Sensitivity of Turkish Infants to Vowel Harmony in Stem-suffix Sequences: Preference Shift from Familiarity to Novelty

Aslı Altan, Utku Kaya and Annette Hohenberger

Abstract

In two longitudinal studies, using a similar preferential listening paradigm but different experimental set-ups, we studied the early sensitivity of 6- and 10-month-old monolingual Turkish infants towards vowel harmony [backness; rounding] in morphologically complex stem-suffix sequences. In study-1, we found a main effect of age indicating that older infants processed the linguistic information more efficiently than younger infants. In both studies, we found a main effect of trial, indicating that infants' attention dropped in the course of the experiments. Most importantly, in study-1 as well as in study-2 we found a significant interaction between age and harmony: 6-month-olds preferred listening to harmonic over disharmonic stimuli whereas 10-month-olds preferred listening to disharmonic over harmonic stimuli. This interaction was found only for backness harmony. The two studies, although using somewhat different methodologies resulting in different overall levels of listening time, provided converging evidence for a qualitative shift of preference from harmonic to disharmonic stem-suffix sequences in monolingual Turkish infants from 6-to-10-months of age. These finding are in line with the rich literature on the "familiarity-to-novelty-shift" in cognitive development, indicating that younger participants first extract the general, regular, harmonic pattern in their ambient language and filter out irregular, disharmonic tokens, whereas older participants experience a violation of expectation when encountering these unexpected, disharmonic tokens, leading to heightened attention towards them. Our results provide overall evidence that the phonological acquisition process of Turkish vowel harmony is well under way in the first year of life, and readily discernable for backness harmony at 6-months of age.

1. Introduction

This study aims to describe two vowel harmony experiments conducted with 6- and 10-month-old monolingual Turkish infants. The organization of this article is as follows: the first section provides a definition of vowel harmony and summarizes previous work on vowel harmony and its acquisition. In the second section, the methods of our two experiments are outlined. Section 3 presents our findings which are discussed in section 4 followed by a conclusion.

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[*]Aslı Altan, Okan International University, USA, aslialtantr@gmail.com.
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1.1. Vowels and vowel harmony in Turkish

Vowel harmony is the most widely known phonological characteristic of Turkic languages. In general terms, vowel harmony can be defined as a set of constraints on the co-occurrence of vowels. These constraints hold both within a morpheme and across morpheme boundaries. Constraints on the co-occurrence of vowels within a morpheme are also referred to as internal vowel harmony, while constraints applying across morpheme boundaries (affixes) are referred to as external vowel harmony. Vowel harmony in Turkish has been defined as follows: 'all vowels (...) in Turkish words agree in their specification for backness, and high vowels agree with preceding vowels in their specification of roundness' (Clements & Sezer, 1982: 214).

Turkish has 8 vowel phonemes with symmetrical [high]-[low], [front]-[back] and [round]- [unround] opposition (Kabak & Weber, 2013: 55), see Table 1.

Table 1: Turkish vowel chart

	front		**back**	
	unround	**round**	**unround**	**round**
high	i	ü	ı	u
low	e	ö	a	o

All suffix vowels (except the very few exceptions, which are listed and predicted) agree with the immediately preceding vowel (the last vowel of the root) with the features of frontness/backness. There are two types of vowel harmony in Turkish. (1) Backness harmony: back vowels *[a, ı, o, u]* are followed by back vowels; front vowels *[e, i, ö, ü]* by front vowels (2) Rounding harmony: a round vowel triggers rounding on the following vowel. However, in this case the target vowel has to be high. Low target vowels surface as non-round even if the preceding vowel is round (Kabak & Weber, 2013).

The external vowel harmony rule seems to be more compelling a rule than internal vowel harmony. Even with non-harmonic root morphemes, external vowel harmony applies and the suffix vowel agrees with the immediately preceding vowel as in *pizza-lar, paket-ler, televizyon-un* and *polis-in*.

1.2. Studies on the acquisition of vowel harmony in Turkish

The property of vowel harmony (VH) is a feature that infants begin to hear from the first moment they are exposed to Turkish. Vowel harmony (Clements & Sezer, 1982; Zimmer & Küntay, 2003; Kabak & Weber, 2013) and its acquisition (Ekmekçi, 1979; Aksu-Koç, 1985; Altan, 2009; van Kampen et al., 2008) has been the topic of many previous studies.

Previous studies have stated that children acquire vowel harmony, as evidenced in their productions, around the age of 2;0 (Ekmekçi, 1979; Aksu-Koç, 1985). In an experimental study Altan (2009) concluded that 2;0-6;0 year-old children do not experience any problems with roots and suffixes that undergo vowel harmony. The finding that children can correctly attach harmonic suffixes to borrowed and nonce words also demonstrated that they fully acquired the rules of vowel harmony. This study pointed out that children only make errors with words that were exceptions to the vowel harmony rule, such exception words as '*saat*' (whose plural is '*saat-ler*'). The study found that the errors they make with irregular words decrease as they get older.

1.3. Studies in other languages

Van Kampen et al. (2008) suggested that 6-month-old Turkish infants growing up in Germany, in contrast to monolingual German infants, prefer listening to nonsense words such as *'letinn'* that obey back/front vowel harmony to non-harmonic words such as *'nelock'*. Mintz and Walker (2006) in a head turn preference study with 7-month-old infants acquiring English, familiarized them with a consonant-vowel string (*ditepubobidetupo*) and found out that infants prefer to listen to vowel harmonic CVCV sequences from the string such as *dite, pubo* over non-harmonic sequences such as *tepu, bobi, detu.* They concluded that 7-month-old infants were sensitive to vowel harmony patterns and they use harmony as a cue to word segmentation, positing a word boundary at points of disharmony, pointing to a universal sensitivity. Ketrez (2013) analysed child-directed speech in a corpus study comparing harmonic (Turkish and Hungarian) and non-harmonic languages (Farsi and Polish). She claims that harmonic languages provide learners with harmony cues for word segmentation. Similar findings were also reported in other vowel harmonic languages as Finnish, where speakers used vowel harmony for speech segmentation (Suomi, McQueen & Cutler, 1997). As also pointed out by Kabak, Maniwa & Kazanina (2010) speakers of harmonic languages, but not the non-harmonic ones, rely on harmony cues in speech segmentation.

Our study is the first study that involves real words and suffixes conducted with infants acquiring a harmonic language. We used words in their suffixed forms as in the natural language infants are exposed to. We used two types of vowel harmony (backness and rounding) again parallel to natural language. In previous studies, infants whose native language lacks vowel harmony were found to be sensitive to the vowel harmony property (Mintz and Walker, 2006). Also, children were reported to be sensitive to this property in nonsense words (Van Kampen et al., 2008).

Our research questions are as follows: Do young monolingual Turkish infants' distinguish between vowel-harmonic and –disharmonic [back-front] and [round-unround] stem-suffix sequences at the age of 6 and 10 months, respectively? If so, which ones do they prefer, and what does the developmental pattern look like?

2. Methods – study-1 and study-2

2.1. Participants

A total of n=71 infants (34 females) participated in study-1, at 6 and 10 months of age. Of these, a subset of 33 participants contributed valid data points for both 6 and 10 months, 22 only at 6, and 16 only at 10 months; a subset of 30 participants contributed valid data points for both BF and RU harmony, 21 for only BF and 20 only for RU harmony; a subset of 7 participants contributed valid data points at both 6 and 10 months, for BF and RU. Participants were recruited from a database of birth records at a state university hospital and from respondents to a call for participants placed on our lab's internet website: http://bebem.ii.metu.edu.tr/. All infants were healthy, born between 36-42 weeks of gestation and had no auditory problems. Both parents were native Turkish speakers and Turkish was the only language spoken in their homes.

2.2. Procedure

Experiments were conducted in the Babylab facility at the Informatics Institute, Middle East Technical University (METU) in Ankara, Turkey. We used the Head-Turn paradigm (Kemler Nelson et al., 1995) that is frequently used in infant language acquisition studies. The rationale behind this paradigm is that when infants become interested in a stimulus, they turn their head towards the stimulus source and continue to attend to the source until they lose their interest in it. In our experiment, the target stimuli were auditory records of Turkish stem-suffix sequences. For the presentation of these stem-suffix sequences, we used two speakers mounted on the wall, left and right. When sound was presented from one of the speakers, the infants' head movements toward the direction of the speaker could be easily observed. In addition to the

Figure 1: 6-month-old infants looking/listening to stimuli from the left and right speakers, respectively

target auditory stimuli we used light to capture infants' attention. The green light beneath the speaker was illuminated throughout the presentation of each stimulus. The experiment room was observed in the control room with the help of two cameras mounted on the ceiling and the wall, respectively. The speakers and the lights were operated from there. During the experiment the infant sat on their caregiver's (mostly their mother's) lap (see Figure 1).

Four trials were presented to the infants – two harmonic, two disharmonic; two left, two right (see Figure 2).

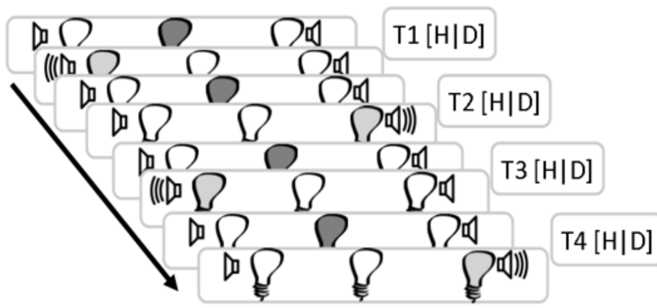

Figure 2: Trial-sequence in study-1

Each trial consisted of 15 stem-suffix sequences randomly chosen from the stimulus pool. For a given trial T stimuli were chosen only among harmonic or disharmonic, thus within a trial all words had the same harmony value. Stem-suffix sequences were presented in random order with Inter-Stimulus-Intervals (ISIs) of 1 s. Stimuli were presented with E-prime 2.0 software.

2.3. Auditory Stimuli

Auditory stimuli were Turkish vowel-harmonic and vowel-disharmonic stem-suffix sequences. Two separate experiments were designed for backness and rounding harmony, respectively. A pool of 180 stem-suffix sequences was prepared for each experiment. Stems which are infrequently used in Turkish, according to Turkish frequency dictionaries (Göz, 2003), to avoid the possibility of confounding due to stimulus familiarity. Stems could be 1-3-syllabic; suffixes 1-2-syllabic. Examples can be seen in Table 2 below:

Table 2: Examples of stem-suffix sequences for backness and rounding harmonies used in study-1

Backness		Rounding	
Harmonic	Disharmonic	Harmonic	Disharmonic
gerin-ecek	ova-lim	ahçı-cık	yamak-luk
yalak-ta	faraş-e	kemir-miş	uzman-u
yeltek-çe	işlev-dan	vurgun-du	külfet-çük
zındığ-a	süz-mak	ulu-yu	yüksük-miş

Stimuli were spoken by a female native speaker of Turkish and recorded in the Media Lab of Middle East Technical University (METU). Each token had a length of about 1 s (M=1.0075, SD=0.0210).

2.4. General and Experimental Procedure

Families were invited to the lab during hours in which their infants would be usually alert. Parents completed a questionnaire including information about their infant's week of birth, health condition and language environment. Then, one of the parents and the infant moved to the experiment room. The parent was asked to wear headphones and listen to music during the experiment in order to prevent their response to experimental stimuli. From the control room, one of the researchers conducted the presentation of the auditory stimuli and the lights while another researcher observed and coded the infant's looking behaviour on-line with a coding program called BABY[2]. The observer pressed a button on a hand-held game pad when the infant was listening to the stimuli and released it when it was not actively listening anymore. Trial-length was infant-dependent. The BABY program accumulates listening times until the criteria for terminating a trial are met. Criteria for terminating a trial were set to (i) a minimum listening time of 1 s and a cut-off point after the baby was looking-away from the sound source of 0.5 s. The experiment was terminated earlier if the infant cried, became sleepy or inattentive for some other reason. Experiments lasted 3-5 minutes on average. After the experiments, infants' listening times were re-coded off-line from the videos by two experienced coders, in order to obtain inter-rater reliability. All data was re-coded thus, accepting only reliability scores > .90.

3. Study 2

After the observation that infants lost their interest during study-1 quickly, we decided to make the visual stimuli more interesting for them. First, we selected only

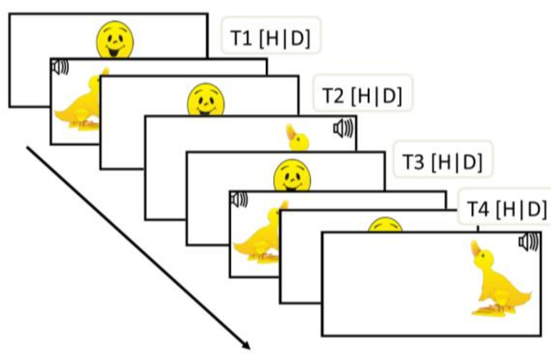

Figure 3: Trial sequence of study-2

[2] The BABY program was developed by Renée Baillargeon's laboratory at the Max Planck Institute for Human Cognitive and Brain Sciences, Germany. One of the authors of this study, Annette Hohenberger, has previous experience of using the BABY program, both at the institute and subsequently at Middle East Technical University, Turkey. The authors kindly acknowledge the use of this eminently helpful and efficient program.

one stimulus word per trial which was then repeatedly presented, according to a separate evaluation study conducted with adult Turkish speakers, as described in Hohenberger, Altan, Kaya, Köksal Tuncer, & Avcu (forthcoming). This change was thought to allow infants to perceive and process each stimulus in more depth, thus facilitating extraction of the relevant harmonic dimensions. Second, we combined the auditory stimuli with an attractive visual stimulus on a computer screen, namely a yellow duck which jumped up and down in the rhythm of the stimulus words (see Figure 3).

Table 3: Stem-suffix sequences for backness and rounding harmonies used in study-2

Backness		Rounding	
Harmonic	Disharmonic	Harmonic	Disharmonic
üfleç-te	verev-da	eğim-di	gövер-lük
nasır-dan	yalız-den	toynak-çık	yüksük-miş
vantuz-a	uyluk-ten	yulaf-ı	nefer-ümsü
yulaf-ı	yaylım-e	zakkum-suz	uyluk-sız
ümük-ten	zeybek-tan	bayır-mış	zındık-tu

4. Results

4.1. Study-1

A Mixed Linear Effect (MLE; Heck, Thomas, & Tabata, 2014) model was carried out with age, harmony-type, harmony, and trial as fixed effects and

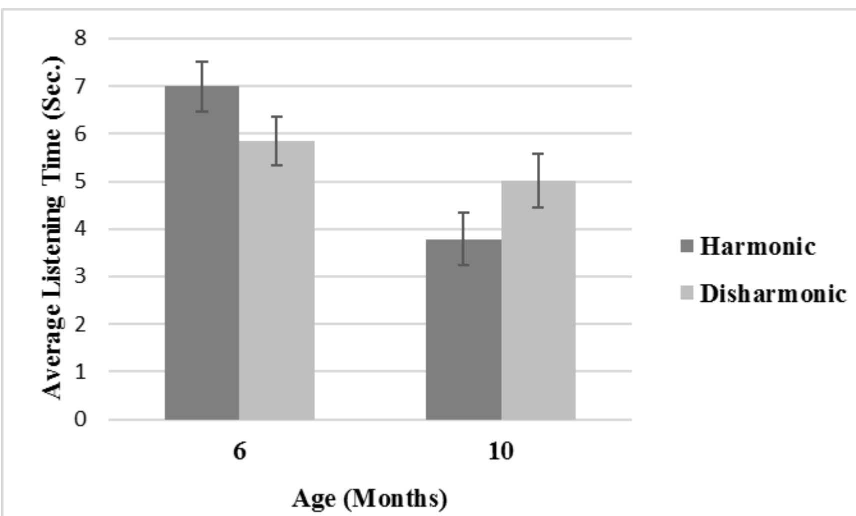

Figure 4: Study-1: Interaction age*harmony: 6-month-old infants listen longer to the harmonic than to the disharmonic trials; 10-month-old infants listen longer to the disharmonic than to the harmonic trials. Error bars represent SEs.

subject-ID as random factor; age, harmony, and trial were repeated factors (as indicated above, not every infant contributed data at both ages). A significant age effect was found ($F(1,178.29)=13.03$, $p<.01$): listening times (in sec) of older infants were shorter ($M=4.40$, $SE=0.42$) as compared to younger infants ($M=6.42$, $SE=0.39$) indicating higher processing efficiency in older infants. Next, a main effect of trial[3] was found ($F(1,345.96)=9.22$, $p=.01$): listening times decreased significantly from the first ($M=6.05$, $SE=0.36$) to the second trial pair ($M=4.77$, $SE=0.36$), indicating a decrease in interest and attention. Importantly, a significant age*harmony interaction was found ($F(1,303.15)=5.13$, $p<.05$): 6-month-olds tended to listen longer to harmonic trials ($M=6.99$, $SE=0.53$) as compared to disharmonic trials ($M=5.85$, $SE=0.52$), whereas 10-month-olds showed the reverse pattern: they tended to listen longer to disharmonic trials ($M=5.02$, $SE=0.57$) as compared to harmonic trials ($M=3.79$, $SE=0.55$), see figure 4. There was also a significant age*harmony-type interaction ($F(1,368.21)=4.36$, $p<.05$): 6-month-olds tended to listen longer to RU stimuli ($M=7.03$, $SE=0.48$) as compared to BF stimuli ($M=5.80$, $SE=0.48$) whereas 10-month-olds tended to listen equally short to RU ($M=4.18$, $SE=0.52$) and BF stimuli ($M=4.62$, $SE=0.49$). Separate analyses for back-front and round-unround harmony showed that the age*harmony interaction was due to back-front harmony ($F(1,238.59)=7.58$, $p<.01$) but not to round-unround harmony ($F(1,222.27)<1$).

4.2. Study-2

A total of $n=80$ (38 females) infants participated in study-2, at 6 and 10 months of age. Of these 27 participated in the study only at 6 months of age and 44 at 10 months of age, 9 participated at both ages; 40 participated only in BF and 38 only in RU, 2 in both conditions. As in study-1, a Mixed-Linear Effect Model with the same parameter specifications was conducted.

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[3] Note that in total there were 4 trials: 2 harmonic and 2 disharmonic trials; or, 2 first and 2 second trials. “Trial-1” therefore does not mean the first of the four trials but the mean of the first harmonic and the first disharmonic trial and “trial-2” means the mean of the second harmonic and second disharmonic trial.

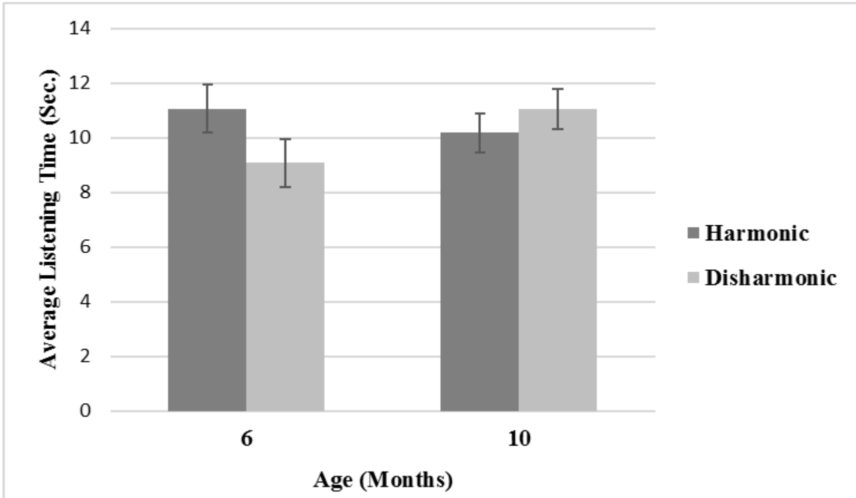

Figure 5: Study-2: Interaction age*harmony: 6-month-old infants listen longer to the harmonic than to the disharmonic trials; 10-month-old infants listen longer to the disharmonic than to the harmonic trials.

A significant main effect of trial was found ($F(1,200.14)=16.83$, $p<.001$): infants attended longer to the first trial ($M=11.34$, $SE=0.52$) as compared to the second trial ($M=9.35$, $SE=0.53$). More importantly, as in study-1, there was a significant interaction between age*harmony ($F(1,324.02)=4.32$, $p<.05$): Again, 6-month-olds tended to listen longer to harmonic trials ($M=11.08$, $SE=0.88$) as compared to disharmonic trials ($M=9.08$, $SE=0.87$), whereas 10-month-olds tended to listen longer to disharmonic trials ($M=11.04$, $SE=0.73$) as compared to harmonic trials ($M=10.18$, $SE=0.72$), see figure 5. This 2-way interaction was qualified by a significant 3-way interaction between age*harmony*trial ($F(1,238.03)=3.89$, $p=.05$): 6-month-olds tended to listen equally long to the first harmonic trial ($M=11.06$, $SE=1.05$) as compared to the second harmonic trial ($M=11.09$, $SE=1.05$) but to listen substantially shorter to the second disharmonic trial ($M=7.72$, $SE=1.32$) as compared to the first disharmonic trial ($M=10.44$, $SE=1.04$). However, 10-month-olds showed a different pattern: they listened substantially much shorter to the second harmonic trial ($M=8.46$, $SE=0.86$) as compared to the first harmonic trial ($M=11.90$, $SE=0.85$) but showed a less steep decrease of listening time from the first disharmonic trial ($M=11.98$, $SE=0.86$) to the second disharmonic trial ($M=10.12$, $SE=0.89$).

5. General Discussion:

Our overall results show that the processing of vowel harmony in monolingual Turkish infants is well under way in the first year of life and readily discernable at 6 months of age. This finding is in line with previous findings by Mintz and Walker (2006) and van Kampen et al. (2008), on young infants at comparable ages to our subjects and by Altan (2009) and Ketrez (2013), on older children. In the following, we will discuss the results of study-1 and study-2 separately and then compare them.

5.1. Study-1

In study-1 only auditory stimuli – harmonic and disharmonic BF and RU stem-suffix sequences – had been presented to 6- and 10-month-old infants. Main effects of age and trial were found, showing that listening times dropped significantly from 6- to 10-months of age and from trial-pair 1 to trial-pair 2, respectively. These effects are expected, indicating that older infants processed our stimuli more efficiently and that attention dropped from the first to the second trial pair. Importantly, an interaction between age and harmony was found, showing a reversal of preference from 6 to 10 months: 6-month-old infants tended to listen longer to harmonic over disharmonic trials whereas 10-month-old infants tended to listen longer to disharmonic over harmonic trials. This pattern is reminiscent of the "familiarity-novelty-preference sequence" (Houston-Price & Nakai, 2004) and is consistent with similar findings in the literature in various cognitive areas such as face, object, and language processing (Rose, Gottfried, Melloy-Carminar, & Bridger, 1982; Roder, Bushnell, & Sasseville, 2000; Pascalis & de Haan, 2003; Fisher-Thompson & Peterson, 2004; Houston-Price & Nakai, 2004; Sirois & Mareschal, 2004; Shinskey & Munakata, 2010, among many others).

Note that in our study, infants were directly exposed to the stimuli with no previous habituation or familiarization, as was the case in the above-mentioned studies. Novelty or familiarity therefore must have been established on the background linguistic knowledge that infants brought to the lab. Our results thus reflect (differences in) attentional processes elicited by our experimental stimuli – harmonic or disharmonic – vis-à-vis implicit memory (Snyder, Blank, & Marsolek, 2008) of all linguistic data infants had ever encountered within the 6- and 10-months of their young lives.

We also found a significant interaction between age and harmony type, indicating that 6-month-olds listened longer to RU than to BF stimuli whereas 10-month-olds listened equally long – but much shorter to both types of stimuli than 6-month-olds. The longer listening of the younger age group could be a reflection of the higher information load in the RU stimulus set. Phonologically, BF harmony may be recognized and generalized more easily because it applies to both high and low vowels (see Kabak, 2011), whereas RU harmony only applies to high vowels. At the same time, in our stimulus set, BF harmony was only expressed on two suffix vowels [e, a] – as compared to RU harmony, which, in our stimulus set was expressed over the four suffix vowels [i, ı, u, ü]. Both facts may have made it easier for our participants to extract BF harmony but not yet RU harmony, as separate analyses for BF and RU conditions showed.

Since in study-1 only auditory stimuli were presented, infants may have quickly become bored, as indicated by short overall listening times which furthermore decreased from trial-pair 1 to trial-pair-2. In addition, trials consisted of ever changing stimuli randomly selected from an item pool. Therefore, infants may not have paid enough attention to each stimulus and thus may not have been able to extract the relevant phonological dimensions underlying vowel harmony to the best extent possible. In particular, this may be true for the RU stimuli which were more complex and demanded longer exposure time. In order to remedy these potential shortcomings of study-1, we conducted study-2 in which we changed the experimental setup as explained in the methods. These changes were thought to increase the interest of infants in the stimuli and, as a consequence, their listening times.

5.2. Study-2

In study-2 we obtained a main effect of trial and an interaction between age and harmony, as in study-1. This two-way interaction was qualified by a three-way-interaction between age, harmony, and trial: 6-month-olds maintained their interest in harmonic stimuli from trial 1 to trial 2 but lost their interest in disharmonic trials from trial 1 to trial 2; however, 10-month-olds' interest in disharmonic stimuli decreased less from trial 1 to trial 2 as compared to a marked decrease in interest in harmonic stimuli from trial 1 to trial 2. The maintenance of interest for harmonic trials in the younger age group is remarkable insofar it is opposed to the general trend of decreasing listening times in the course of the experiment, as indicated by the main effect of trial. There were no further effects in study-2.

5.3. Comparison between study-1 and study-2

Study-1 and study-2 yielded some similar but also different results. In both studies we obtained a main effect of trial indicating a general loss of interest throughout the course of the experiment. Yet, in study-2 listening times were much higher than in study-1. In that respect, our manipulation of adding a salient and attractive visual object – the duck – to the auditory stimuli worked out. The disappearance of the previously found age effect in study-2 may be related to the presentation of the duck as well. Infants' interest in the audio-visual stimuli, however, in particular older infants' interest, got boosted resulting in similar overall levels of listening times of about 11 s per trial. The two-way interaction between age and harmony type found in study-1 was not found in study-2, though. This, again, may be due to the increased overall listening times which may have evened out the previous difference between RU and BF stimuli found in the younger age group. Most importantly, the two-way interaction between age and harmony found in study-1 was replicated in study-2. The resilience of this interaction under different experiment conditions substantiates the evidence for the presence of a familiarity-to-novelty shift in the perception of vowel harmony in the first year of life – irrespective of different experimental settings. Younger infants maintained their interest in harmonic trials but lost their interest in disharmonic trials throughout the experiment whereas older infants lost interest in disharmonic trials less than in harmonic trials. What is the nature of this shift in preference? We argue that the observed reversal in preference from familiarity to novelty is consistent with a developmental account in terms of two different developmental phases, characteristic of our younger and our older age group, respectively: (1) Infants at around 6 months of age are extracting the prevalent linguistic pattern/rule from the ambient language. According to Ramscar & Gitcho (2007) young infants acquire language implicitly and learn the most frequent pattern first. This pattern represents the conventional use of their language. In our case, infants would first extract the vowel-harmonic patterns of Turkish. At 6 months of age, infants have already made progress on the BF harmony pattern (however, not yet on the RU harmony pattern). In terms of Piaget's (1976) two basic developmental mechanisms – assimilation and accommodation – they readily assimilate the harmonic words they hear in our experiment to this pattern, which is the basis of the observed familiarity preference. (2) Infants at around 10 months of age attended longer to disharmonic than harmonic trials. We interpret this novelty preference as evidence for a processing phase in which the predominant default pattern has already been firmly established and from then on serves as a background against which incoming data is compared: if confirmatory, it will not be attended to too much – it will just be quickly assimilated to that background. In our case, the harmonic pattern (at least for BF harmony) has reached this status at around 10 months of age. If, however, some unexpected data in the form of an irregular probe is encountered, a "violation of expectation" occurs. Violation of expectation has been used as an experimental paradigm in many areas of experimental infant research (for a critical debate, see Munakata, 2000, among many others). In Piaget's (1976) classical terms these stimuli cannot be assimilated but have the potential to instigate an accommodation process.

6. Conclusion

Our results confirm and extend earlier findings on early sensitivity of vowel harmony. The extension is four-fold: First, previous experiments with infants were conducted with nonce words. Moreover, in Mintz and Walker's experiment, tokens were not spoken by a human native speaker but synthesized by a computer. In our studies, however, we used real – though infrequent – Turkish words, spoken by a native speaker of Turkish. Second, previous experiments had probed harmony only in (2-syllabic) root environments. In our studies, however, we probed harmony in derived or inflected environments, i.e., we used (2-4 syllabic) root+suffix sequences. While Ketrez (2013) as well as Kabak & Weber (2013) have shown that vowel harmony also operates in roots, yet, vowel harmony is even more regular in derived or inflected environments. Third, previous experiments had looked at back-front harmony only (van Kampen et al., 2008) or at both types of harmony in combination (Mintz & Walker, 2008). We, however, looked at both major types of harmony, backness and rounding harmony separately, yet within the same experiment. We found only evidence for harmony distinctions at both ages for the BF stimuli, not for the RU ones. Fourth, by conducting two studies with different experimental setups, we could substantiate the evidence for a familiarity-to-novelty preference in the first year of life which emerged as a resilient outcome of both studies.

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