Communicative functions of rhythm in spoken discourse - the case of radio broadcasting

Fonctions communicatives du rythme dans le discours radiophonique

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A matter of time...

1   Time is thoroughly structured throughout our daily life. In the morning, your alarm clock is set to 6.30, your toast is ready in under 2 minutes, you get your bus at 7.34 and you know that it takes exactly 8 minutes to walk from your house to the bus stop... In Western societies, we have developed an amazing sense of time. Still, imagine an environment where not only minutes, but seconds are counted, where you have to finish your next sentence in 8 seconds to be on time ... Then you are on air! "It is the only industry that comes to mind that actually establishes procedures and mechanics for telling time" (Warren, 2005: 122). This "Time telling" happens by structuring the day of the audience through specific radio programs (such as Lunchtime News, Late Night Show, etc.), but also by developing routines to keep radio broadcasters themselves at time. Relatively little research is available on the professional procedures and routines developed by different radio stations to keep up with time lines. In this article, the idea is set out that speech rhythm is one of the professional routines for keeping listeners and broadcasters on time. Furthermore, I discuss other communicative functions fulfilled by speech rhythm. In the first section, the notion of speech rhythm is reviewed by examining its possible functions and effects during verbal perception, production and interaction. The second section describes the rhythmic characteristics of radio speech (with a focus on French) and discusses its role as a professional time-keeping and communication device.

1. What is rhythm in speech?

2   Rhythm is one of the major components of prosodic structure in language. It is a complex and multidimensional phenomenon structured through accents, length, timing and tempo (Fox, 2000). Although the notion of speech rhythm is still controversially discussed, there seems to be consensus among researchers that rhythm organizes recurring patterns of speech in time (for detailed overviews, see Arvaniti, 2009; Auer et al., 1999; Fletcher, 2010; Kohler, 2009). Depending on the perspective taken, these patterns in time can be found in the verbal behavior of one single speaker or in the joint conversation of two or more speakers.

3   So far, a major goal in language sciences was to define the properties of speech pertaining to rhythm perception and production in one single speaker or listener. The focus has been on the idea that languages are build on typical acoustic time-invariants, characterized by temporal intervals or interval ratios that organize speech production and perception. The best known example is the classification of languages in rhythmic classes, e.g., as syllable- or stress-timed (Abercrombie, 1967). Stress-timing (as in English), for instance, would emerge from equal durations between inter-stress-intervals with variable syllabic intervals, while syllable-timing (as in French) would show a tendency to invariant intervals between syllables and variable intervals between accents. Rhythm metrics are another example in the quest for temporal "fingerprints" of languages. They were developed during the last decade in order to investigate duration ratios and their amount of variability in different languages, especially at the segmental level (i.e., the percentage of vowels, the difference between durations of successive consonant clusters, a.o.; Ramus et al., 1999). The purely quantitative nature of these approaches was criticized (e.g., Arvaniti, 2009 ; Dauer, 1983). Alternatively, qualitative aspects of rhythm such as the marking of prominent events in the speech stream as well as different speaking situations, intentions and interaction should be taken into account (e.g., Auer et al., 1999).

4   In this paper, I approach the nature of speech rhythm by examining its possible functions. To begin with, it may be helpful to look at another auditory domain that has less controversial views on rhythm. In music, rhythm was described by referring to two major components: grouping and meter (London, 2012). Grouping serves an informational function allowing for packaging of notes and tonal events into larger relevant temporal units. Meter, on the other hand, has a predictive function. It aids the listener in developing temporal expectancies about important upcoming events at different periodicity levels (London, 2004). Could these functions be relevant for speech as well?

5   We will address grouping first. Imagine pronouncing the following phrase: "*What you see is what you get*". Where would you slow down or even make a short pause? The preferred boundary[1] would be after *see* resulting in two groups (*what you see*) (*is what you get*). You would mark these groups by building two different intonation units, by slowing down and lengthen the syllables *see* and *get*. Accentuation also plays an important role in grouping. German exhibits very complex noun composites such as (*'Donau*) (*'dampfschifffahrts*) (*ge'sellschaft*) which means "corporation for steam boat navigation on the Danube". Accents (') mark the three major lexical components of the composite. Wrong accent placement would substantially change the grouping of lexical elements, e.g., (*'Donaudampf*)(*'schifffahrts*)(*ge'sellschaft*). The meaning of this composite

would be rather absurd, i.e., "corporation for navigation through the steam of the Danube". These examples illustrate that accentuation, temporal adjustments on the syllabic level, tempo, pauses and intonational boundaries all fulfill a grouping function and thereby create speech patterns shaped in time necessary for the segmentation and understanding of utterances and phrases.

6   The predictive function of rhythm is related to the capacity to plan and predict upcoming important events in time via previous encountered recurrences. In music, the rhythmic experience is guided by a recurring pulse or beat throughout multiple coordinated rhythmical layers. The beat emerges as a perceptual property when different layers of rhythmic structure reinforce each other at recurring points in time (Jones, 2009). Maximum resonance between multiple rhythmical layers therefore results in maximum prominence of an acoustic event. In addition, the periodic nature of the resonance pattern enables the listener to predict and attend better to the next upcoming events, a process called "entrainment" (Jones, 1976, 2009, Large & Jones, 1999).

7   Speech exhibits a complex hierarchy of multiple temporal layers as well. Maximum prominence of a syllable or word is achieved by the joint coupling of several underlying levels, as illustrated in the following metrical grid (as used in Metrical Phonology, see Liberman & Prince, 1977).

	what	you	see	is	what	you	get
a)	x	x	x	x	x	x	x
b)	x		x		x		x
c)			x				x
d)							x

8   Layer a) represents the syllabic units made prominent by their sonorant vowel portions. Layer b) is lexical. Differences in prominence (expressed by e.g., stress-accent, clarity of articulation, syllabic duration) are related to the lexical or grammatical function of words. Layer c) and d) relate to phrase and utterance levels. Some units in these layers are accented because of their semantic-pragmatic contribution to the utterance or their boundary-marking functions.

9   However, the unfolding in time of the prominence structure in speech has been said to be much less regular than in music and even aperiodic (Cummins, 2009). This should render the rhythmic structure of speech less predictive and thereby less entraining (London, 2012; Patel, 2008). On the other hand, it has been argued that predictions are essential for language comprehension and that successful interaction in dialogue depends on it (Garrod & Pickering, 2004; Pickering & Garrod, 2007). For instance, temporal predictions on the basis of speech cues play an important role in turn-taking during conversation (Wilson & Wilson, 2005). Other studies have shown that listeners actually form predictions about upcoming prominence patterns in speech (e.g., Dilley & McAuley, 2008). When similar stress patterns regularly recur (e.g., a sequence of words such as 'apple, 'zebra, 'mustard), words in the following speech signal are segmented in accordance with these expectancies. In the next sections, more light will be shed on the probability of a predictive function of rhythm in speech as well as on the grouping function.

2. The role of rhythm during verbal learning, comprehension and interaction

10   Different research domains have identified benefits of speech rhythm for verbal learning, comprehension and interaction. In the following, findings from several disciplines (phonetics, psycho- and neurolinguistics, developmental, neuro- and cognitive psychology, conversational analysis, gesture and interaction studies) are presented that can elucidate the role played by rhythmic structure in language acquisition, speech and language processing and conversation. First, I focus on production and perception processes that are typical in one single speaker or listener. In the second part, multi-speaker and multi-modal contexts are considered.

2.1 Language acquisition, processing and comprehension

11   Since their first days, babies are immersed in a linguistic world that is rhythmic by nature. Already around the sixth month of pregnancy, the unborn starts to hear. Through his mother's heart beat and blood rushing, voices, especially his mother's voice, and sounds from outside penetrate into the womb. In these prenatal days, rhythmic properties seem to be captured by the unborn. At birth, babies are already sensitive to stress patterns in speech (Sansavini et al., 1997). Furthremore, pre-term infants have more difficulties than term infants to distinguish between different stress patterns during their first half year of life (Herold et al., 2008). This suggests that prenatal experience is important for the later perception of speech prominences.

12   Actually, rhythmic grouping plays a fundamental role in infant's language development as they begin to extract words from the speech stream via recurring prominence patterns. Jusczyk and colleagues (Jusczyk, 1997; Jusczyk et al., 1999) were the first to show that English learning infants used stress patterns to segment the speech stream into bisyllabic words. They found that there was a trochaic bias in bisyllabic word segmentation: With seven months, infants segmented trochaic words like '*bottle* from the speech stream*, a stress pattern that has a prominent (i.e., stressed, strong) first syllable and a non-prominent (i.e., weak) second syllable. Only at 10 months, infants were equally able to extract iambic words such as *gi'raffe* (i.e., a weak-strong pattern) as a unit from the speech stream. A similar development has been observed in German-learning infants (Höhle et al., 2009; Weber et al., 2004), but not in French-learning infants. Until 12 months of age, French-learning infants do not seem to use prominence patterns to segment multisyllabic words (e.g., Goyet et al., 2010; Nazzi et al., 2006), although they are able to discriminate between iambic and trochaic patterns when they are as young as 6 months (Höhle et al., 2009). Overall, infants use rhythmic cues to acquire their first words, but language-specific aspects have to be taken into account.

13   The predictive function of speech rhythm has been in the center of interest in a number of recent adult studies. The idea was tested that temporal predictions induced by the regular recurrence of prominences may facilitate speech processing. Quené and Port (2005) presented English-speaking participants with lists of bisyllabic trochaic or iambic words with the instruction to indicate the presence of a specific phoneme as quickly as possible. The target phoneme appeared in the onset of a stressed syllable that was either placed at precisely timed regular intervals or at irregular intervals. The authors found that listeners were performing better when the prominent syllables of

the word appeared at regular temporal intervals. In another phoneme-monitoring task with French listeners, Cason et al. (2012) showed that even a non-verbal regular rhythm preceding a nonsense-word was enhancing phonological processing. These findings provide evidence that a temporally regular rhythmic structure enhances the processing of phonetic and phonological aspects of speech in different languages.

14 Moreover, rhythmically regular sentences have proven beneficial for semantic and syntactic processing. In an EEG study, participants listened to German nonsense sentences with a regular alternation of stressed and unstressed syllables (e.g., 'Norbert 'pflückte 'letzten 'Dienstag 'Ginas 'Rohre und 'Kabel „Norbert picked last Tuesday Gina's pipes and cables"; Rothermich et al., 2012). Event-related potentials (i.e., a smaller N400 component) indicated better lexico-semantic integration of these sentences compared to sentences with an irregular distribution of prominences. Note that the temporal intervals between stress-accents in this study were not exactly timed but were naturally co-varying with the amount of segmental material. In another electro-physiological study, syntactically ambiguous German sentences were better understood and processed when featuring a regular recurring prominence structure (Roncaglia-Denissen et al., 2013). The authors used sentences with recurring patterns of one stressed and three unstressed syllables. These four-syllable patterns consisted of a variable number of words (not a pattern – a word, as in Rothermich et al., 2012). These studies show that listeners benefit from recurring speech patterns of variable size during grammatical and lexical processing. Moreover, exact timing of prominences does not seem to be a prerequisite for generating processing advantages.

15 Yet, it may depend on the native language experience how recurring prominence patterns in speech are perceived. Lidji et al. (2011) had native French, native English and bilingual French-English participants tap with their finger to French and English rhythmically regular sentences. The sentences were composed of 13 monosyllabic words which formed an alternating accent pattern (strong-weak-strong-weak, etc.). Participants were instructed to follow the 'subjective beat' they heard in these speech samples. Importantly, English and French native listeners were tapping to different rhythmical levels in this task. Independently of the language of the sentences, English listeners tapped to a higher periodicity level (i.e., every second or forth syllable carrying an accent), while French listeners tapped to a lower periodicity level (i.e., every syllable), and bilinguals were somewhere in between them. These differences potentially reflect native language biases in prominence perception. In another tapping study, Falk & Dalla Bella (2012) investigated the nature and effect of prominence perception in rhythmically regular sentences in German listeners. They showed that a regular rhythmic structure in speech (i.e., alternating patterns of stressed and unstressed syllables) can boost memory for semantic detail. However, memory advantages were only found when a rhythmically regular context allowed for the formation of temporal predictions. Importantly, memory advantages were clearly bound to prominent syllables in the sentence, demonstrating that they constitute the points of reference that participants attended to during listening. As German is a language exhibiting lexical stress, prominences are particularly important cues to word identification. Future studies on other languages will clarify how advantages in processing are linked to prosodic prominences and their interaction with the language-specific grammatical and lexical structure.

16   In sum, the results from studies on language acquisition, speech and language processing, comprehension and memory show that rhythmic grouping as well as rhythmic predictions in speech have beneficial effects for the listener. Recent findings on processing advantages due to regular rhythmic structure in speech provide first evidence that entrainment to speech is eventually possible (Jones, 2009, see section 1). Despite more variable temporal acoustics, the formation of predictions and enhanced attending may be feasible. However, it is still unclear how much variability is acceptable and if there is a temporal threshold that need not to be exceeded in order to induce processing advantages (see also Lehiste, 1977).

17   Some studies cited above used motor components to assess rhythmic effects in speech. This alludes to another potentially relevant dimension of speech rhythm which will be addressed in the next section: its relation to movement and its power to coordinate the dynamics of (inter)action.

2.2 Movement and Coordination

18   In a recent paper, Cummins (2009) highlighted the relation between rhythmic activity in humans and movement. In his view, rhythmic structure in sound, especially music and speech, provide an incentive to coordinate and synchronize own actions and movement with it. He defines rhythm as an „affordance for the entrainment of movement" (Cummins, 2009:17). An „affordance", a term borrowed from ecological psychology (Gibson, 1979), represents an interaction potential of an organism with his environment, in this case with a complex sound. „Entrainment of movement" means that movement will be coordinated, coupled or even synchronized with the auditory signal (see also sections 1 and 2.1).

19   In fact, this view on rhythm is a very ancient one. The meaning of the original Greek word 'rhythmos' was intricately linked to the idea of an organized or recurring flow of movement. 'Rhythmos' "[..] produces distinctive movements in a generalized direction; it combines fixity with variability." (Hawhee, 2004, p.142). In dance and sports, we observe bodily rhythms of movements that are clearly linked to specific affordances in the environment, such as music or movement performances of others in order to achieve artistic or athletic goals. In a parallel view, entrainment of movement could be stimulated by the verbal behavior of others in order to achieve communicative goals. But what are the kinds of movements are we talking about?

20   First, there are co-speech movements, the gestures of hands, arms, face and posture (for overviews, seee.g., Goldin-Meadow, 2003; McNeill, 1992, 2005). These movements are typically performed by one speaker accompanying his own productions. The development of gestures and speech are coupled since our early days of life (Ejiri & Masataka, 2001; Esteve-Gibert & Prieto, 2014). Moreover, gestures are aligned with speech prominences with high temporal precision (Esteve-Gibert & Prieto, 2013). In addition, further research suggests that speech and gesture form an integrated communcative system (Gentilucci & Dalla Volta, 2008, for a review). Co-speech gestures affect the listener / observer as well. For instance, co-speech gestures facilitate recall of lexical items and sentences in the listener, in the native and in a foreign language (e.g., Feyereisen, 2006; Tellier, 2008; So et al., 2012). Gestures also help in sequencing information. Stories that were told with gestures were better remembered by pre-school children and re-told in a more coherent and structured way (Demir et al., 2014).

Besides memory, gesturing guides prominence perception in speech in the listener. Krahmer & Swerts (2007) presented participants with videos showing persons who were talking and gesturing. The gestures were 'beat gestures' (e.g., moving the arm or hand rhythmically up and down, McNeill, 1992), head nods or eye brow movements. Words accompanied by these visual cues were perceived as more prominent. In sum, there is a close temporal alignment and integration between speech prominences and gestural movements that shape the perception and production of speech.

21   Second, there are the articulatory movements themselves. Articulations are amongst the quickest and most complex motion sequences humans are able to produce. An English speaker at a normal speaking rate would produce on average 5.3 segmental gestures per second with the fine-tuned and temporally overlapping movements involving up to 80 muscles (Laver, 1994). How could this rapidly progressing motion structure constitute "an affordance for the entrainment of movement" (Cummins, 2009:17)? One line of research proposes that we constantly monitor and covertly mirror the articulatory movements of others during speech perception. The motor theory of speech perception puts forward the idea that speech perception engages the motor system by linking acoustic outputs to their articulatory sources (Liberman et al., 1967; Liberman & Mattingly, 1985). Advances in neurocognitive and -biological research on the role of neuronal structures (i.e., „mirror neurons") in action perception and production have revived the discussion on this proposal (e.g., Gantalucci, Fowler, & Turvey, 2006; Massaro & Chen, 2008). Brain-imaging research and neuronal stimulation techniques showed that cortical motor areas can become activated during speech perception and that this activation facilitates e.g., the categorization of speech sounds (e.g., Bartoli et al., 2013; D'Ausilio et al., 2009; Fadiga et al., 2002; Möttönen & Watkins, 2009). For instance, activation in cortical areas related to lip movements facilitate the identification of syllables containing a labial plosive like /p/ (d'Ausilio et al., 2009). However, doubts have been raised that this motor recruitment is a general process during speech perception (e.g., Krieger-Redwood et al., 2013). In fact, it could be a strategy adopted under circumstances of increased processing difficulty, for example, in a noisy environment or when multiple speakers are talking (Bartoli et al., 2013, Krieger-Redwood et al., 2013). Notably, findings by Bartoli et al. (2013) indicate that interactional aspects can regulate motor activation. Using the transcranial magnetic stimulation technique, they found that listeners' cortical motor involvement in a phonetic discrimination task was higher when the listeners' own productions were close to the presented auditory stimuli. This result fits well with previous results that the personal motor repertoire influences cortical motor involvement during the observation of others' actions (e.g., in dance, Calvo-Merino et al., 2005).

22   The third aspect is closely related to these results, namely, the potential of rhythmic cues to incite coordination in interaction. During conversation, speakers establish an idiosyncratic interaction structure by becoming more similar to each other on multiple levels of performance. This involves adaptation of non-verbal aspects like posture or gesture, but also of verbal aspects such as speaking rate, pitch register or phonetic pronunciation (Garrod & Pickering, 2004; Pardo, 2006). It has been put forward that speech rhythm fosters postural coordination of speakers, even in the absence of visual cues (Shockley et al., 2003). Furthermore, conversational and interaction analysts have pointed out many instances of temporal adaptation between speakers governing turn-taking, feedback, and repair (Auer et al., 1999; Couper-Kuhlen, 1993; Erickson & Shultz, 1982). In their study on English counseling interviews, Erickson & Shultz (1982) were

among the first to describe verbal interaction as being fundamentally rhythmized. Their analyses suggested that speakers tend to temporally adapt to each other throughout their turns by timing pauses, speech prominences and non-verbal gestures at recurring temporal intervals. A recent study revealed that turn-taking actually follows subtle timing mechanisms across languages (Stivers et al., 2009). Temporally fine-grained transitions between turns were found in all cultures with an acceptable inter-turn gap lying around 250 ms on average. In addition, results pointed to language-specific time-constraints related to communicative purposes (e.g., signaling dissent). In recent years, it has been proposed that speakers in conversation also synchronize their neural activity in time (Hasson et al., 2012). This time-locked synchronization has been shown to be most important during face-to-face communication (Jiang et al., 2012). The rhythmic structure of speech could play a crucial part in this synchronization between speakers (Peelle & Davis, 2012), but more clarification is needed in future studies.

23   In this section, the notion of speech rhythm as an incentive for the entrainment of movement and action coordination has been explored. Temporal adaptation between speakers has been found to play a vital role in structuring successful interaction and conversation. Moreover, studies on gesture coordination with speech as well as neural motor activation during speech perception suggest that speech rhythm has an important physical dimension. Therefore, a comprehensive account of rhythmic structure and functions in speech should also incorporate these embodied perspectives on language.

3. Radio broadcasting & rhythm

24   The previous sections have demonstrated the multifaceted nature of rhythmic functions in speech. In the following, I will concentrate on the rhythmic characteristics of radio speech and their effects on the audience as well as on journalists in their professional context.

3.1 "Radiophonic speech": Prosody between oral and written text

25   The audiovisual media are intrinsically oral media, that is, verbal information is transported uniquely (radio) or predominantly (TV) via the auditory channel. Nevertheless, written text (i.e., the manuscript) is the basis for most utterances on air (e.g., Chantler & Stewart, 2009). This two-sided nature makes it difficult to classify radio speech as an exclusively oral or written medium (Koch & Oesterreicher, 2001). However, radio speech is *conceptualized* as an oral medium. The textual structure is meant to evoke or to *simulate* criteria linked to personal oral communication as illustrated by the following excerpt of a British textbook on radio journalism:

> "Radio is a personal medium [...]. When you talk on the radio, you are not broadcasting to the masses through a gigantic public address system. You are talking to *one* person in the way you would speak if you were holding a conversation over a cup of coffee or a pint of beer." (Chantler & Stewart, 2003, p.10)

26   The prosodic structure of speech plays an important role in conveying this oral quality and in creating a proximal relation with the listener (e.g., Hupin & Simon, 2007; Simon et al., this volume). This is recognized by journalists themselves: "[...] the *way*

something is being said is just as important as *what* is being said." (Chantler & Stewart, 2003, p.11). Most textbooks of practical radio journalism give some advice to future journalists how to shape prosodic aspects of their speaking style, for example:

> „On speech rhythm: [...] a sluggish recitation disengages the listener's attention.
> Small variations in speaking rate revive – minor points and additional information
> can be spoken at higher speaking rates." (Rossié, 2013:74 ; translation of S.Falk)

27   In sum, journalists and their instructors are conscious of the professional relevance and effects of prosodic characteristics in radio speech in order to involve the listener in the broadcasting experience. Besides the need for naturalness and simulation of proximity, there is another function of prosodic organization in radio-journalism that is related to branding. In this respect, prosody serves the actualization of a phonostyle that characterizes a program or a station. For instance, Luginbühl (2012) reports a tendency in the main Swiss television news to realize more accents, higher tempo and exaggerated pitch variation than before. In his interpretation, these changes reflect the imitation of an American role model standing for dynamic and up-to-date news journalism. Phonostylistic preferences may also change over time due to changes in the local identity (i.e., when Australian radio stations begin to use an Australian English accent instead of a British English accent, Price, 2008).

3.2 Rhythmic characteristics of radio speech - beneficial for the audience or not?

28   As highlighted in the preceding section, prosodic characteristics of radio speech have been recognized by professionals as important tools to establish an intimate relation with the audience in spite of the physical distance between speaker and listener. In the following, the contribution of rhythmic characteristics of radio speech for this relation will be examined.

29   Astésano (2001) compared the rhythmic structure of three different speaking styles, notably radio news (France Info), radio interview and reading a narrative (non-public, non-professional speakers). Results of her in-depth acoustic study (i.e., including analyses on the infrasyllabic, syllabic and suprasyllabic level) showed that differences between the three phonostyles were related to rhythmic parameters. She found that radio news were intermediate to the reading (i.e., based on written text) and interview style (i.e., spontaneous, oral utterances) in many respects. In radio news, pauses mark phrasal boundaries very consistently, their duration is correlated to the duration of prepausal syllables which is less the case for the oral interview style. News presenters also speak at a moderate-high tempo, intermediate to the two other styles. Notably, there is a higher density of accents in news speech than in the two other styles.

30   More recent studies confirmed this trend for higher accent density in French radio news (e.g., Goldman et al., 2007). The higher density is in particular due to the fact that more initial accents are realized by the speakers. Initial accents in French occur towards the beginning of an accentual phrase. For example, the phrase *le covoitu***rage**'the car pooling' can feature an initial accent (underscored) in addition to the regular boundary-marking final accent (in bold). The role and rules for the occurrence of French initial accents are still not entirely understood. Several functions have been discussed such as an eurhythmic function, an emphatic function, boundary-marking or even lexical marking (e.g., Fonagy, 1980; Vaissière & Michaud, 2006, Welby,

2006). In radio speech, it is not only the quantity, but also the quality of initial accents that is noticeable (Goldman et al., 2007). The melodic peaks of initial accents have higher excursions than in other speech styles. In general, pitch range in radio speech is higher and the overall melodic contour more dynamic (e.g., more dynamic tonal targets).

31   Studies on news presentations in the audiovisual media in other languages have stated a similar trend towards an increased use of dynamic intonation and additional accents (for Spanish, see Rodero, 2013; for Australian English, see Price, 2008; for Polish, see Francuz, 2010, for Swiss German, Luginbühl, 2012). Some of these authors criticize this phenomenon as decreasing listener's comprehension (Francuz, 2010; Rodero, 2007, 2013). Rodero (2013) remarks that Spanish news presenters would often accentuate function words and mark more intonation groups than usual in Spanish speech, thereby "producing a break in the meaning of the message" (Rodero, 2013: 522). In a similar vein, Francuz (2010) suggests that Polish TV news speakers use incorrect accentuation and intonation. In his experimental study, he found better comprehension and recall when participants were listening to a 'corrected' prosodic version than when watching the original television news (Francuz, 2010). Unfortunately, the differences between these two versions were not acoustically assessed, so it remains unclear how differences in comprehension were related to the acoustics of the news. Future studies should shed more light on the question of how rhythmic properties affect comprehension by combining both perceptual measures and acoustic measures.

32   However, rhythmic aspects of radio speech are likely to induce positive communicative effects as well. Despite overall higher accent density, presenters of French radio news optimally distinguish between different accent types (Astésano 2001, p.233). The accents in question had either pragmatic-semantic functions or structural functions. Pragmatic-semantic accents underline the informational importance of a constituent (e.g., narrow focus) or mark single words as particularly relevant (i.e., emphasis). Structuring accents such as final and initial accents mark phrasal or lexical boundaries or rhythmic structure in general. Astésano's (2001) results demonstrated that pragmatic-semantic accents showed higher duration and more salient pitch excursions than structural accents. In addition, structural accents (final vs. initial accents) were clearly differentiated as well. Phonetically, final accents had prolonged rime components, whereas initial accents had prolonged consonantal onsets and more variable pitch slopes. These findings show that presenters mark different functions of accents very clearly in French news speech. This could help listeners in distinguishing between accents and in identifying the message by relying on the appropriate discourse markers. In addition, grouping of speech patterns in time appears to be very efficient in French radio news. In their study, Degand & Simon (2009) found that French-speaking news presenters (from Belgium, France and Switzerland) consistently delimited syntactic chunks by prosodic boundaries. Degand & Simon (2009: 98) called this matching a "didactic strategy" of boundary-marking. In fact, presenters rarely created smaller chunks and avoided to separate closely related syntactic units (e.g., nouns and their modifiers).

33   In sum, these results illustrate that the rhythmic features of French radio news speech could aid listeners to decode the relevant message, notably by fostering syntactic segmentation and the distinction of semantic, pragmatic and structural information

linked to different accent types (Astésano, 2001; Degand & Simon, 2009). However, in other languages, concerns have been raised that news presenters hyper-accentuate and thereby obscure the salience of semantic-pragmatic accents (in Spanish, Polish; Rodero, 2007; Francuz, 2010). Future studies on radio speech should investigate the consistency of accent marking cross-linguistically and find out if the audience can use this acoustic markers in order to process and understand the information.

3.3 Structuring time in radio speech – rhythm as a professional pacemaker

34   According to the studies cited above, accent density is higher in audiovisual media than in other speaking styles. It is intriguing that this phenomenon was reported for typologically diverse languages with largely differing systems of prominence marking such as English, Polish, French and Spanish. Importantly, accents were shown to recur at quite regular time intervals of around 500-600 ms (in French and Swedish news, e.g, Astésano, 2001; Fant, 2004, p. 221ff). This periodicity may be linked to more general psycho-physiological rhythmic preferences. A frequency of 2 Hz was mentioned as a benchmark for spontaneous motor tempo and highest synchronization efficiency (Repp, 2005), for perceptually maximal pulse salience (e.g., Parncutt, 1994) and highest temporal estimation precision (Fraisse, 1963, 1982). Moreover, studies on neural entrainment to speech have suggested that oscillations around 2 Hz (delta-band, foot level) and 4-6 Hz (theta band, syllable level) are of particular importance in order to guarantee fluent speech processing (e.g., Luo & Poeppel, 2007; Power et al. 2012, Peelle & Davis, 2012). Hence, the recurring prominence patterns at approximately 2 Hz found in radio speech may be a reflection of more general rhythmic preferences pertaining to the perception and production of speech. In section 2 above, it was laid out how a regular recurrence of prominences in speech can lead to entrainment and thereby, to processing advantages in the semantic, syntactic and phonological domain. Therefore, the audience may benefit from these regular accent occurrences via rhythmic entrainment.

35   However, another way of looking at this phenomenon is from the perspective of the speaker himself. One might argue that another function of regular prominence patterns is to guide the speaker's own production. First, one concern of radio speakers is to maintain fluency under circumstances of relatively high articulation rates (Astésano, 2001; Degand & Simon, 2009). Speech is more error-prone with increasing time pressure and speaking rates (Oomen & Postma, 2001). Therefore, rhythmic regularity may be a tool to ease speech planning and production and thereby foster fluent production, a hypothesis actually pursued in stuttering research (e.g., Toyomura et al., 2011). Second, radio speakers have to keep track of the duration of their own productions in order to stay in time with the program's delimited time slots. It has been argued that an important function of rhythmic regularity is to allow speakers to situate themselves in time during a conversation (Erickson & Shultz, 1982). Under the lack of a real-life conversational partner and the time constraints of audiovisual media, it seems essential for the speaker to have techniques to estimate his actual "being" in time.

36   Physical time and time experience are not going hand in hand (see Wittman, 2009, for a review). In situations of stress or heightened arousal, time estimation can be

considerably distorted (e.g., Droit-Volet & Gil, 2009, for a review). As broadcasting in radio is done under constant time pressure, techniques of keeping time can be beneficial for the speaker to cope and feel at ease with this particularly demanding environment. Only a few psychological studies address the role of (self-produced) rhythm in time estimation. For instance, results of a non-verbal time reproduction experiment (Guay & Salmoni, 1987) suggested that participants develop a self-produced inter-trial rhythm in order to maximize time estimation performance. In perception, duration estimation of musical phrases in a musical piece improved substantially when a pattern of recurring prominences was present that highlighted the hierarchical structure of the sound (Boltz, 1995). A regular rhythmic structure in speech could similarly aid the overall time estimation of one's own speech in relation to units of sense. Future studies could investigate a rich pool of new questions in this respect, including the role of regular timing of prominences at intervals around 600 ms, a time lapse that is estimated most precisely by humans (Fraisse, 1982).

37 Finally, another rhythm-related pacemaker for radio speakers may be of a more bodily nature. The role of movement and gestures in shaping the rhythmic structure and experience of radio speech is another largely unexplored field. In section 2.3, it was laid out that gestures show temporal coupling with speech prominences during production and perception. Importantly, their presence translates into the speech signal and can be literally "heard" by the listener without visual support (Krahmer & Swerts, 2007). Gestures are produced by speakers during narrating even in the physical absence of the listener (Alibali et al., 2001). They are therefore as well listener- as speaker-oriented. However, as radio news are delivered as an auditory signal, it is rare that audiovisual recordings from the studio are acquired (but see Fauré, this volume). Hence, relatively little is known on the movements and gestures of radio presenters. However, gesturing is encouraged by textbooks of radio journalism:

> "Gestures help communicate ideas in ways other than purely using words. You may want to frown when you read a sad or serious story, or smile when you have a kicker to read. A complicated story may benefit in the telling if you gesticulate."
> (Chantler & Stewart, 2009, p.185).

38 Finally, temporal properties of gestures could allow for time-keeping during speech production. One approach to gesture has proposed a rhythmic pulse to which gestures and speech content jointly align (Tuite, 1993). In this perspective, speakers could use gestures to structure their utterances in time and thereby, keep track of the lapse of time. Beat gestures are good candidates for this purpose as they have been described as markers of emphasis and also as organizing elements of the rhythmic structure of utterances (McNeill, 1992). Future research should inspect in more detail the temporal dynamics and determinants of joint gesture and speech production in radio speech and investigate if they contribute to help the speaker keep track of the temporal structure of his own discourse.

4. Conclusion

39 The aim of this article was to highlight the communicative functions of speech rhythm in radio broadcasting from a multidisciplinary perspective. This overview showed that speech rhythm has high impact on how we learn, understand and process verbal information as well as on how we interact and manage the course of conversation with others. Speech rhythm could help radio presenters to meet at least two major

challenges of their profession: to get the listener involved and engaged with the broadcast and to keep up with time lines during broadcasting. The major rhythmic cues supporting these goals, at least in French radio speech, were as follows: 1) consistent grouping of syntactic chunks via prosodic boundaries and pauses, 2) clear acoustic marking of different accent types, 3) high accent density and a regular accent recurrence, potentially coupled with gestures. However, when some of these cues are missing or become exaggerated, detrimental effects on comprehension may arise. Therefore, future studies should investigate the relation between rhythmic structure in radio speech and comprehension. In addition, new pathways were identified to investigate speech rhythm as a tool that presenters use themselves to control the time and timing of their own speech production. Gesture could also play a role in this endeavor as it affects the temporal as well as informational structuring speech. To conclude, research on speech rhythm in radio broadcasting offers many opportunities to examine the dynamics and unfolding of speech patterns over time and to shed light on their effects on speech perception and production. Thereby, we will also better understand the nature of professional routines that aid radio presenters to stand the test of time each and every day.

BIBLIOGRAPHIE

This research was funded by the People Program (Marie Curie Actions) of the European Union's Seventh Framework Program (FP7/2007-2013) under REA grant agreement n°327586 and by the LMU Munich's Institutional Strategy LMUexcellent within the framework of the German Excellence Initiative.

ABERCROMBIE, D., *Elements of general phonetics*, Edinburgh, Edinburgh University Press, 1967.

ALIBALI, M.W., D.C. HEATH and H.J. MYERS. « Effects of visibility between speaker and listener on gesture production: Some gestures are meant to be seen. » *Journal of Memory and Language* (44), 2001, pp. 169–188.

ARVANITI, A. « Rhythm, timing and the timing of rhythm », *Phonetica* (66), 2009, pp. 46–63.

ASTÉSANO, C., *Rythme et accentuation en Français: Invariance et variabilité stylistique*, Paris, L'Harmattan, 2001.

AUER, P., E. COUPER-KUHLEN and F. MÜLLER, *Language in time. The Rhythm and tempo of spoken interaction*, Oxford, Oxford University Press, 1999.

BADINO, L. *et al.* « Listener-speaker perceived distance predicts the degree of motor contribution to speech perception », *Cerebral Cortex*, 2013.

BOLTZ, M.G. « EFFECTS OF EVENT STRUCTURE ON RETROSPECTIVE DURATION JUDGMENTS. » *PERCEPTION AND PSYCHOPHYSICS* (57(7)), 1995, PP.1080-1096.

CALVO-MERINO, B. *et al.* « Action observation and acquired motor skills: An FMRI study with expert dancers », *Cerebral Cortex* (15(8)), 2004, pp. 1243–1249.

CASON, N. and D. SCHÖN. « Rhythmic priming enhances the phonological processing of speech », *Neuropsychologia* (50(11)), 2012, pp. 2652–2658.

CHANTLER, P. and P. STEWART, *Basic radio journalism*, London, Taylor & Francis, 2003.

CHANTLER, P. and P. STEWART, *Essential radio journalism: How to produce and present radio news*, London, A&C Black Publishers, 2009.

COUPER-KUHLEN, E., *English speech rhythm. Form and Function in everyday verbal interaction*, Amsterdam, Benjamins, 1993.

CUMMINS, F. « Rhythm as an affordance for the entrainment of movement », *Phonetica* (66(1-2)), 2009, pp. 15–28.

DAUER, R. « Stress timing and syllable timing reanalyzed », *Journal of Phonetics* (11), 1983, pp. 51–62.

D'AUSILIO, A. *et al.* « The motor somatotopy of speech perception », *Current Biology* (19), 2009, pp. 381–385.

PEELLE, J.E. and M. H. DAVIS. « Neural oscillations carry speech rhythm through to comprehension », *Frontiers of Psychology* (3), 2012, p. 320.

DEGAND, L. and A. C. SIMON. « Mapping prosody and syntax as discourse strategies: How basic discourse units vary across genres », *in:* D. Barth-Weingarten, N. Dehé and A. Wichmann (Eds.), *Where prosody meets pragmatics,* Bingley, Emerald Group Publishing, 2009, pp. 81–107 .

DEMIR, Ö. E. *et al.* « Narrative processing in typically developing children and children with early unilateral brain injury: Seeing gesture matters », *Developmental Psychology* (50(3)), 2014, pp. 815–828.

DILLEY, M. C. and J. D. MCAULEY. « Distal prosodic context affects word segmentation and lexical processing », *Journal of Memory and Language* (59), 2008, pp. 294–311.

DROIT-VOLET, S. and S. GIL. « The time–emotion paradox. » *Philosopical Transactions of the Royal Society B,* 2009, pp. 1943-1953.

EJIRI, K. and N. MASATAKA. « Co-occurence of preverbal vocal behavior and motor action in early infancy », *Developmental Science* (4(1)), 2001, pp. 40–48.

ERICKSON, F. and J. SHULTZ, *The counselor as gatekeeper: Social interactions in interviews*, New York, Academic Press, 1982.

ESTEVE-GIBERT, N. and P. PRIETO. « Prosodic structure shapes the temporal realization of intonation and manual gesture movements », *Journal of Speech, Language, and Hearing Research* (56(3)), 2013, pp. 850–864.

ESTEVE-GIBERT, N. and P. PRIETO. « Infants temporally coordinate gesture-speech combinations before they produce their first words », *Speech Communication* (57), 2014, pp. 301–316.

FADIGA, L. *et al.* « Speech listening specifically modulates the excitability of tongue muscles: A TMS study », *European Journal of Neuroscience* (15), 2002, pp. 399–402.

FALK, S. and S. DALLA BELLA. « Regular timing patterns, sensorimotor synchronization and text-change detection in speech », *Proceedings of the PoRT workshop: Perspectives on Rhythm and Timing*, University of Glasgow, July 19-21, 2012.

FANT, G., *Speech acoustics and phonetics. Selected writings*, Dordrecht, Kluwer Academic Publishers, 2004.

FEYEREISEN, P. « Further investigations on the mnemonic effect of gestures: Their meaning matters », *European Journal of Cognitive Psychology* (18), 2006, pp. 185–205.

FLETCHER, J. « The prosody of speech: Timing and rhythm », *in:* W. Hardcastle, J. Laver and F. Gibbon (Eds.), *The handbook of phonetic sciences,* Oxford, Blackwell, 2010, pp. 523–602 .

FÓNAGY, I. « L'accent en français: accent probabilitaire », *in:* I. Fónagy and P. Léon (Eds.), *L'accent en français contemporain,* Montréal, Didier, 1980, pp. 123-233.

FOX, A., *Prosodic features and prosodic structure: The phonology of suprasegmentals*, Oxford, Oxford University Press, 2000.

FRAISSE, P., *The Psychology of time*, New York, Harper, 1963.

FRAISSE, P. « Rhythm and Tempo », *in:* D. Deutsch (Ed.), *The Psychology of Music*, New York, Academic ress, 1982, pp. 149-180.

FRANCUZ, P. « The impact of audio information intonation on understanding television news contents », *Psychology of Language and Communication* (14(1)), 2010, pp. 71–86.

GARROD, S. and M. J. PICKERING. « Towards a mechanistic psychology of dialogue », *Behavioral and Brain Sciences* (27), 2004, pp. 169–226.

GALANTUCCI B., C.A. FOWLER and M. T. TURVEY. *«* The motor theory of speech perception reviewed. *»* *Psychonomic Bulletin & Review* (13(3)), 2006, pp. 361-377.

GASKELL, M. G. *et al.* « The selective role of premotor cortex in speech perception: A contribution to phoneme judgements but not speech comprehension », *Journal of Cognitive Neuroscience* (25(12)), 2013, pp. 2179–2188.

GENTILUCCI, M., and R. DALLA VOLTA. Spoken language and arm gestures are controlled by the same motor control system. *Quarterly Journal of Experimental Psychology* (61(6)), 2008, pp. 944-957.

GIBSON, J.J. *The ecological approach to visual perception*. Boston, Houghton Mifflin, 1979.

GOLDIN-MEADOW, S., *Hearing gesture*, Cambridge, MA, Harvard University Press, 2003.

GOLDMAN, J.-PH. *et al.«* Phonostylographe : un outil de description prosodique. Comparaison du style radiophonique et lu », *Nouveaux cahiers de linguistique française* (28), 2007, pp. 219-237.

GOYET, L., S. DE SCHONEN and T. NAZZI. « Words and syllables in fluent speech segmentation by French-learning infants: An ERP study », *Brain Research* (1332), 2010, pp. 75–89.

GUAY, M. and A.W. SALMONI. « An examination of self-pacing procedures in human time estimation », *Perceptual and Motor Skills* (64(3.2)), 1987, pp.1231-1236.

HASSON, U. *ET AL.* « Brain-to-brain coupling: A mechanism for creating and sharing a social world », *Trends in Cognitive Sciences* (116), 2012, pp. 114–121.

HAWHEE, D., *Bodily arts. Rhetorics and athletics in ancient Greece*, Austin, University of Texas Press, 2004.

HEROLD, B. *et al.* « Impaired word stress pattern discrimination in very-low-birthweight infants during the first 6 months of life », *Developmental Medicine and Child Neurology* (50(9)), 2008, pp. 678–683.

HÖHLE, B. *ET AL.* « Language specific prosodic preferences during the first year of life: Evidence from German and French infants », *Infant Behavior and Development* (32), 2009, pp. 262–274.

HUPIN, B. and A. C. SIMON. « Analyse phonolostylistique du discours radiophonique », *Recherches en communication* (28), 2007, pp. 103–122.

JIANG, J. *et al.* « Neural Synchronization during Face-to-Face Communication. » *The Journal of Neuroscience*, 32(45), 2012, pp. 16064 –16069.

JONES, M. R. « Time, our lost dimension: Toward a new theory of perception, attention, and memory. » *Psychological Review* (83(5)), 1976, pp. 323-355.

JONES, M. « Musical time », *in:* I. Cross, S. Hallam and M. Thaut (Eds.), *The Oxford handbook of music psychology,* Oxford, Oxford University Press, 2009, pp. 81–92 .

JUSCZYK, P. W., *The discovery of spoken language*, Cambridge, MA: MIT Press, 1997.

JUSCZYK, P. W., D.M. HOUSTON and M. NEWSOME. « The beginnings of word segmentation in english-learning infants », *Cognitive Psychology* (39(3-4)), 1999, pp. 159–207.

KOCH, P. and W. OESTERREICHER. « Gesprochene Sprache und geschriebene Sprache : Langage parlé et langage écrit », *in:* G. Holtus, M. Metzeltin and C. Schmitt (Eds.), *Lexicon der romanistischen Linguistik,* Tübingen, Max Niemeyer Verlag, 2001, pp. 584–627 (I).

KOHLER, K. J. « Rhythm in speech and language », *Phonetica* (66), 2009, pp. 29–45.

KRAHMER, E. and M. SWERTS. « The effects of visual beats on prosodic prominence: Acoustic analyses, auditory perception and visual perception », *Journal of Memory and Language* (57), 2007, pp. 396–414.

LARGE, E.W. AND M.R. JONES. « The dynamics of attending: How people track time-varying events », *Psychological Review* (106(1)), 1999, pp. 119–159.

LAVER, J., *Principles of phonetics*, Cambridge, Cambridge University Press, 1994.

LEHISTE, I. « Isochrony reconsidered. » *Journal of Phonetics (5)*, 1977, pp. 253-263.

LIBERMAN A.M *et al.* « Perception of speech code. » *Psychological Review* (74), 1967, pp. 431–461.

LIBERMAN A.M. and I.G. MATTINGLY. « The motor theory of speech perception revised. » *Cognition* (21), 1985, pp. 1–36.

LIBERMAN, M. and A. PRINCE. « On stress and linguistic rhythm », *Linguistic Inquiry* (8), 1977, pp. 249–336.

LIDJI, P. *et al.* « Listeners feel the beat: Entrainment to English and French speech rhythms », *Psychonomic Bulletin & Review* (18), 2011, pp. 1035–1041.

LONDON, J., *Hearing in time*, Oxford, Oxford University Press, 2004.

LONDON, J. « Three things linguists need to know about rhythm and time in music », *Empirical Musicology Review* (7(1-2)), 2012, pp. 5–11.

LUGINBÜHL, M. « Die Stimme(n) der Tagesschau : Prosodie der Fernsehnachrichten - Präsentation als kulturelle Performanz », *in:* I. Bose and D. Schwiesau (Eds.), *Nachrichten schreiben, sprechen, hören. Forschungen zur Hörverständlichkeit von Radionachrichten,* Berlin, Frank & Timme, 2012, pp. 353–373 .

LUO, H. and D. POEPPEL. « Phase patterns of neuronal responses reliably discriminate speech in human auditory cortex », *Neuron* (54), 2007, pp. 1001–1010.

MASSARO, D.W. and T. H. CHEN. « The motor theory of speech perception revisited », *Psychonomic Bulletin & Review* (15), 2008, pp. 453–457.

MCNEILL, D., *Hand and mind: What gestures reveal about thought*, Chicago, University of Chicago Press, 1992.

MCNEILL, D., *Gesture and Thought*, Chicago, University of Chicago Press, 2005.

MÖTTÖNEN, R. and K. E. WATKINS. « Motor representations of articulators contribute to categorical perception of speech sounds », *Journal of Neuroscience (29(31))*, 2009, pp. 9819–9825.

NAZZI, T.*et al.* « Early segmentation of fluent speech by infants acquiring French: Emerging evidence for crosslinguistic differences », *Journal of Memory and Language (54(3))*, 2006, pp. 283–299.

OOMEN, C. C. E. andA. POSTMA. « Effects of time pressure on mechanisms of speech production and self-monitoring », *Journal of Psycholinguistic Research (30)*, 2001, pp. 163–184.

PARDO, J. S. « On phonetic convergence during conversational interaction », *Journal of the Acoustical Society of America (119(4))*, 2006, pp. 2382–2393.

PARNCUTT, R. « A perceptual model of pulse salience and metrical accent in musical rhythms », *Music Perception (11(4))*, 1994, pp. 409–464.

PATEL, A. D., *Music, language and the brain*, Oxford, Oxford University Press, 2008.

PICKERING, M. J. and S. GARROD. « Do people use language production to make predictions during comprehension? » *TRENDS in Cognitive Sciences (11(3))*, 2007, pp. 105-110.

POWER, A.J. *et al.* « Neural entrainment to rhythmic speech in children with developmental dyslexia », *Frontiers in Human Neuroscience (7)*, 2013, p. 777.

PRICE, J. « New News Old News: A sociophonetic study of spoken Australian English in news broadcast speech », *AAA - Arbeiten aus Anglistik und Amerikanistik (33(2))*, 2008, pp. 285–310.

QUENÉ, H. and R. F. PORT. « Effects of timing regularity and metrical expectancy on spoken-word perception », *Phonetica (62(1)), 2005, PP. 1–13.*

RAMUS, F., M. NESPOR and J. MEHLER. « Correlates of linguistic rhythm in the speech signal », *Cognition (73)*, 1999, pp. 265–292.

REPP, B. H. « Sensorimotor synchronization: A review of the tapping literature », *Psychonomic Bulletin & Review (12(6))*, 2005, pp. 969–992.

RODERO, E. « Caracterización de una correcta locución informativa en los mensajes audiovisuales », *Estudios sobre el mensaje perodístico (13)*, 2007.

RODERO, E. « Peculiar styles when narrating the news: The intonation of radio news bulletins », *Estudios del Mensaje Periodístico (19(1))*, 2013.

RONCAGLIA-DENISSEN, M.P., M. SCHMIDT-KASSOW and S.A. KOTZ. « Speech Rhythm Facilitates Syntactic Ambiguity Resolution: ERP Evidence. » *PLoS ONE (8(2))*, 2013, e56000.

ROSSIÉ, M., *Sprechertraining*, Berlin, Ullstein Verlag, 6th edition, 2013.

ROTHERMICH, K., M. SCHMIDT-KASSOW and S. A.KOTZ. « Rhythm's gonna get you: Regular meter facilitates semantic sentence processing », *Neuropsychologia (50(2))*, 2012, pp. 232–244.

SANSAVINI, A., J. BERTONCINI, and G. GIOVANELLI. « Newborns discriminate the rhythm of multisyllabic stressed words. » *Developmental Psychology (33(1))*, 1997, pp.3-11.

SHOCKLEY, K., M.V. SANTANA, and C.A. FOWLER. « Mutual interpersonal postural constraints are involved in cooperative conversation. » *Journal of Experimental Psychology: Human Perception and Performance* (29(2)), 2003, pp. 326-332.

SO, W.C., C.S. CHEN-HUI and J.W. WEI-SHAN. « Mnemonic effect of iconic gesture and beat gesture in adults and children: Is meaning in gesture important for memory recall? », *Language and Cognitive Processes* (27(5)), 2012.

STIVERS, T.*et al.* « Universals and cultural variation in turn-taking in conversation », *Proceedings of the National Academy of Sciences* (106(26)), 2009, pp. 10587–10592.

TELLIER, M. « The effect of gestures on second language memorization by young children », *Gesture* (8(2)), 2008, pp. 219–235.

TOYOMURA, A., T. FUJII and S. KURIKI (2011). « Effect of external auditory pacing on the neural activity of stuttering speakers. » *NeuroImage* (57(4)), pp. 1507–1516.

VAISSIÈRE, J., and A. MICHAUD. « Prosodic constituents in French - A data-driven approach », *in:* Y. Kawaguchi, I. Fonagy, and T. Moriguchi (Eds.), *Prosody and Syntax,* Amsterdam, Philadelphia, John Benjamins, 2006, pp. 47-63.

WARREN, S., *Radio. The book*, London, San Diego, Burlington, Elsevier Focal Press, 2005.

WEBER, C. *ET AL.* « Discrimination of word stress in early infant perception: Electrophysiological evidence », *Cognitive Brain Research* (18), 2004, pp. 149–161.

WELBY, P. « French intonational structure: Evidence from tonal alignment. » *Journal of Phonetics* (34(3)), 2006, pp. 343–371.

WILBY, P. and C. CONROY,*The radio handbook*, New York, Routledge, 1994.

WILSON, T.P. and M. WILSON. « An oscillator model of the timing of turn-taking», *Psychonomic Bulletin and Review* (12(6)), 2005, pp. 957-968.

WITTMANN, M. « The experience of time. » *Philosophical Transactions of the Royal Society* (364), 2009, pp. 1955–1967.

NOTES

1. As the main focus of this article is on rhythm, the role of syntax in grouping, although equally important, will not be discussed.

RÉSUMÉS

Le temps est une ressource précieuse dans les médias audio-visuels. Les journalistes qui travaillent à la radio sont particulièrement soumis aux contraintes temporelles. Leur message doit être diffusé en quelques minutes ou secondes sans le support visuel d'un texte ou des images. Ainsi, le message doit être structuré de telle façon que les aspects les plus importants seront proéminents dans le discours et intéressent l'audience. D'un autre point de vue, les

journalistes ont besoin de bien contrôler le temps qu'ils mettent eux-mêmes pour prononcer leur discours et de s'orienter dans le temps pour ajuster le temps de leur intervention le plus précisément possible. Dans cette contribution, j'examine l'hypothèse que le rythme de la parole fournit les structures nécessaires pour la réussite dans ces défis journalistiques. Dans un premier temps, je présente la littérature sur la nature du rythme de la parole et son rôle dans la perception et le traitement de la parole, l'acquisition de la langue et dans l'interaction. Deuxièmement, je passe en revue les résultats principaux des études concernant la proéminence rythmique dans le phonostyle radiophonique. Finalement, l'hypothèse défendue est que le rythme de la parole, parfois concurremment avec les gestes, conduit à un meilleur timing et une meilleure estimation du temps par les journalistes eux-mêmes quand ils sont à l'antenne. L'article fournira au lecteur un aperçu détaillé et multidisciplinaire de la littérature et identifiera les enjeux et de nouvelles pistes pour la recherche future à propos du rythme de la parole à la radio.

Time is one of the most precious resources in the audio-visual media. Journalists working in radio broadcasting are particularly subject to time constraints. Their message has to be passed on by the speech signal in a few minutes or seconds without visual support of written text or pictures. Therefore, the message has to be structured in a way that the most important aspects of the information are made prominent and interesting for the audience. On the other hand, journalists have to keep in time and need strategies to orient themselves in time in order to achieve exact timing of their spoken discourse. In this article, I lend support to the notion that the rhythmic structure of speech is one of the major tools for journalists to succeed in this endeavor. First, I review some of the literature on the nature of speech rhythm and its role for speech perception, language acquisition, processing and interaction. Second, the state of the art about what we know about rhythmic prominence in radio broadcasting is given. Finally, the idea will be advanced that speech rhythm, sometimes in conjunction with gesture, improves timing and time estimation in journalists speaking on air. A rich set of literature from different domains is presented in order to identify major questions and pathways for future research on speech rhythm in radio broadcasting.

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