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A Closer Look at Formulaic Language: Prosodic Characteristics of Swedish Proverbs

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Formulaic expressions (such as idioms, proverbs, and conversational speech formulas) are currently a topic of interest. Examination of prosody in formulaic utterances, a less explored property of formulaic expressions, has yielded controversial views. The present study investigates prosodic characteristics of proverbs, as one type of formulaic expression, including tonal patterns and rate. Seven familiar proverbs and matched control sentences were spoken as naturalistically as possible by 15 Swedish females (10 adults, 5 children). Results revealed that tonal pattern distributions were significantly different between sentence proverbs and matched control sentences, with proverbs generally showing a 'less stress' tonal pattern, which may be interpreted as proverb specific. Proverbs were also spoken with a significantly faster speech rate than control sentences. Children showed a significantly faster rate in proverbs known to them but showed more variability in tonal patterns. The results indicate that proverbs have distinctive prosodic characteristics when compared with newly created language. Implications for proposals of holistic storage and processing, the role of frequency of exposure, and a dual model of language are discussed.

Formulaic language, including proverbs and idioms, has attracted researchers from many different fields. Questions cover diverse topics, such as structural characteristics, acquisition by first and second language users, frequency of occurrence, and conditions of use. A more modestly explored area in the formulaic language literature addresses their prosodic characteristics: stress, pitch mean and variation, and rate (but see Van Lancker *et al*. 1981; Ashby 2006; Lin 2010a, b, 2012, 2013). Pitch phenomena as measurable in word level stress and intonation contour have been held to reflect details of mental storage and processing, including their role in speech repairs (Heeman and Allen 1999) and in sequential models of production and perception (Levelt 1999). Swedish, a pitch accent language, is suitable for investigating tonal patterns, since the patterns are regular, salient, and change with focal stress in a sentence. Another prosodic parameter, speech rate, is contingent in part on anticipatory articulatory processing (Guenther 1993), suggesting that efficacy of

production may be reflected in rate measures (Herman 1985). Previous studies of perception and production of formulaic expressions have focused on idioms and another formulaic language category, lexical bundles, and only a few of these have addressed prosodic characteristics. The current study explores speech rate and tonal (stress) patterns in Swedish adults and 12-year-old children, in order to investigate aspects of storage and processing of a subset of formulaic language: culturally transmitted proverbs.

PROCESSING OF FORMULAIC EXPRESSIONS

Formulaic expressions are central to human communication and language use, and overall, appear with frequency in natural language use. Analyses of spoken and written corpora show that the proportion of total words that are part of any formulaic expression ranges between 25 and 58 per cent depending on style and content of discourse samples and the criteria for identifying formulaic expressions (e.g. Erman and Warren 2000; Foster 2001; Van Lancker Sidtis and Rallon 2004), although a given formulaic expression may have negligible frequency counts in any given text (Moon 1997; Rammel *et al*. 2014).

Formulaic expressions are characterized by stereotyped, routinized, or fixed form; conventionalized meanings; and specialized usage conditions. Having stereotyped form, such expressions differ from novel, newly created language, whereby a speaker creates a new utterance based on individual words and morpho-syntactical rules. Furthermore, the conventionalized meanings of many formulaic expressions include attitudinal and affective connotations (e.g. *She has him eating out of her hand*), and they often have an especially close association with social contexts (e.g. greetings and leave-taking, which must occur at certain points in a conversation, professional expressions, and political slogans; see Fillmore 1979; Kecskes 2000; Kuiper 2009). Finally, and most importantly, formulaic expressions are personally familiar to speakers of a language (Van Lancker Sidtis 2004, 2009). That formulaic expressions are in fact known, in the sense of being stored in memory with the special characteristics described above, is seen in the fact that idioms and proverbs may be mentioned by a few keywords such as *A bird in the hand*... with the expectation that the co-participant will fill in the rest. Knowledge by speakers of a language community is supported by surveys and quantitated probes of language users' shared knowledge (Van Lancker Sidtis and Rallon 2004; Van Lancker Sidtis *et al*. 2012; Rammel *et al*. 2014).

Definitions of formulaic language have been debated, and many classifications and terms have been in play for well over a century (see e.g. Wray 2012). Subsets of formulaic language vary in terms of such parameters as compositionality, frequency, and emotional and social associations (Van Lancker Sidtis 1975, 2004; Wray 2012). The view in this article is that the various subsets of formulaic expressions (idioms, conversational speech formulas, expletives, pause fillers, discourse elements, and so on) have in common these important characteristics: (i) that they are not newly created and (ii) they are known to

speakers of a language community. This has important implications for first and second language acquisition, models of language, and neurological descriptions of language function.

One type of formulaic expression is the proverb: short sayings that superficially may take the form of literal, factual statements, but that are uttered to convey a more general, nonliteral level of wisdom, morals, and traditional views (Mieder 1993; Gibbs 2001), such as *A rolling stone gathers no moss*. Proverbs often feature stylistic characteristics such as rhyme and rhythm (*Birds of a feather flock together*), assonance (*The squeaky wheel gets the grease*), repetition (*When the going gets tough, the tough get going*), symmetry (*Beggars can't be choosers*), alliteration (*Practice makes perfect*), and combinations of these rhetorical elements, which may contribute to their successful uptake into memory.

There is now considerable evidence that formulaic expressions, when compared with non-formulaic (newly created or novel) language, are stored and processed according to different principles. This derives from psychological and neurolinguistic studies (for a full review of neurolinguistic findings, see Van Lancker Sidtis 2012, 2013). Proverbs have not been as extensively studied as the processing of idioms (e.g. *He's at the end of his rope*), but idioms and proverbs share many characteristics. Idioms are multi-word nonliteral expressions, conveying meanings that point beyond the usual meanings of the lexical items, just as proverbs are; both are culturally learned; and both carry distinctive social, attitudinal, and cultural connotations. Furthermore, in comparison with other formulaic expressions, such as lexical bundles (*In the meantime, all things being equal)* and conversational speech formulas (*How's the family, it's great to see you*), proverbs and idioms are similarly relatively rare in everyday language use (Van Lancker and Rallon 2004; Van Lancker Sidtis 2009).

Most studies comparing processing of formulaic expressions have focused on comprehension tasks. It has been shown that native speakers and high-proficiency nonnative speakers process idioms faster compared with matched novel word-strings in sentence recognition tasks (Swinney and Cutler 1979; Tabossi *et al*. 2009). Silent reading tasks also provided evidence that the conventional (nonliteral) meanings of proverbs are accessed faster than the literal meanings (Katz and Ferretti 2001). Text frequency does not provide a strong explanation for these results, given the demonstrated text infrequency of idioms and proverbs (Moon 1997; Rammel *et al*. 2014). A more viable explanation for the formulaic processing advantage is, known expressions are stored as unitary lexical items along with their structural and meaning characteristics. In addition to anecdotal evidence (Fillmore 1979; Pawley and Syder 1983; Van Lancker Sidtis 2011), it is arguable that these known expressions are retrieved in a holistic fashion from memory rather than generated by grammatical rules operating on independently retrieved lexical items (Swinney and Cutler 1979; Van Lancker Sidtis 2004, 2009; Wray and Perkins 2004; Berman and Ravid 2010). This might happen at least on one level of mental representation, but it does not exclude that on other levels, the expressions can be decomposed (see Titone and Connine 1999 for a discussion of a hybrid model).

PROSODIC CHARACTERISTICS OF FORMULAIC EXPRESSIONS

Results from comprehension studies indicating faster processing and claims about unitary structure in mental storage lead naturally to questions about the prosody of formulaic expressions in production. Prosody includes variation in pitch/fundamental frequency, loudness, speech rate, stress patterns, and pausing. Formulaic expressions are predicted to exhibit 'phonological coherence': the expressions form a single intonation unit (Lin 2010a, b) and are uttered faster and more fluently than novel language (Wray 2004; Erman 2007; Lin 2010a). Erman (2007) analyzed two speech corpora and compared the number and length of pauses in formulaic expressions and in novel utterances, since pausing is seen as a covert sign of lexical retrieval (Levelt 1983; Postma and Kolk 1993). There were significantly fewer longer pauses in formulaic than novel expressions in the adult corpus, suggesting that retrieval of the formulaic expressions required less processing. In a similar approach, Lin (2010a) found that words in formulaic expressions were consistently less likely to receive stress. Both Erman (2007) and Lin (2010a, b) included a wide range of formulaic expressions, ranging from sentence stems and frames to proverbs, idioms, and social speech formulas. Because of this, the prosodic patterns observed in common with the expressions could be explained at least in part by the high frequency of some (but not all) of these expressions. For example, phonological coherence could be a result of the improved neuromotor coordination through repeating the same articulatory sequences (Bybee 2002). The effects of high frequency include articulatory reduction and assimilation, which has been shown for high-frequency phrases, and this could also lead to a faster rate of speech (see e.g. Bybee and Scheibman 1999; Bybee 2000). Other possible prosodic consequences of high occurrence in the language are discussed in Lin (2013). One is semantic or pragmatic weight: utterances that are frequently used may lose some of their meaning and function and are therefore unlikely to be stressed (an example is 'if you like' in British English). Both of these arguments have less pertinence to the formulaic expressions currently under study; proverbs have not been shown in texts or in surveys to be frequent in use or exposure.

Previous studies have explored the role of prosodic cues in idioms using read material in listening tasks (Van Lancker and Canter 1981; Van Lancker Sidtis 2003; Ashby 2006). These studies focused on listeners' ability to distinguish between the literal and nonliteral meaning of ditropic idiomatic sentences (e.g. *The coast is clear*) using acoustic cues alone. Native listeners were able to distinguish between the literal and nonliteral versions in ditropic sentences recorded by two actors who were instructed to convey the intended meaning (literal or nonliteral) (Van Lancker and Canter 1981; Van Lancker Sidtis 2003). Later acoustic analyses showed that the literal versions were longer in duration and contained significantly more pauses and more pitch accents on individual words, compared with the nonliteral/conventional versions (Van Lancker *et al.* 1981).

The authors speculated that these acoustic cues (fewer pitch accents and pauses and faster rate in the idioms) iconically reflected the nonliteral versions as unitary utterances, an interpretation that is in line with the 'phonological coherence' proposal mentioned above. Ashby (2006) argued that the differences seen in prosodic patterns in this study were due to varying focus in the sentence, and not due to any stereotyped prosodic pattern on the idiom. He proposed that what differentiates the nonliteral from the literal version is the prosodic manipulations that places a focus distinction on different parts of the sentence, and that speakers merely signal 'look out for another meaning than the obvious' when altering the prosody in the literal versions. Our study is designed to investigate the prosodic characteristics in proverbs, under conditions where speakers do not have to disambiguate the meaning of an idiom, but simply say a familiar proverb 'as naturally as possible'.

ACQUISITION OF PROVERBS

The development of proverbial understanding in children has been the topic of many studies through the second half of the 20th century, with the conclusion that metacognitive understanding of proverbs continues to emerge throughout adolescence (see e.g. Nippold and Rudzinski 1993; Berman and Ravid 2010). Many questions remain about *how* children learn formulaic expressions and how much exposure is required before adult-level familiarity is acquired. In a recent study by Reuterskiöld and Van Lancker Sidtis (2013), it was shown that girls ages 8–14 recognized low-frequency idioms after a single exposure in a conversational and contextually relevant setting, better than matched novel expressions. These authors proposed that the unique characteristics of idioms, including nonliteral and nuanced meanings along with a saliently unusual relationship to context (e.g. *I'm gonna put you through the mill* spoken by the teacher in a crafts session), trigger a one-trial exposure mechanism (see also Kreiman and Sidtis 2011, pp. 226–8) leading to rapid uptake of the expression.

It is not known whether children produce formulaic utterances with the same prosodic characteristics as adults. Lin (2012) argues that prosody might play a central role in the learning of formulaic expressions. She refers to a case study by Peters (1977), which showed that a child may learn the prosody of chunks before learning the actual constituent words, and argues that this may be due to specific prosodic characteristics of formulaic expressions that make them stand out in the spoken input (see also Morgan and Demuth 1996). Few, if any, studies, have investigated prosodic aspects of proverb production in children, which is one of the aims of the present study.

AIMS, RESEARCH QUESTIONS, AND HYPOTHESES

The present exploratory study aims to add to the literature on processing and storage of formulaic expressions in two ways. First, no previous studies have specifically examined speech rate and tonal patterns in proverbs across a group

of nonprofessional native speakers of either Swedish or English. If familiar (i.e. known, culturally transmitted) proverbs, which do not need to be disambiguated from a literal counterpart, show differences in the distribution of tonal patterns and speech rate compared with carefully matched control sentences, this would give further evidence for specific prosodic characteristics for proverbs, which are relatively infrequent but personally familiar formulaic expressions. Secondly, this study compares school-aged children's productions to adults' to investigate a developmental aspect of the storage and processing of formulaic expressions.

The study was guided by the following research questions:

1. Are there differences in speech rate between proverbs and matched control sentences?
2. Are there differences in distribution of tonal patterns between proverbs and control sentences?
3. Are there differences between adults and school-aged children in speech rate and tonal pattern distribution in proverbs and control sentences?

If there is a processing advantage for proverbs, a faster speech rate is expected in proverbs compared with matched control sentences since faster processing may reflect phonological coherence, a surrogate indicator of holistic structure. Furthermore, if the tonal pattern is part of the proverbs' stereotyped form, a uniform tonal pattern will be seen across participants in the proverbs in matched sentence pairs. This uniform pattern, which will include a picture of fewer stress peaks than the control sentences, should be more frequent in the proverb than in a matched control sentence.

METHOD

Participants

Twelve adult females and five female children, all native speakers of central/Stockholm Swedish, participated in the study. Two adult participants were excluded due to technical problems, and the remaining ten adults had an age range of 22–38 years (Mean: 29.1, SD: 4.93). The children were between 11;8 and 13;11 years old (Mean: 12;9, SD: 11 months). The participants were recruited via word of mouth and the distribution of flyers in Stockholm. All adults lived in Stockholm, and eight had not lived more than 1.5 years outside of Stockholm. One participant (36 years old), had moved to Stockholm when she was 10 years old, and another (26 years old) had lived 5.5 years in another mid-Swedish town during graduate school. All participants described their dialect as being central/Stockholm Swedish or standard Swedish. All adults had at least 12 years of schooling in Stockholm. All participating children were born and had lived their entire lives in Stockholm. All participants had self-reported normal hearing and normal/corrected-to-normal vision, and did

not report any developmental delays such as language or reading difficulties or any voice problems. The adult participants were not given any compensation for participating; the children were given a $12 gift card.

All procedures were approved by the appropriate human subjects research administration, and all subjects, as well as children's parents, gave written informed consent.

Materials

The speech material consisted of seven Swedish proverbs and matched control sentences. Control sentences were matched to the proverbs with regard to grammatical phrase structure, number of words, and number of syllables. Furthermore, the lexical stress pattern of multisyllabic words was also matched across each sentence pair. The sentences were not phonetically matched, since the macro-prosodic shape of the whole utterance was of interest rather than micro-prosodic changes due to sound combinations, but total counts of long and short vowels and consonant clusters were the same for the proverbs and control sentences. Proverbs and control sentences with word-by-word translations can be found in Table 1.

To confirm the low frequency of the included proverbs, their frequencies of occurrence were estimated through the PAROLE corpus (24,331,936 tokens, November 2014) using the web interface Korp (http://spraakbanken.gu.se/korp/, Borin *et al*. 2012). PAROLE is a written corpus with texts from the categories book (≈20 per cent), newspaper (≈65 per cent), periodical (≈5 per cent), and miscellaneous (≈10 per cent) (Xiao 2008). All included proverbs had a frequency between 0 and 0.3 occurrences per million words in PAROLE.

The material was recorded in a quiet room with the FiRe digital recording app for the Apple iPhone (Version 2.6.0, Audiofile Engineering, LLC) in WAVE format. An 1/8 inch microphone adapter (KM-IPHONE-MIC) was connected to a compact condenser lavalier omnidirectional microphone (Audio-Technica ATR3350), which was fastened to the participant's clothing approximately 20 cm from the mouth.

Familiarity questionnaire

Familiarity is one of the key properties of a formulaic expression (Van Lancker Sidtis 2004), and may affect how it is perceived (Nordmann *et al*. 2014). To ensure that only personally familiar proverbs were included in the analysis, all participants filled out a written questionnaire indicating whether they recognized the proverbs (yes/no), if they had ever heard the proverb spoken (yes/no/do not remember) and if they ever used the proverb themselves (yes/no) at the end of the data collection session.

All adults reported 100 per cent recognition of all seven proverbs, while, on average, they had heard 94 per cent and used 66 per cent of the proverbs. As expected, the children were less familiar with the proverbs, recognizing an

Table 1: Proverbs and matched control sentences with English translations

No.	Proverb	Matched control sentence
1	Borta bra men hemma bäst.	Ute kallt men inne varmt.
	Away good but at home best.	*Outside cold but inside warm.*
2	Bättre sent än aldrig.	Bättre kallt än ljummet.
	Better late than never.	*Better cold than lukewarm.*
3	Den som spar han har.	Den som står han ser.
	The one who saves he has.	*The one who stands he sees.*
4	Lagt kort ligger.	Lat man sitter.
	Laid card lies.	*Lazy man sits.*
5	Det som inte dödar, härdar.	Den som inte stannar, ramlar.
	That which doesn't kill, toughens.	*The one who doesn't stop, falls.*
6	När katten är borta dansar råttorna på bordet.	När hästen är ute städar skötaren i stallet.
	When the cat is away, the rats dance on the table.	*When the horse is outside, the keeper cleans in the stable.*
7	Ensam är stark.	Lasse är svag.
	Alone is strong.	*Peter is weak.*

average of 69 per cent, with 57 per cent heard and 40 per cent used themselves.

For the subsequent analysis of speech rate and tonal patterns, only the tokens that the participant reported as recognized were included, a total of 70 sentence pairs for the adults, and 24 sentence pairs for the children.

Procedures

The participants were told that they were going to participate in a study that investigated well-known phrases and expressions. The data were collected in one session starting with a short interview to obtain background information, followed by an elicitation task where the participant read target sentences silently, presented on an Apple iPad screen, and then spoke the sentence out loud twice. The recording was divided into three sections with separate instructions: (i) control sentences, (ii) everyday formulaic expressions (not analyzed in this article), and (iii) proverbs. The sentences were randomized in each block with two practice items per block. For the control sentences, the participant was asked to silently read each sentence and then say it as naturally as possible twice. Participants were told that it was expected that they would not recognize the sentence. For the proverbs, the participant was asked to read each proverb silently, name a situation where the proverb could be used, and then say it as naturally as possible, as if they were in that situation.

The participant was asked to repeat the proverb once. If the participant (as in the case of a few participants in the child cohort) did not recognize the proverb, they were requested to read it as naturally as possible.

Analyses

All sentences were extracted from the recording and analyzed using the software Praat (Boersma and Weenink 2012). Total duration of all sentences was measured to determine rate, calculated as number of syllables/second. Numbers of syllables were fixed for each utterance across participants (there were no instances of syllable deletion or excessive coarticulation). Furthermore, care was taken so that both types of utterances were spoken fluently without silent or filled pauses by the participants. For all participants, the first token (of two samples taken) was analyzed unless error or noise interfered with the first, in which case the second was analyzed. Out of 210 tokens, 78.5 per cent were first productions, 18.5 per cent were second productions, and 3 per cent were 'other', where the participant was asked to repeat the sentence a third or fourth time.

Swedish tonal transcription

Swedish is a pitch accent language and has both a syllabic prominence and stress pattern signaled by duration, intensity, and vowel quality, and two different tonal word accents for multisyllabic words: accent I (acute) and II (grave). The accent patterns carry information about the phonological and morphological structure of words, and there are minimal word pairs where the only difference is the lexical accent, such as '*tomten*' ('the backyard') and '*tòmten*' ('the gnome'). Phonetically, the difference between the two accents is the timing of the peak accent (Bruce 2012), which leads to perceptually distinct and salient tonal patterns associated with each accent (see Table 2). In the context of a sentence, the word accents also signal sentence focus; the tonal pattern of a word changes depending on whether it is focal or non-focal, and in central/Stockholm Swedish, focus is signaled with a tonal rise (Bruce 2012). The tonal word accents are determined at the lexical level, which means that a high tone remains a high tone and a low tone remains a low tone in relation to the overall intonation curve of a sentence. There is a predictable pattern in the interaction between word accents in Swedish sentences, according to Bruce (2012). Without any specific focus of the sentence with three words or more, there will be a rise on the first accented word, a fall in the middle, and a final rise-fall pattern on the last word. If there is a focus added, a successive lowering of the fundamental frequency will happen after the last word with focus (Hansson 2003; Bruce 2012). This pattern will from now on be referred to as the 'standard' tonal pattern in the Results and Discussion sections.

The goal of the present study was to capture the most salient auditory prosodic features and compare tonal patterns of proverbial utterances across

Table 2: Tonal categories in the Swedish Tonal Transcription (Bruce 2012), and a minimal pair example with annotations according to the base prosody system. H indicates a (relatively) high tone, and L indicates a (relatively) low tone. The star (*) indicates the timing of the peak accent

Tonal category	Tonal transcription	Base prosody
Accent I (non-focal)	HL*	′cvcv
Accent II (non-focal)	H*L	′cv̀cv
Focal accent I	(H)L*H	″cvcv
Focal accent II	H*LH	″cv̀cv
Initial boundary tone	%L, %H	—
Final boundary tone	L%, LH%	—

speakers. Transcription and annotation of prosody is challenging, and any transcription system has to be language- and dialect-specific (Kreiman and Sidtis 2011, pp. 269–74). In American English, the format called Tones and Breaks Indices is the most common system used for prosodic transcriptions (ToBI: Beckman *et al*. 2005), with published standards adopted for several languages. There is no complete extension of ToBI to Swedish (M. Heldner, personal communication, June 2012), but Bruce (2012) has developed a notation system of tonal layering for central/Stockholm Swedish called the Swedish Tonal Transcription (STT). Similarly to ToBI, STT specifies high (H) and low (L) tones, which are relative to the overall contour of the sentence (Hansson 2003). In contrast to ToBI, the tonal categories available reflect the patterns typically associated with Swedish accent I and accent II in both focal and accented positions, see Table 2 (Bruce 2012). This differentiation between focal and accented positions makes STT more similar to the Standard British Model of Intonation. A second difference between STT and ToBI is that auditory information is the primary resource, while ToBI uses both auditory and visually acquired acoustic information in transcription. For the purpose of this study, STT was chosen for the present analysis since it is the most well-defined existing tonal annotation system adapted for central/Stockholm Swedish (M. Heldner, personal communication, June 2012), and it captures both lexical and focal stress as well as tonal beginning and end points. However, no complete or official guidelines/training materials are available for STT, and for the current project, information was compiled from Bruce (2012) and two dissertations by Hansson (2003) and Myrberg (2010).

All transcriptions were performed by the first author from sound files of the speech material. Sentence-initial and final words, focally accented words, and non-focal words were assigned a tonal pattern, while non-stressed words (mainly function words) did not. Four months after the initial transcription, a random sample of 20 per cent of all sentences was re-transcribed. Same-rating concordance was 94 per cent (calculated across all transcribed words).

Tonal patterns

After all sentences were tonally transcribed, they were sorted according to their tonal patterns. For sentences to be considered as having the same tonal pattern, the initial and final tones, focally accented words, and non-focal words had to be the same. Furthermore, this pattern had to be the same for at least five participants in either the proverb or the matched control sentence of a sentence pair to count as a uniform pattern. The sorting resulted in 1–2 patterns commonly associated with each sentence pair. These patterns were coded either as A or as B. Pattern A, or the standard pattern, typically showed the sentence final rise/fall pattern, or the successive lowering of the fundamental frequency after a focused word as described by Bruce (2012), and discussed above. If there was only one pattern common to a sentence pair, it was also coded (A). The second uniform pattern (B) showed less overall stress compared with pattern A and is thus called the 'less-stress pattern'. This was revealed by direct comparison with tonal pattern A: pattern B had fewer focused compared with non-focused words, and fewer accented words overall in each sentence pair and typically, the final rise/fall pattern was absent in pattern B. The rest of the utterances (which did not show A or B patterns outlined above) were coded as C or 'other'. Group C thus encompassed all utterances that did not have an A or B tonal pattern in common in five participants or more.

Table 3 shows the transcriptions of the tonal patterns in each sentence pair, the number of participants that used pattern A or pattern B across both sentence types, and the number of sentences placed in 'other' group C.

RESULTS

Statistical analyses

R version 3.0.0 was used for all analyses (R Core Team 2013). Paired-sample t-tests were utilized to compare speech rate between proverbs and matched control sentences. Chi-square tests were used to compare distributions of the tonal pattern groups (A, B, and C) across proverbs and control sentences. Standardized residuals ±1.96 (corresponding to an alpha-level of .05) or ±2.58 (corresponding to an alpha-level of .01) were used as indicators of the contribution to the overall significance of the chi-square test, and to determine if the proportion of a specific pattern was significantly above or below the expected values (Sheskin 2004).

Adult results

Speech rate

Figure 1 shows the distributions of speech rate for all seven control sentences and seven proverbs familiar to adult speakers. A paired sample t-test across all

Table 3: Uniform tonal patterns ['standard' (A) 'less stress' (B)] and frequency of 'other' (C) tonal patterns seen in seven sentence pairs (only proverbs shown in this table) for 15 participants. For English translations of both types of sentences, see Table 1

Pattern	Tonal transcriptions of tonal patterns A and B for each sentence pair								Frequency
	1. Borta		bra		men	hemma		bäst	
A	H*LH					H*L		L%	9
B	H*L					H*L		L%	6
C									15
	2. Bättre		sent		än	aldrig			
A	H*L					H*LH			15
B	—								0
C									15
	3. Den		som			spar	han	har	
A	%L					(H)L*H		L%	13
B	%H					L	H*	LH*	6
C									11
	4. Lagt		kort			ligger			
A	(H)L*H					H*L			19
B	(H)L*H					L%			6
C									5
	5. Det		som		inte	dödar		härdar	
A	%L					H*LH		H*LH	6
B	%L					H*L		H*LH	12
C									12
	6. När	katten	är	borta	dansar	råttorna	på	bordet	
A	%L	HL*		H*L		HL*		HL*	10
B	%L	LH*		H*L		HL*		L%	7
C									13
	7. Ensam		är			stark			
A	H*LH					HL*			19
B	H*L					%L			7
C									4

seven sentence pairs showed that on average, proverbs were spoken with a significantly faster rate with a medium effect size, $\text{mean}_{\text{proverb}} = 4.56$ syllables/second ($SD = 1.119$), $\text{mean}_{\text{control}} = 4.04$ syllables/second ($SD = 0.750$), $t(69) = 3.320$, $p = .001$, Cohen's $d = 0.58$. There is some variability across the proverbs, as well within utterances across speakers, especially for #1, #3, and

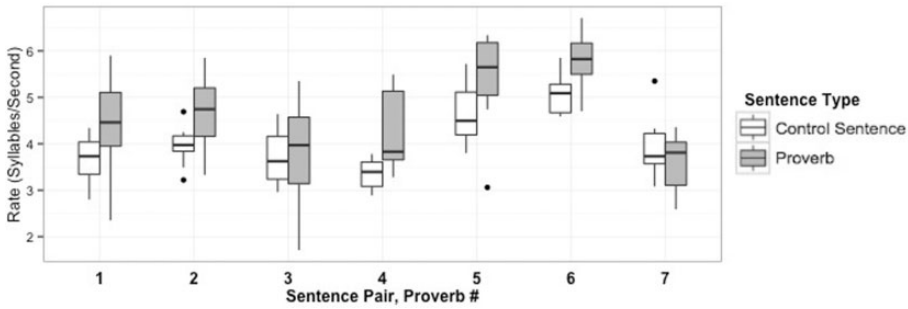

Figure 1: Distributions of average speech rate for proverbs and matched control sentences in 10 adult speakers (N = 70 sentence pairs). The line in the box represents the median speech rate. The difference in average speech rate between the two sentence types was significant, p = .001

#4, which points to individual differences; this will be addressed in the Discussion.

Tonal patterns

The frequencies and proportions of the three tonal patterns of recognized proverbs and control sentences in adult speakers can be found cross-tabulated in Table 4. A chi-square test was performed to determine if the tonal patterns were distributed differently across proverbs and control sentences. The test was significant, $\chi^2(2, N = 140) = 17.1$, $p < .001$. Furthermore, the standardized residuals indicated that proverbs had a higher than expected frequency of the less stress pattern (B) ($p < .001$) and that control sentences had a higher than expected frequency of the standard tonal pattern (A) ($p < .001$). The tonal patterns that fell in group C ('other') did not significantly contribute to the overall significance of the chi-square test and were not significantly below or above the expected value.

Child results

Speech rate

Figure 2 shows the distributions of speech rate for all seven familiar (recognized) proverbs and control sentences for five children ($N = 24$ sentence pairs). Similarly to adults, a paired sample t-test showed that familiar proverbs were spoken with a significantly faster rate than control sentences on average, $\text{mean}_{\text{proverb}} = 4.40$ syllables/second (SD = 0.961), $\text{mean}_{\text{control}} = 4.00$ syllables/second (SD = 0.774), $t(23) = 1.710$, $p = .003$, Cohen's $d = 0.47$. Compared with the adults, there is more variability in the control sentences, and one sentence pair #2 (English translation *Better late than never*, recognized by all five

Table 4: Cross-tabulation of personally familiar (recognized) proverbs vs. matched control sentences and three prosodic patterns for adult female speakers, percentages in parenthesis

Prosodic pattern	Sentence type	
	Proverb	Control
Standard (A)	26 (37%)	44 (63%)
	−3.04	3.04
Less stress (B)	24 (34%)	5 (7%)
	3.96	−3.96
Other (C)	20 (29%)	21 (30%)
	−0.18	0.18
Total	70 (100%)	70 (100%)

Note: Standardized residuals appear below observed frequencies/percentages.

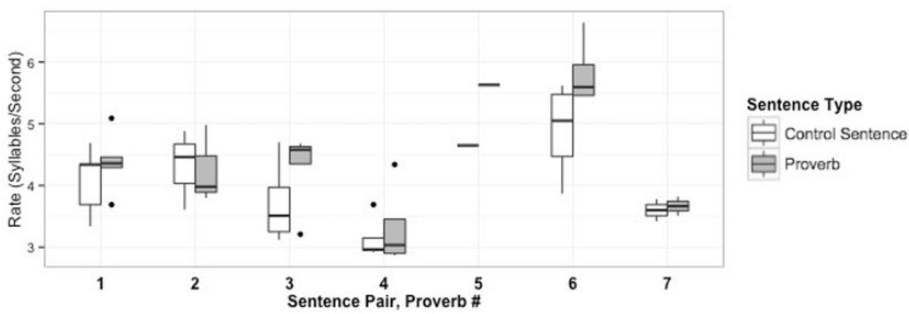

Figure 2: Distributions of average speech rate in control sentences and personally familiar (recognized) proverbs for five children (N = 24 sentence pairs: #1: 5 pairs, #2: 3 pairs, #3: 5 pairs, #4: 4 pairs, #5: 1 pair, #6: 4 pairs, #7: 2 pairs). The line in the box represents the median speech rate. The difference in average speech rate between the two sentence types was significant, p = .003

children) shows the opposite pattern, with the control sentence spoken at a faster rate than the proverb on average.

Tonal patterns

Table 5 shows the cross-tabulation for 24 sentence pairs (recognized proverbs and matched control sentences) for five children. The children show more overall variability in their tonal patterns as shown by the increased proportion

Table 5: Cross-tabulation of personally familiar (recognized) proverbs vs. matched control sentences and three prosodic patterns for child speakers, percentages in parenthesis

Prosodic pattern	Sentence type	
	Proverb	Control
Standard (A)	6 (25%)	10 (42%)
	−0.71	0.71
Less stress (B)	8 (33%)	3 (12%)
	1.06	−1.06
Other (C)	10 (42%)	11 (46%)
	−0.15	0.15
Total	24 (100%)	24 (100%)

Note: Standardized residuals appear below observed frequencies/percentages.

of the group C 'other' tonal patterns, and also less use of the standard tonal pattern (A) overall compared with adults. Even though proverbs were spoken more often with the less stress pattern (B) compared with control sentences, the distributions of tonal patterns were not significantly different across proverbs and control sentences, $\chi^2(2, N=48)=3.3$, $p=.19$, ns.

DISCUSSION

This exploratory study investigated the production of formulaic expressions through measures of speech rate and tonal patterns in proverbs compared with control sentences in tasks involving first silently reading and then producing the utterances as naturally as possible. The results largely supported the hypotheses: in adult speakers, proverbs were spoken with a faster rate than matched control sentences, which implies faster processing of these expressions. Furthermore, the proverbs were spoken with a less-stress tonal pattern significantly more often than expected if there were no systematic prosodic differences between the phrase types. All adults endorsed familiarity with the proverbs. As expected, school-aged children rated some of the proverbs as not familiar. Nonetheless, they also showed significantly faster speech rate in familiar proverbs compared with control sentences, and they revealed some evidence of the same proverbial tonal patterns as adults.

The results lend support to the hypothesis of differentiated processing for the production of proverbs, as a subset of formulaic expression, and control (novel) sentences in adult and child speakers. Furthermore, it extends the results of Van Lancker *et al.* (1981) who found that the idiomatic version of

ditropic sentences were spoken more rapidly and with fewer word pitch accents compared with the literal version of the same sentence, when spoken by two actors who were intending to communicate the respective meanings. Fewer pitch accents are analogous to the more frequent use of the less stress pattern (with fewer accented/focused words, tonal pattern B) in the current study. The results also support the notion of 'phonological coherence' in formulaic expressions as shown by the faster speech rate in proverbs compared with control sentences, which has been discussed previously in the literature (Wray 2004; Lin 2010a). In addition, phonological coherence has not been addressed in proverbs but only in other types of formulaic expressions.

Furthermore, the current study showed that these differences in tonal patterns and speech rate are found not only in ditropic idioms where prosody was produced by two actors to intentionally disambiguate between a literal and a nonliteral version, but also (i) in familiar (personally known) proverbs that do not have to be disambiguated and (ii) at a group level in non-professional speakers. This weakens the critique that was posed by Ashby (2006), who argued that the prosodic differences seen in literal and nonliteral versions of ambiguous sentences were essentially signals to the listeners to look out for a different interpretation than the standard idiomatic interpretation, rather than holistic storage of the prosodic contour. The present results show that even though the speakers do not have to signal 'something different' to a presumptive listener, they alter their prosody and significantly more often than expected use a nonstandard prosodic contour and a faster speech rate for proverbs.

One explanation to the less-stress pattern, which has been suggested in the literature, is that formulaic expressions have less semantic or pragmatic weight and, for this reason, are less stressed (Lin 2013). This is an unlikely explanation in this case, since proverbs carry strong, generalized moral and social meanings by definition. Another explanation might be that a proverb does not receive focal stress because the speaker signals that no new semantic information is conveyed by any one word in the utterance, in other words, the 'highlighting' function of focal stress is not needed. This perspective cannot be directly refuted from the design in the current experiments, and it is true that proverbs do not convey new semantic information. However, as mentioned above, it also can be argued that proverbs do carry information in considerable depth, in the form of morality, wisdom, and traditional knowledge. Finally, it is the very fact that these utterances, like idioms, are unitary in form, pointing to a conventionalized meaning and not employing individual lexical semantics, that focal stress is not utilized.

The results, while statistically significant, are not conclusive, as 37 per cent of the proverbs were spoken with the standard tonal pattern, which would be how a native speaker of Swedish typically says a sentence in a reading aloud task (Bruce 2012). This could be an effect of task demands in the laboratory. Participants may have different abilities to pretend and produce a proverb as if

they were in a specific situation. Further, there might be several possible lexicalized intonation patterns stored with the same proverb depending on situation or use by the speaker (Calhoun and Schweitzer 2012). In fact, the 'other' tonal pattern category (C) in the present study often contained one or two additional patterns that appeared in three and sometimes four participants, which supports this notion.

Investigating the tonal patterns qualitatively, there is some additional evidence supporting the notion of lexicalized proverbial tonal patterns. For two of the sentences (#3 and #6, please see Table 3), the less-stress pattern (tonal pattern B) *only* occurred in the proverbs and never in the corresponding control sentence (for the other sentence pairs, the less-stress pattern occurred one to five times in the control sentences). Furthermore, these two tonal patterns seemed more idiosyncratic, with #6 having focus in the beginning of the expression (where the matched control sentence did not), and #3 showing a high starting boundary tone, and a L-H pattern across two one-syllable words which was not seen in any other of the sentences. The second piece of evidence relates to Lin's hypothesis that if formulaic expressions are processed as a whole, only one focal stress should be assigned (Lin 2010b). This was partly supported by the tonal analysis of proverbs, especially the absence of the final word accent in sentences #4, #6, and #7 which is part of the standard pattern of read Swedish, but was not seen in the proverbs to the same extent.

The seven proverbs in the present study had different lengths and different syntactic structures. As Shattuck-Hufnagel and Turk (1996) point out, syntax imposes some constraints on prosody, but the variability in the sentences selected ensured that the uniform tonal patterns could not be attributed to this. Of course, in any given sentence, there are many prosodic possibilities; sentences with the same syntax may show different phrasing, different overall tonal patterns that are either rising or falling, and differences in focus and accents. There is a possible risk that shorter sentences have fewer possible tonal pattern combinations and this could artificially increase the amount of common patterns. This possibility, however, was not supported by the data from the present study, with no more variability in tonal patterns in the longer sentences compared with the shorter sentences.

Tonal patterns and speech rate are only two aspects of prosody. Examples of other aspects that also may contribute to 'proverb specific' prosody are loudness, voice quality, and other temporal aspects such as initial shortening and phrase final lengthening. In the adult group, a variability in speech rate was seen, especially in the proverb condition, both within and across proverbs. Some of the variability could be attributed to use of irony when producing proverbs, which in some cases resulted in a slower speech rate. These aspects are outside the scope of the present investigation, but it is also possible that some of the proverbs that showed the 'standard' tonal pattern differed from the control sentences in other prosodic parameters not measured in the present study.

FREQUENCY AND FAMILIARITY

Frequency of occurrence has been adduced as an explanation for more efficient processing of formulaic than novel expressions, especially for the faster speech rate. However, idioms are infrequent when measured in language corpora also rated by listeners as seldom heard or used (Moon 1997; Rammel *et al.* 2014). Infrequent use of and low exposure to proverbs were also endorsed in the current study. Adults recognized the proverbs as familiar to the culture, but reported hearing or using only a fraction of them in everyday speech. These observations mitigate the pertinence of frequency-based explanations of prosodic characteristics (especially speech rate) as providing an account for processing differences between the formulaic expression and its matched control exemplar.

Increased speech rate is more convincingly attributable to the fact that formulaic expressions are stored and processed as complex motor gestures, based on procedural or skilled behavior as modulated by subcortical motor systems. The basal ganglia modulate routinized motoric skills of all kinds (Graybiel 2008), including recited speech (Bridges and Van Lancker Sidtis 2013). A complex motor gesture, such as a golf swing, for example, can be acquired very rapidly, even from merely briefly observing it done. As mentioned previously, the study by Reuterskiöld and Van Lancker Sidtis (2013) supports the notion that formulaic expressions can be subjected to rapid uptake into memory from a single exposure. Clinical research has shown that when the motor systems of the brain, the basal ganglia, are impaired, as in stroke or Parkinson's disease, formulaic language is impoverished (Sidtis *et al.* 2009; Van Lancker Sidtis 2012). Left hemisphere damaged persons have spared formulaic expressions despite sparse novel speech, likely modulated by the right hemisphere and the basal ganglia (Van Lancker Sidtis 2001; Van Lancker Sidtis and Postman 2006). The dual-process model proposes that formulaic expressions are produced using holistically stored motoric gestures modulated by a right hemisphere-subcortical system. A holistically stored motoric gesture can be expected to be produced with a faster rate than a composed one.

Proverbs contain rhetorical and stylistic devices such as meter, rhyme, alliteration, assonance, and parallelism, which make them inherently easier to recognize and to remember (Gibbs 2001). This is true for the Swedish proverbs in this sample, which feature rhyme (*Den som spar han har*), alliteration (*Lagt kort ligger*), and meter (*När 'katten är 'borta dansar 'råttorna på 'bordet*). Given that these characteristics aid in acquisition and storage, it follows that numerous exposures might *not* be necessary to recognize and learn a proverbial or idiomatic expression. Other characteristics, including their nonliteral meaning structure, affective and attitudinal nuances, and incongruity with immediate context, also contribute to their special status in acquisition. The recent study by Reuterskiöld and Van Lancker Sidtis (2013) renders support to this notion: these authors showed that school-aged children are able to recognize previously unfamiliar idioms after only one exposure in a naturalistic setting.

The hypothesis that prosodic and other stylistic characteristics contribute to successful short-term acquisition of formulaic expressions (as suggested by Lin 2012) remains to be evaluated in detail.

The current study showed that school-aged children showed the same differences in speech rate between proverbs endorsed as familiar and matched control sentences as adults. Tonal pattern distributions in the child group, however, were not significantly different between sentence types, which could be attributed to a small sample size both in terms of participants and tokens included in this analysis. However, very little is known about maturational schedules of acquiring formulaic language. A study of developmental acquisition of formulaic expressions (idioms, conversational speech formulas, and proverbs) in participants aged 3–18 years showed that adult-like performance on the formulaic expressions in a picture-matching task was not achieved until late adolescence, while children as young as 8 years of age successfully identified the meanings of matched novel expressions (Kempler *et al*. 1999). In the current study, children were more variable in terms of both the standard pattern and the less-stress pattern, which is in the line with the study by Erman (2007) who investigated phonological coherence in formulaic expressions in adolescents. Erman found more variability compared with adults. These results could be attributed to exposure or to maturational characteristics related to the acquisition of formulaic language. A further study would have to include a larger sample of children to confirm the variability and the patterns seen and to be able to draw additional conclusions about the acquisition of proverb prosody.

CONCLUSIONS

Prosodic production in adult speakers was different for proverbs compared with matched control sentences in terms of both speech rate and tonal patterns, indicating faster processing and suggesting that a prosodic pattern is stored with the form of the utterance. This extends the results of previous studies by Van Lancker *et al*. (1981), Van Lancker and Canter (1981) and Van Lancker Sidtis (2003) which included idioms, as well as Erman (2007) and Lin (2010a, b) who studied a range of formulaic expressions in large spoken language corpora, all of which support a proposal for systematic differences in prosodic characteristics for novel and formulaic expressions.

The observation that proverbs are stored and processed differently from matched novel expressions supports the broader model of the dual process of language competence. There is ample evidence from clinical and psycholinguistic studies that formulaic and novel languages are processed according to different principles. This perspective can inform teaching normal children and adults and rehabilitating persons with language disturbance. In children with language disorders, formulaic language may be impoverished or excessive. In rehabilitation from brain injury, recovery of appropriate use of formulaic expressions may aid communicative function. When more is understood about formulaic and novel

language processing in language learning and use, teaching methods will be better informed and directed toward more useful goals.

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