turkish: 4F, 2M, μ age = 33.7y) and comprises 1127 continuation rise tokens (443 Athenian, 355 AMGgen1, 187 AMGgen2, 142 Turkish). The comparisons in the four groups (Athenian, Turkish, AMGgen1, AMGgen2) were quantified by a combination of tools: (a) modeling the shape of the f0 contour

employing Functional Data Analysis (see Baltazani, Przedlacka & Coleman 2019, Baltazani et al. accepted, for details); and (b) mainstream Autosegmental-Metrical (Pierrehumbert 1980, Ladd 2008) f0 alignment with segmental landmarks.

For the alignment comparison among the four groups, the L tone was chosen as a common landmark in Athenian and Turkish. This is expected to occur after the end of the nuclear vowel in Turkish but before the end of the nuclear vowel in Athenian (see Figure 4). Similarity of the AMG tunes to Athenian or Turkish was measured through the shape characteristics of the f0 curves and through the alignment details of the trough with the stressed syllable.

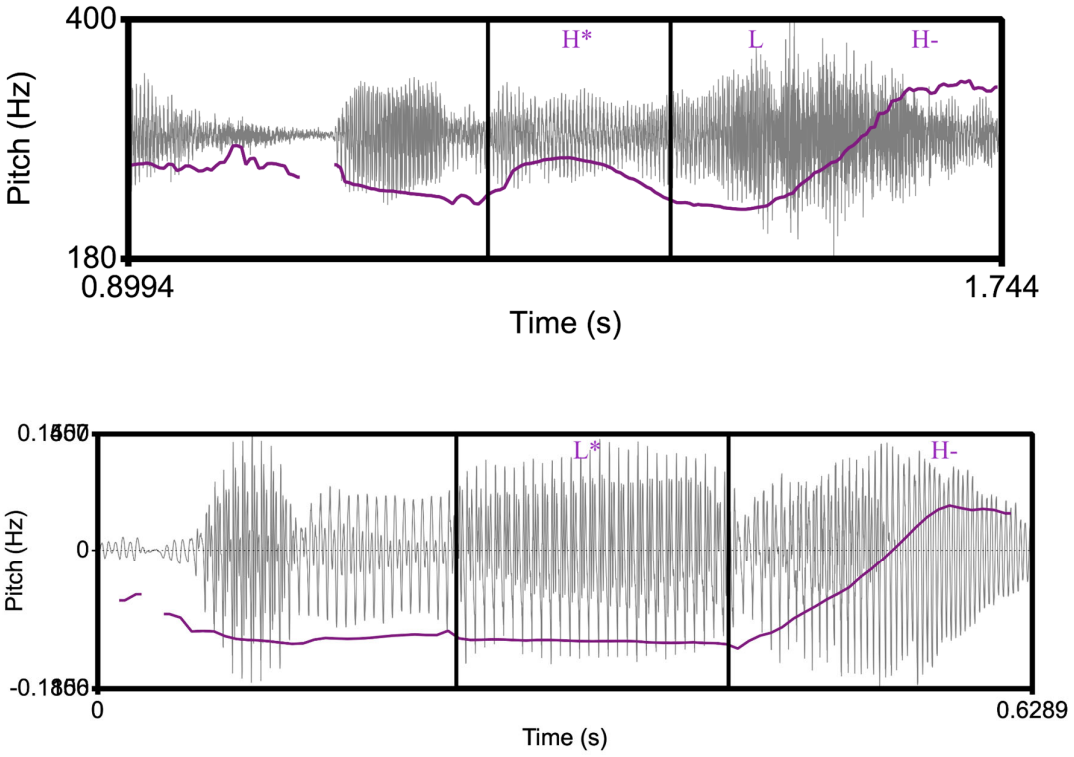
Figure 4. Representative examples of the continuation rise tune in Turkish (top) [maˈsaja oˈturmadan] 'Before sitting at the table' and Athenian (bottom) [eryaˈzotane] '(she was) working.' Here and in Fig. 2, rectangles indicate the nuclear vowel, transcribed in bold.



Results

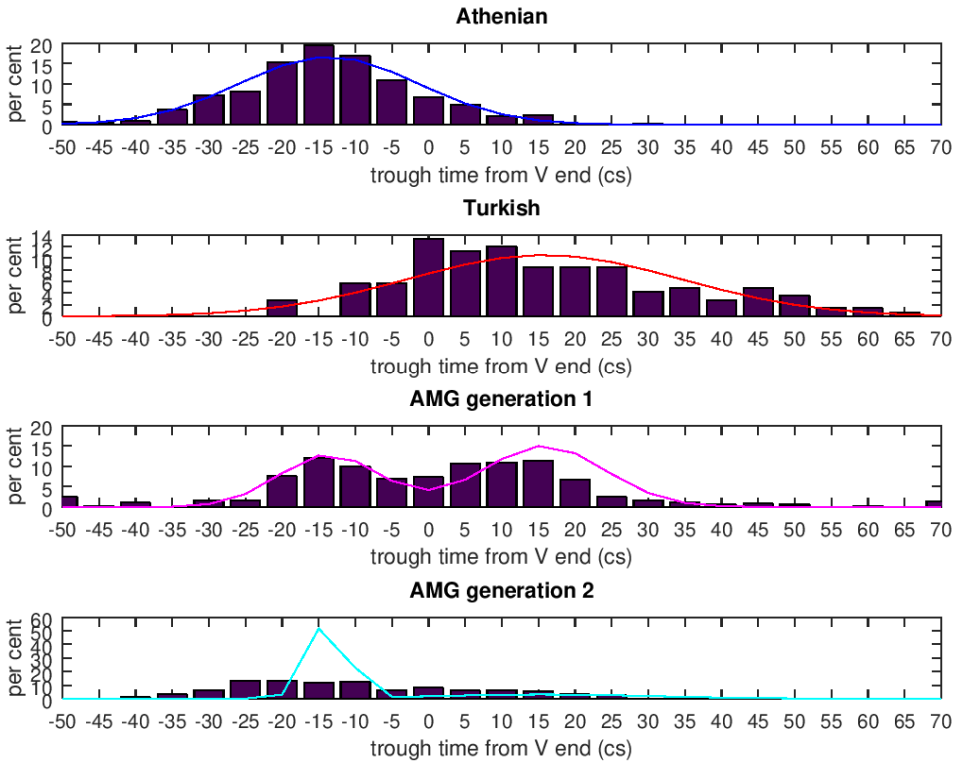
Results show that most first-generation AMG speakers produced continuation rises with two modes of trough alignment: one "late," Turkish-like pattern of trough alignment well after the nuclear vowel end and one "early," Athenian-like pattern within the nuclear vowel (Figure 5).

Figure 5. Examples from AMGgen1 speakers producing a Turkish-like (top) [istoˈria] '…story…' and an Athenian-like (bottom) [taˈmeri] 'The places' continuation rise.



As shown in Figure 6, comparison of the trough alignment in the four groups (Athenian, Turkish, AMGgen1, AMGgen2) reveals a distribution with two modes of alignment in the first-generation AMG speakers.

Figure 6. Distribution of trough time with respect to V end, which is represented as 0 in the x-axis.



The histograms of trough alignment P(t) in AMG generations 1 and 2 were modelled as a weighted sum of Gaussian probability density functions with means (μ) and standard deviations (s) estimated from the Athenian and Turkish controls, and weights w1 and w2:

P(t)AMG = w1 probdf(t, μAth, ½sAth) + w2 probdf(t, μTur, ½s Tur)

These models are shown as overlaid lines in Figure 6. Table 2 shows that in AMGgen1 the Athenian and Turkish components are both strong, whereas in AMGgen2 the "Athenian" component strongly predominates.

Table 2. Weights of the Athenian and Turkish components of the AMG histograms.

	AMGgen1	AMGgen2
w1 (Athenian)	0.44237	0.78817
w2 (Turkish)	0.55763	0.21183

Discussion

The analysis confirmed that the shape of the "early alignment" utterances patterned with that of Athenian and the "late alignment" ones patterned with Turkish, indicating a heavy influence of Turkish. A diminishing proportion of Turkish pattern tokens was found in the second-generation, with a shift towards a higher frequency of Athenian-type variants, suggesting intergenerational change. The bimodality also suggests code-mixing, as first-generation speakers alternated between the Athenian and the Turkish pattern. To understand more about the nature of these variants, the intonation of later generations needs to be examined (see Baltazani et al., accepted).

The future for socioprosodics

In this chapter we have presented an overview of research at the intersections of sociophonetics and intonation. Relevant literature was found in many different fields of study, including language variation and change, bilingualism, and language contact. In addition, we have noted how sociophonetics and intonation has been treated with relation to perception, pragmatics, and style. Our case studies showcase synchronic and diachronic approaches to examining sociolinguistic variation of intonation as a result of language contact.

We have proposed the term socioprosodics to describe what we see as a nascent field with potential for development in many directions. We believe and hope that raising awareness of common research goals in the scientific community of socioprosodics will lead to the adoption of comparable analytical tools, in a way similar to the spread of AM methods for intonation studies in the past three decades. An analytical consensus of this kind will lead to advances in the field of socioprosodics and more generally in our understanding of the role that social factors play in intonation variability. Our wish is that this chapter will promote greater dialogue between scholars in the field of socioprosodics, and in doing so we may see the field grow and contribute to linguistic research as a whole. We hope that more typological generalizations (e.g., Kireva 2016; Mascaró & Roseano 2020) will emerge regarding the social effects on intonational change and variability.

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