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A standardized set of 260 pictures for Turkish: Norms of name and image agreement, age of acquisition, visual complexity, and conceptual familiarity

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Abstract In the present study, normative data in Turkish are presented for the 260 color versions of the original Snodgrass and Vanderwart (1980) picture set for the first time. Norms are reported for name and image agreement, age of acquisition (AoA), visual complexity, and conceptual familiarity, together with written word frequency, and numbers of letters and syllables. We collected data from 277 native Turkish adults in a variety of tasks. The results indicated that, whilst several measures displayed language-specific variation, we also reported what seem to be language-independent—that is, universal—measures that show a systematic relationship across several languages. The implications of the reported measures in the domain of psycholinguistic research in Turkish and for wider cross-linguistic comparisons are discussed.

Keywords Turkish · Lexical processing · Picture norms · Cross-linguistic · Age of acquisition · Visual complexity · Conceptual familiarity

Much effort has been put into understanding the psycholinguistic factors that influence the naming latencies (RTs) of words, objects, and pictures in various tasks. It has become increasingly essential to establish word and picture norms in Turkish, as empirical investigations on lexical processing have thus far been limited in this language. For example, picture naming has been reported to be affected by name and image agreement, age of acquisition (AoA), conceptual familiarity, and imageability (see, e.g., Barry, Morrison, & Ellis, 1997; Cuetos, Ellis, & Alvarez, 1999; Snodgrass & Vanderwart, 1980). Since their publication, the 260 black-and-white line drawings from Snodgrass and Vanderwart (1980) have drawn unprecedented attention and have been extensively used in object-naming and recognition tasks, not only in English (e.g., Barry et al., 1997), but in many languages, such as Spanish (Cuetos et al., 1999; Sanfeliu & Fernandez, 1996), French (Alario & Ferrand, 1999; Bonin, Peereman, Malardier, Méot, & Chalard, 2003), Icelandic (Pind, Jónsdóttir, Gissurardóttir, & Jónsson, 2000), Italian (Nisi, Longoni, & Snodgrass, 2000), Japanese (Nishimoto, Miyawaki, Ueda, Une, & Takahashi, 2005), Chinese (Weekes, Shu, Hao, Liu, & Tan, 2007), Greek (Dimitropoulou, Duñabeitia, Blitsas, & Carreiras, 2009), Russian (Tsaparina, Bonin, & Méot, 2011), and most recently, Persian (Bakhtiar, Nilipour, & Weekes, 2013).

In this respect, the Snodgrass and Vanderwart (1980) picture set has become the hallmark for picture norms in alphabetic and nonalphabetic writing systems, providing a basis for reliable cross-linguistic comparisons of behavioral data. Moreover, the picture set has been modified by the addition of color and texture, two characteristics that turn black-and-white line drawings into more like real-life objects, which has demonstrable benefits for the reader (Price & Humphreys, 1989) over the original set (see Rossion & Pourtois, 2004; Weekes et al., 2007).

Although empirical research on lexical processing in Turkish, which has a transparent alphabetic orthography, has recently gained attention (e.g., Durgunoglu & Oney, 2002; Raman, 2006, 2011; Raman & Baluch, 2001; Raman, Baluch, & Besner, 2004), to date no studies have reported normative data for pictures. Therefore, it has become increasingly imperative to develop picture norms in Turkish. The aim of the present study was to create norms for name

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and image agreement, AoA, visual complexity, and conceptual familiarity for the 260 color and textured pictures from the Rossion and Pourtois (2004) picture set. In addition to this, we report the numbers of letters/phonemes and syllables, together with word frequency, by utilizing the newly available Turkish National Corpus (TNC)–Demo Version (Aksan et al., 2012; www.tnc.org.tr).

The Turkish language

Turkish is the official language of the Republic of Turkey and North Cyprus and, by current estimations, is fluently spoken by 80–90 million people worldwide. Significant Turkish-speaking populations inhabit historically Ottoman lands such as Bulgaria, Macedonia, Iraq, Algeria, Egypt, and Syria, and recent large emigrant populations are present in Germany, France, the Netherlands, Austria, and the United Kingdom.

Turkish is a member of the Turkic subdivision of the Altaic language family. The modern orthography is composed of a 29-letter alphabet of eight vowels and 21 consonants, based on a modified Latin script. The vowels work in four pairs (A–E, I–İ, O–Ö, U–Ü), with corresponding front/back and rounded/unrounded sounds resulting in vowel harmony. Agglutination is another prominent feature of Turkish. Furthermore, grapheme–phoneme and phoneme–grapheme conversions are regular, explicit, and consistent, resulting in absolute bidirectional transparency.

The measures

Alario et al. (2004) have reported on the significance of different predictor variables on picture-naming latencies. They found that name agreement, image agreement, and visual complexity had significant impact on naming speeds. Moreover, they found independent effects of both frequency and AoA.

Weekes et al. (2007) utilized a multiple regression analysis of both the black-and-white and color versions of the Snodgrass and Vanderwart picture set, in a picture-naming study in Chinese that identified name agreement, AoA, and conceptual familiarity as key predictor variables for naming speeds. Interestingly, the significance of image agreement appeared to diminish when color pictures were used in this study.

Name agreement

Name agreement is defined as the degree to which participants agree on a specific name to refer to a picture. The two measures that have frequently been used to investigate name agreement are (1) the percentage of participants who provide the most common name (the NA%) and (2) the H statistic (Shannon, 1949), which measures the variability of answers across participants. The H statistic is calculated using the following formula:

$$H = \sum_{i=1}^{k} p_i[\log_2(1/p_i)],$$

where k represents the number of different names given to a picture by the participants, and p_i is the value for each name as a proportion of all the alternative names. An H score of 0 stipulates that all participants have given the same name, whereas an increasing H score indicates increasing variability regarding the object's name.

As we have previously stated, name agreement has been identified as a significant predictor of picture-naming latencies. This effect has also been found in several studies across different languages (Alario et al., 2004; Barry et al., 1997; Bonin, Chalard, Méot, & Fayol, 2002; Ellis & Morrison, 1998; Snodgrass & Yuditsky, 1996; Vitkovitch & Tyrrell, 1995).

Image agreement

Image agreement is a measure of the degree to which the mental images formed by participants, in response to the object's name, align with the picture's appearance. The general consensus appears to stipulate that pictures with high image agreement scores are named more quickly than pictures with low image agreement (Barry et al., 1997; Bonin et al., 2002).

The rationale underpinning this, as Barry et al. (1997) suggested, is that image agreement impacts at the level of object recognition, and therefore the closer the mental image is to the picture, the faster the naming speed. The finding of a reduced effect for image agreement when color pictures are used lends further support to this view (Weekes et al., 2007). Consequently, image agreement was omitted as a variable in the Modern Greek normative study (Dimitropoulou et al., 2009). As this is the first study of normative psycholinguistic data in Turkish, it was necessary to incorporate this variable at this stage.

Age of acquisition

The AoA effect has been shown to be an important factor of performance in several lexical-processing tasks (Barry et al., 1997; Dent, Johnston, & Humphreys, 2008; Morrison & Ellis, 2000). Furthermore, AoA has been identified as the most important predictor variable of word-naming and

lexical-processing tasks (Cortese & Khanna, 2008). It is therefore not surprising that as a measure, AoA is highly correlated with behavioral data, such that reduced reaction times for early-acquired concepts in picture naming, reading aloud, and lexical decision tasks are taken as evidence for faster and more efficient processing than is available for late-acquired concepts (for comprehensive reviews, see Johnston & Barry, 2006; Juhasz, 2005).

Visual complexity

Visual complexity can refer to both the subjective and objective assessments of the number of lines and the level of detail in a drawing. Several studies have indicated that the visual complexity of color pictures significantly affects naming speeds, and thus have reported that pictures with a higher visual complexity score result in longer naming speeds (Alario et al., 2004; Ellis & Morrison, 1998). However, only a handful of studies using subjective visual complexity have demonstrated its reliability as a predictor for naming speeds (Barry et al., 1997; Bonin et al., 2002; Weekes et al., 2007). Székely and Bates (2000) suggested using the size of the digitized image (in bytes) as a measure of objective visual complexity, in order to address the issue of differentiating subjective visual complexity from subjective familiarity measures.

Taking these findings into consideration, we decided to collect and report subjective visual complexity measures. The rationale for this is that to the best of our knowledge, no reports for visual complexity measures in Turkish are extant, and we would like to establish the possible relationships between the various subjective measures reported in this study for future studies in Turkish.

Conceptual familiarity

Conceptual familiarity is the degree to which people come into contact with or think about a depicted concept (Rossion & Pourtois, 2004). Familiarity has been shown to be a highly variable, yet reliable, measure of naming speeds (Ellis & Morrison, 1998). Hirsh and Funnell (1995) suggested that concept familiarity directly influences the activation of central semantic representations.

Frequency

Word frequency counts (per million words) were extracted from the recently published TNC–Demo Version (Aksan et al., 2012), which contains 50 million words and offers a representative corpus of modern Turkish. It contains samples of textual data across a wide variety of genres covering a period of 20 years (1990–2009). The TNC–Demo Version is based on 4,438 text samples representing nine domains, including both imaginative and informative subject fields and 34 different genres—for example, social sciences, art, world affairs, and leisure. Numbers of letters (phonemes) and syllables have also been reported in this study. Note that the number of letters directly corresponds with the number of phonemes in Turkish, because the relationship between orthography and phonology is one-to-one (Raman, 2006, 2011; Raman, Baluch, & Sneddon, 1996).

Present normative study

The aim of the present study was to develop Turkish picture norms regarding name and image agreement, AoA, visual complexity, and concept familiarity for the 260 color pictures from the Rossion and Pourtois (2004) picture set.

Instructions were given to each participant both orally and in written format. The instructions were adapted and translated from those used by Alario and Ferrand (1999) and by Bonin et al. (2003) with regard to the nature of the tasks performed. For the name agreement task, 57 participants (three groups of 19) were asked to identify each picture projected on a white screen and to write down the name of the object that first came to mind in an answer booklet provided. In the scenario that participants did not know the object or name, they were asked to give as a response *Bilmiyorum* (corresponding to DKO, or "Don't know object"), *İsmini bilmiyorum* (corresponding to DKN, or "Don't know name"), or *İsmini hatırlamıyorum* (corresponding to TOT, or "Tip of the tongue"). Participants were instructed to work as quickly as possible, writing down responses in the order of picture appearance. We also made clear that there were no correct or incorrect responses, and the importance of collecting normative data was outlined to the participants. The rating tasks were completed using the SuperLab 4.5 software package. The participants completed the study at their own pace during nonteaching hours, but were asked to also work as quickly as possible. All of the rating tasks designed in SuperLab used 5-point scales.

For the image agreement task, 40 participants were required to rate the agreement between their own mental images and the subsequently displayed pictures. In line with Alario and Ferrand (1999), the experimenter began by reading the modal name of the picture out loud, and then paused for 5 s. During this period, the participant was asked to generate the mental image associated with the spoken name that had just been said. The experimenter then pressed the space key, which triggered presentation of the relevant picture on the screen. At this point, the participant had to rate, on a 5-point scale, using the relevant number keys on the keyboard, the degree of agreement between the mental image

and the picture. The ratings ranged from 1 to 5, with 1 corresponding to *low agreement* and 5 to *high agreement*. In the event that a participant could not form an image of an object, he or she was asked to press the "B" key (corresponding to NI, or "no image"). Similarly, if a participant imagined a different object from the one pictured, he or she was asked to press the "N" key (corresponding with DO, or "different object").

In the AoA rating task, 61 participants were required to provide an estimated age at which they thought that they had learned each of the names. They were required to indicate this age on a 5-point scale by pressing the relevant number key on the keyboard, whereby 1 corresponded to a word learned *between 0 and 3 years*, 2 to *between 4 and 6 years*, 3 to *between 7 and 9 years*, 4 to *between 10 and 12 years*, and 5 to *learned at 13 years or later*.

For the visual complexity rating task, 60 participants were instructed to rate the visual complexity of the object in the picture, and not its real-life equivalent. Participants were then instructed to assess the visual complexity of each drawing on a 5-point scale using the relevant number keys on the keyboard, ranging from 1 *very simple* to 5 *very complex*.

In the familiarity task, 59 participants were requested to estimate the familiarity of the concept displayed in each picture and were given instructions that they were to rate the concept and not the manner in which it was displayed to them. For the purposes of this task, *familiarity* was defined as the extent to which one comes into contact with or thinks about the concept in the picture. Participants recorded their answers on a 5-point scale using the relevant number keys on the keyboard, with 1 corresponding to a *very unfamiliar object* and 5 corresponding to a *very familiar object*. In the event that participants had no previous exposure to the concept in the picture, they were required to press the "B" key (corresponding to DKO).

Results and discussion

The mean ratings collected for each stimulus are presented in an Excel file (Appendix A) that is available as supplementary materials, together with their corresponding standard deviation values. The items are listed alphabetically according to the English names of the pictures. Starting from the left column, the following information is provided for each item: (1) the number of the picture, the name of the picture in English in the Rossion and Pourtois (2004) database, the intended Turkish name, and the modal Turkish name given by participants; (2) name agreement measures—both the percentages of participants giving the modal name and the corresponding *H* statistic; (3) the means and standard deviations for image agreement, conceptual familiarity, rated AoA, and subjective visual complexity, in accordance with the 1-to-5 Likert scales that were given to participants. The numbers of letters (phonemes) and syllables of the modal names are also supplied. Finally, the word frequency values (taken from the TNC) of the modal names are also presented, with the exception of three items missing from the corpus: namely, *ayrelli*, "asparagus"; *Amerikan topu*, "American football"; and *eğirme makinası*, "spinning wheel."

Furthermore, in the supplemental materials also include an Excel file (Appendix B) with the different nonmodal names provided for each item, together with their corresponding frequencies of occurrence. In addition, for each item, the numbers of DKO, DKN, and ToT responses are indicated. A summary of the findings is presented in Table 1.

Across the set of color pictures, the mean name agreement percentage for all participants was 83.49%, which is suggestive of a high level of agreement with regard to the picture set by the majority of participants. Consequently, when an in-depth investigation of name agreement scores was carried out, we found that 80 out of 260 pictures were named by all participants with the same word ($H = 0$, 100% agreement); 101 of the 260 pictures produced name agreement percentages ranging from 80% to 99%; 36 had percentages from 60% to 79%; 12 had values from 50% to 59%; and 31 pictures had name agreement rating scores below 50%. In addition, for 94 of the 260 pictures, the *H* statistic was 0 (single name); 80 of the 260 resulted in two names; 41, in three names; 25, in four names; 7, in five names; and 13 of the pictures had more than five names.

The mean percentage of naming failures was 1.85% (DKN 2.34%, DKO 1.14%, and ToT 2.06%), which is similar to the value reported in English (1.75%), lower than the one for Spanish (4.15%), but higher than those for French and Russian (1%). An analysis of several items that have been reported in several languages as consistently displaying high naming failure rates showed a strong overlap with the previous findings. In particular, the names identified by Tsaparina et al. (2011) in Russian—*artichoke*, *asparagus*, *celery*, *chisel*, *nut*, *pliers*, *plug*, and *raccoon*—as well as

Table 1 Summary statistics for name agreement (NA, as both percentages of participants providing the modal name [%] and *H* values) and the other measures, rated on 5-point Likert scales

	NA (%)	NA (H)	IA	Fam	VC	AoA
Mean	83.49	0.47	3.91	4.65	1.35	2.31
SD	21.66	0.61	0.68	0.21	0.23	0.51
Min	13.00	0.00	1.09	3.47	1.00	1.38
Max	100.00	2.76	4.94	4.97	2.09	3.95
Median	94.00	0.23	4.03	4.69	1.31	2.27

IA, image agreement; Fam, conceptual familiarity; VC, visual complexity; AoA, age of acquisition

French horn, *wagon*, and *wrench*, which were not found in Russian but were in three other languages, were all found to present naming failures above 5% in Turkish. In addition, it was interesting to observe that four items classified as musical instruments (*harp*, *accordion*, *trumpet*, and *flute*) demonstrated particularly high levels of naming failure. One explanation for this finding was that the participants had limited or no exposure to such items.

A correlation analysis was carried out between the measures. In addition to the previously mentioned measures, written word frequency, number of syllables, and number of letters for the modal name were also included as variables in the correlation analysis. A summary of the results can be seen in Table 2.

The results for name agreement (%) showed significant correlations with all other measured variables. A correlation of $r = –.923$, $p < .01$, with name agreement (*H*) is in line with previous normative studies which have typically reported values in the $r = –.9$ region. This finding adds to and ascertains the universality of the relationship between the two name agreement measures across languages and confirms their usefulness in normative studies. In addition to this, but contrary to the recent findings in Russian (Tsaparina et al., 2011), name agreement (%) also showed a significant correlation with word frequency ($r = .195$, $p < .01$), pertaining to the observation that as word frequency increases, name agreement (%) increases.

Additionally, the finding between name agreement (*H*) and word frequency yielded a significant inverse correlation ($r = –.184$, $p < .01$), confirming that increasing word frequency results in less variability and a higher degree of name agreement. Moreover, a small yet significant inverse relationship was also shown between name agreement (%) and the number of syllables ($r = –.158$, $p < .05$) and the number of letters/phonemes ($r = –.181$, $p < .01$). This finding was not unexpected, as items with shorter length/syllable number are more likely to have singular names.

The name agreement (*H*) measure was found to be influenced by visual complexity ($r = .153$, $p < .05$) and AoA ($r = .282$, $p < .01$), in addition to other reported variables. Therefore, it can be extracted that as pictures become increasingly complex, the variability in naming their intended name increases. Furthermore, earlier-acquired items result in progressively more homogeneous naming agreement.

With regard to conceptual familiarity, significant findings were reported with all of the other measures: with name agreement (%) ($r = .44$, $p < .01$), name agreement (*H*) ($r = –.319$, $p < .01$), image agreement ($r = .281$, $p < .01$), visual complexity ($r = –.479$, $p < .01$), AoA ($r = –.632$, $p < .01$), and word frequency ($r = .256$, $p < .01$). From this, it can be deduced that conceptual familiarity is a central measure in establishing psycholinguistic norms in Turkish.

Similarly, we found AoA to be another pertinent measure, as it also produced significant effects with all other measures. In addition to the measures reported above, the most substantial effects were found between AoA and name agreement (%) ($r = –.44$, $p < .01$), visual complexity ($r = .396$, $p < .01$), and word frequency ($r = –.329$, $p < .01$).These findings are in line with previously reported findings of an AoA effect in word and black-and-white line picture naming in Turkish (Raman, 2006, 2011). Hence, the present pattern of findings adds to the extant body of literature showing that AoA is a universal element in psycholinguistic normative studies.

As can be seen in Fig. 1, the overall distribution characteristics of the present normative study are largely in line with what has been observed in several previous studies in other languages. Both the *H* statistic (skewness = –1.35) and the name agreement percentage (skewness = 1.51) display classic skewness patterns.

Correlation analyses were conducted for the cross-linguistic data. The correlation coefficients between the present Turkish norms and those obtained for the same set of pictures in Belgian French (Rossion & Pourtois 2004),

Table 2 Correlations between measures

	NA (H)	IA	Fam	VC	AOA	Freq	*N* Syll	*N* Lett
NA (%)	–.923**	.491**	.440**	–.253**	–.440**	.195**	–.158*	–.181**
NA (H)		–.455**	–.319**	.153*	.282**	–.184**	.093	.116
IA			.281**	–.199**	–.296**	.096	–.091	–.073
Fam				–.479**	–.632**	.256**	–.160**	–.153*
VC					.396**	–.09	.116	.097
AoA						–.329**	.197**	.190**
Freq							–.224**	–.265**
N Syll								.940**

NA (%), name agreement percentage; NA (H), name agreement *H* statistic; IA, image agreement; Fam, conceptual familiarity; VC, visual complexity; AoA, age of acquisition; Freq, word frequency; *N* Syll, number of syllables; *N* Lett, number of letters. * Significant at the $p < .05$ level. ** Significant at the $p < .01$ level.

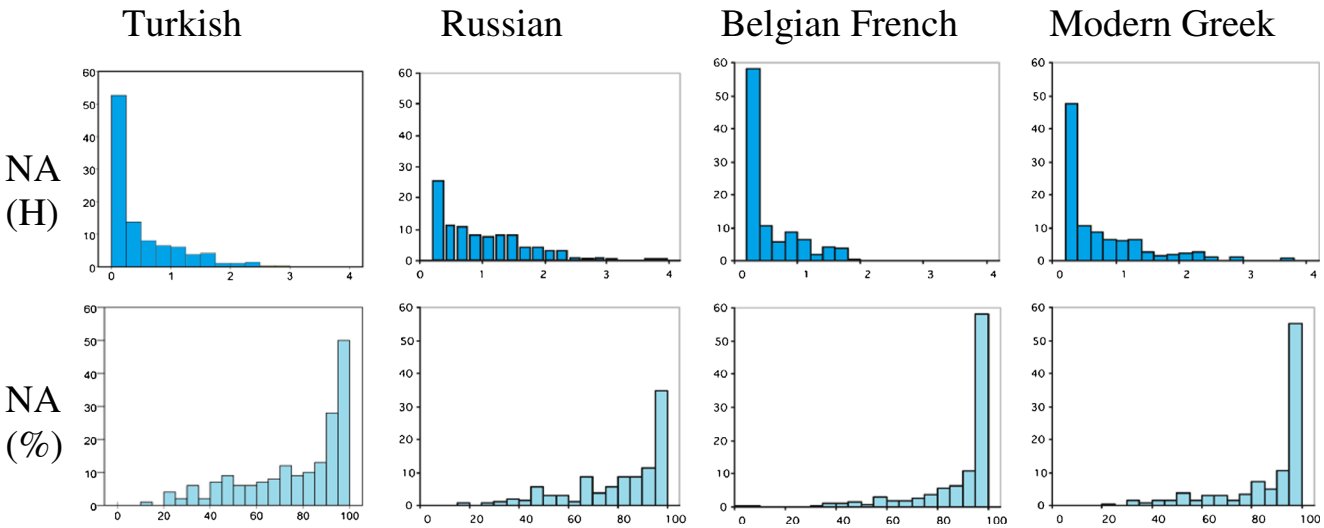

Fig. 1 Frequency distributions of the name agreement measures: Top row, *H* statistic. Bottom row, name agreement percentage for modal name. Far left panels, Turkish; middle left panels, Russian (Tsaparina et al., 2011); middle right panels, Belgian French (Rossion & Pourtois, 2004); far right panels, Modern Greek (Dimitropoulou et al., 2009). From "Russian Norms for Name Agreement, Image Agreement for the Colorized Version of the Snodgrass and Vanderwart Pictures and Age of Acquisition, Conceptual Familiarity, and Imageability Scores for Modal Object Names," by D. Tsaparina, P. Bonin, and A. Méot, 2011, *Behavior Research Methods*, *43*, p. 1092. Copyright 2011 by the Psychonomic Society. Adapted with permission

Modern Greek (Dimitropoulou et al., 2009), and Russian (Tsaparina et al., 2011) are shown in Table 3.

The results of the cross-linguistic analyses show that the data collected for Turkish in this study correlated significantly with all of the reported measures in Russian and Modern Greek, but not with the name agreement measures for Belgian French. This pattern of results is in line with the cross-linguistic analyses previously reported by Tsparina et al. (2011), who concluded that the Rossion and Pourtois (2004) findings for Belgian French were unreliable on two accounts: (1) In terms of between-language correlations, the name agreement norms in Belgian French were found to be nonsignificant in relation to the color norms in Modern Greek (Dimitropoulou et al., 2009) and to the norms for the black-and-white drawings obtained in American English (Snodgrass & Vanderwart, 1980), Spanish (Sanfeliu & Fernandez, 1996), French (Alario & Ferrand, 1999), and Russian (Tsparina et al., 2011). (2) Likewise, in terms of within-language correlations, the correlations between name agreement and naming RTs were found to be nonsignificant in the Belgian French language.

Visual complexity was the only measure that showed a significant correlation between Turkish and all three of the previously reported languages that had used the same picture set: namely, Russian (r = .249, p < .01), Modern Greek (r = .643, p < .01), and Belgian French (r = .557, p < .01). This is not surprising, as visual complexity has been shown to be a consistent, robust, and language-independent measure, and it is in line with previous studies that have investigated both color and black-and-white line drawings.

Insofar as AoA is concerned, we stipulated above the universality of AoA as a psycholinguistic measure. This

Table 3 Cross-linguistic correlations

	Russian	Modern Greek	Belgian French
NA (%)	.356**	.553**	–.011
H	.406**	.661**	–.033
IA	.232**	–	.226**
Fam	.661**	–	.691**
VC	.249**	.643**	.557**
AoA	.662**	.819**	–

NA (%), name agreement percentage; H, name agreement (*H* statistic); IA, image agreement; Fam, conceptual familiarity; VC, visual complexity; AoA, age of acquisition. ** Significant at the p < .01 level.

Table 4 Cross-linguistic correlations with Persian

	Persian
NA (%)	.125
H	.078
IA	.043
FAM	.277**
VC	.197**
AOA	.440**

NA (%), name agreement percentage; H, name agreement (*H* statistic); IA, image agreement; Fam, conceptual familiarity; VC, visual complexity; AoA, age of acquisition. ** Significant at the p < .01 level.

view is supported by the findings of the cross-linguistic comparison, in which AoA in Turkish was highly correlated with both the Russian (r = .662, p < .01) and Modern Greek (r = .819, p < .01) AoA ratings.

Name agreement in Turkish, as measured by both percentages of agreement and the H statistic, correlated strongly with Russian (rs = .356 and .406, respectively, ps < .01) and with Modern Greek (rs = .553 and .661, respectively, ps < .01). However, as in findings reported previously in both the Russian and Greek normative studies, we found no statistically significant correlation regarding name agreement with the Belgian French normative study. In this respect, there is no rationale as to why cross-linguistic comparisons ought to yield or fail to yield significant results, but can be regarded as important for establishing cross-linguistic comparability. Tsaparina et al. (2011) suggested that comparisons with the Belgian French name agreement norms may be "uninformative," in this regard.

Two of the measures in Turkish only had comparable data from the Russian and Belgian French normative studies. Conceptual familiarity, reported above to be a robust measure in psycholinguistic norms, was found to be highly significant between both Turkish and Russian (r = .661, p < .01) and Turkish and Belgian French (r = .691, p < .01). Image agreement also yielded a significant correlation between Turkish and Russian (r = .232, p < .01), and again for Turkish and Belgian French (r = .226, p < .01).

Finally, the measures were subjected to analyses against recently obtained data from Persian (Bakhtiar et al., 2013). It should be noted, however, that Bakhtiar et al. reported only 200 of the original items; therefore, we adjusted our data set accordingly, to construct a partial data set for the purpose of analyses. As can be seen in Table 4, we found nonsignificant correlations for both of the name agreement measures (% and H) and for image agreement between Turkish and Persian. However, conceptual familiarity (r = .277, p < .01), visual complexity (r = .197, p < .01), and AoA (r = .440, p < .01) were found to be significantly correlated in Turkish and Persian. These results, together with those reported for Russian, Greek, and Belgian French, show that in the instances in which comparable data were available, AoA and familiarity yielded cross-linguistic correlations. Conversely, visual complexity was the only measure that correlated significantly in Russian, Greek, Belgian French, and Persian.

Conclusion

In conclusion, the aim of the present study was to establish psycholinguistic normative data in Turkish for the color version of the Snodgrass and Vanderwart (1980) black-and-white line drawings. To the best of our knowledge, this is the first report of such measures in Turkish, and we believe that this data set can be used as a valuable instrument in behavioral studies for the investigation of cognitive processes in Turkish, including, but not limited to, language and memory.

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References

Aksan, Y., Aksan, M., Koltuksuz, A., Sezer, T., Mersinli, Ü., & Ufuk, U. (2012). *Construction of the Turkish National Corpus* (*TNC*). Paper presented at the Eighth International Conference on Language Resources and Evaluation (LREC 2012), Istanbul, Turkey.

Alario, F.-X., & Ferrand, L. (1999). A set of 400 pictures standardized for French: Norms for name agreement, image agreement, familiarity, visual complexity, image variability, and age of acquisition. *Behavior Research Methods, Instruments, & Computers, 31,* 531–552. doi:10.3758/BF03200732

Alario, F.-X., Ferrand, L., Laganaro, M., New, B., Frauenfelder, U. H., & Segui, J. (2004). Predictors of picture naming speed. *Behavior Research Methods, Instruments, & Computers, 36,* 140–155. doi:10.3758/BF03195559

Bakhtiar, M., Nilipour, R., & Weekes, B. S. (2013). Predictors of timed picture naming in Persian. *Behavior Research Methods*. doi:10.3758/s13428-012-0298-6

Barry, C., Morrison, C. M., & Ellis, A. W. (1997). Naming the Snodgrass and Vanderwart pictures: Effects of age of acquisition, frequency, and name agreement. *Quarterly Journal of Experimental Psychology, 50A,* 560–585. doi:10.1080/783663595

Bonin, P., Chalard, M., Méot, A., & Fayol, M. (2002). The determinants of spoken and written picture naming latencies. *British Journal of Psychology, 93,* 89–114. doi:10.1348/000712602162463

Bonin, P., Peereman, R., Malardier, N., Méot, A., & Chalard, M. (2003). A new set of 299 pictures for psycholinguistic studies: French norms for name agreement, image agreement, conceptual familiarity, visual complexity, image variability, age of acquisition, and naming latencies. *Behavior Research Methods, Instruments, & Computers, 35,* 158–167. doi:10.3758/BF03195507

Cortese, M. J., & Khanna, M. M. (2008). Age of acquisition ratings for 3,000 monosyllabic words. *Behavior Research Methods, 40,* 791–794. doi:10.3758/BRM.40.3.791

Cuetos, F., Ellis, A. W., & Alvarez, B. (1999). Naming times for the Snodgrass and Vanderwart pictures in Spanish. *Behavior Research Methods, Instruments, & Computers, 31,* 650–658. doi:10.3758/BF03200741

Dent, K., Johnston, R. A., & Humphreys, G. W. (2008). Age of acquisition and word frequency effects in picture naming: A dual-task investigation. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 34,* 282–301. doi:10.1037/0278-7393.34.2.282

Dimitropoulou, M., Duñabeitia, J. A., Blitsas, P., & Carreiras, M. (2009). A standardized set of 260 pictures for Modern Greek: Norms for name agreement, age of acquisition, and visual complexity. *Behavior Research Methods, 41,* 584–589. doi:10.3758/BRM.41.2.584

Durgunoglu, A. Y., & Oney, B. (2002). Phonological awareness in literacy development: It's not only for children. *Scientific Studies of Reading, 6,* 245–266.

Ellis, A. W., & Morrison, C. M. (1998). Real age-of-acquisistion effects in lexical retrieval. *Journal of Experimental Psychology. Learning, Memory, and Cognition, 24,* 515–523.

Hirsh, K. W., & Funnell, E. (1995). Those old, familiar things: Age of acquisition, familiarity and lexical access in progressive aphasia. *Journal of Neurolinguistics, 9,* 23–32. doi:10.1016/0911-6044(95)00003-8

Johnston, R. A., & Barry, C. (2006). Age of acquisition and lexical processing. *Visual Cognition, 13,* 789–845. doi:10.1080/13506280544000066

Juhasz, B. J. (2005). Age-of-acquisition effects in word and picture identification. *Psychological Bulletin, 131,* 684–712. doi:10.1037/0033-2909.131.5.684

Morrison, C. M., & Ellis, A. W. (2000). Real age of acquisition effects in word naming and lexical decision. *British Journal of Psychology, 91,* 167–180.

Nishimoto, T., Miyawaki, K., Ueda, T., Une, Y., & Takahashi, M. (2005). Japanese normative set of 359 pictures. *Behavior Research Methods, 37,* 398–416. doi:10.3758/BF03192709

Nisi, M., Longoni, A. M., & Snodgrass, J. G. (2000). Italian measurement on the relation of name, familiarity, and acquisition age for the 260 figures of Snodgrass and Vanderwart. *Giornale Italiano di Psicologia, 27,* 205–218.

Pind, J., Jónsdóttir, H., Gissurardóttir, H., & Jónsson, F. (2000). Icelandic norms for the Snodgrass and Vanderwart (1980) pictures: Name and image agreement, familiarity, and age of acquisition. *Scandinavian Journal of Psychology, 41,* 41–48. doi:10.1111/1467-9450.00169

Price, C. J., & Humphreys, G. W. (1989). The effects of surface detail on object categorization and naming. *Quarterly Journal of Experimental Psychology, 41,* 797–828.

Raman, I. (2006). On the age of acquisition effects in word naming and orthographic transparency: Mapping specific or universal? *Visual Cognition, 13,* 1044–1053.

Raman, I. (2011). The role of age of acquisition in picture and word naming in dyslexic adults. *British Journal of Psychology, 102,* 328–339.

Raman, I., & Baluch, B. (2001). Imageability effects and level of skill in naming a transparent alphabetic orthography. *Reading and Writing, 14,* 599–614.

Raman, I., Baluch, B., & Besner, D. (2004). On the control of visual word recognition, Changing routes versus changing deadlines. *Memory & Cognition, 32,* 489–500. doi:10.3758/BF03195841

Raman, I., Baluch, B., & Sneddon, P. (1996). What is the cognitive system's preferred route for deriving phonology from print? *European Psychologist, 1,* 221–227.

Rossion, B., & Pourtois, G. (2004). Revisiting Snodgrass and Vanderwart's object pictorial set: The role of surface detail in basic-level object recognition. *Perception, 33,* 217–236. doi:10.1068/p5117

Sanfeliu, M. C., & Fernandez, A. (1996). A set of 254 Snodgrass–Vanderwart pictures standardized for Spanish: Norms for name agreement, image agreement, familiarity, and visual complexity. *Behavior Research Methods, Instruments, & Computers, 28,* 537–555. doi:10.3758/BF03200541

Shannon, C. E. (1949). The mathematical theory of communication. In C. E. Shannon & W. Weaver (Eds.), *The mathematical theory of communication* (pp. 29–125). Urbana, IL: University of Illinois Press.

Snodgrass, J. G., & Vanderwart, M. (1980). A standardized set of 260 pictures: Norms for name agreement, image agreement, familiarity, and visual complexity. *Journal of Experimental Psychology: Human Learning and Memory, 6,* 174–215. doi:10.1037/0278-7393.6.2.174

Snodgrass, J. G., & Yuditsky, T. (1996). Naming times for the Snodgrass and Vanderwart pictures. *Behavior Research Methods, Instruments, & Computers, 28,* 516–536. doi:10.3758/BF03200540

Székely, A., & Bates, E. (2000). Objective visual complexity as a variable in studies of picture naming. *CRL Newsletter, 12,* 3–33.

Tsaparina, D., Bonin, P., & Méot, A. (2011). Russian norms for name agreement, image agreement for the colorized version of the Snodgrass and Vanderwart pictures and age of acquisition, conceptual familiarity, and imageability scores for modal object names. *Behavior Research Methods, 43,* 1085–1099. doi:10.3758/s13428-011-0121-9

Vitkovitch, M., & Tyrrell, L. (1995). Sources of disagreement in object naming. *Quarterly Journal of Experimental Psychology, 48A,* 822–848. doi:10.1080/14640749508401419

Weekes, B. S., Shu, H., Hao, M., Liu, Y., & Tan, L. H. (2007). Predictors of timed picture naming in Chinese. *Behavior Research Methods, 39,* 335–342. doi:10.3758/BF03193165