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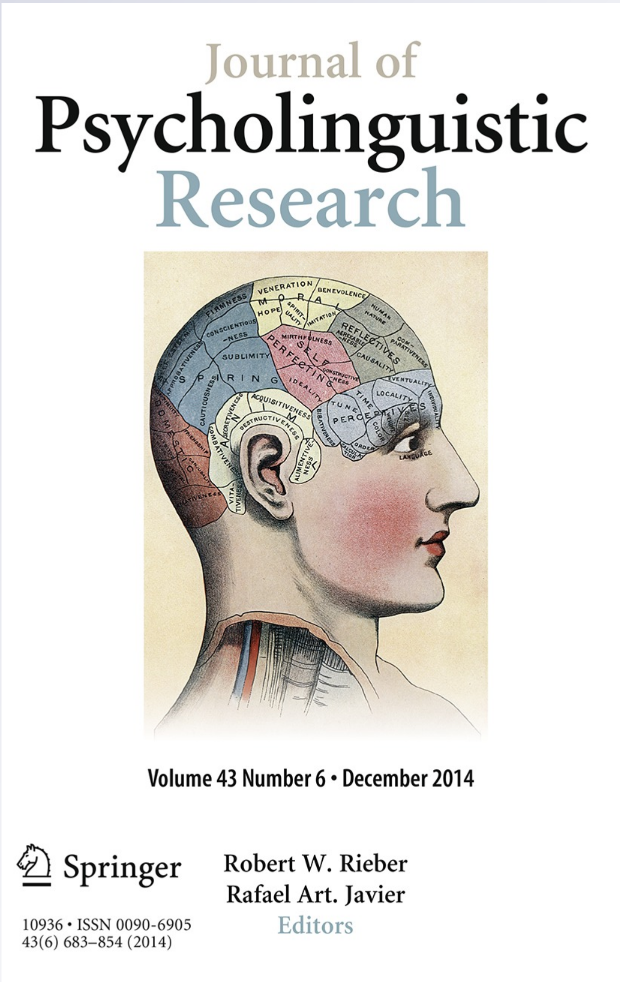

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A Normative Database and Determinants of Lexical Retrieval for 186 Arabic Nouns: Effects of Psycholinguistic and Morpho-Syntactic Variables on Naming Latency

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Abstract Research into lexical retrieval requires pictorial stimuli standardised for key psycholinguistic variables. Such databases exist in a number of languages but not in Arabic. In addition there are few studies of the effects of psycholinguistic and morpho-syntactic variables on Arabic lexical retrieval. The current study identified a set of culturally and linguistically appropriate concept labels, and corresponding photographic representations for Levantine Arabic. The set included masculine and feminine nouns, nouns from both types of plural formation (sound and broken), and both rational and irrational nouns. Levantine Arabic speakers provided norms for visual complexity, imageability, age of acquisition, naming latency and name agreement. This delivered a normative database for a set of 186 Arabic nouns. The effects of the morpho-syntactic and the psycholinguistic variables on lexical retrieval were explored using the database. Imageability and age of acquisition were the only significant determinants of successful lexical retrieval in Arabic. None of the other variables, including all the linguistic variables, had any effect on production time. The normative database is available for the use of clinicians and researchers in the Arab world in the domains of speech and language pathology, neurolinguistics and psycholinguistics. The database and the photographic representations will be soon available for free download from the first author's personal webpage or via email.

Background

Most studies investigating lexical processing have used picture naming tasks. The picture naming task is considered an important experimental paradigm to investigate spoken word production. Glaser (1992) stated that naming a picture is an elementary step towards using language. Picture naming refers to the process of describing a presented picture in no more

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than one word (Bonin et al. 2003; Kosslyn and Chabris 1990). The process of picture naming requires three broad levels: visual analysis, semantic activation and lexical retrieval (Levelt et al. 1999; Dell et al. 1997; Nickels and Howard 1995; Barry et al. 1997). Previous research (e.g. Kosslyn and Chabris 1990; Barry et al. 1997; Bonin et al. 2003) suggests that variables contributing to these three levels of the picture naming process influence the degree of ease or difficulty of naming a given picture.

A number of factors have been found to influence spoken word production in healthy individuals. These factors are properties of the stimuli and contribute to the speed and accuracy of spoken word production. The effect of such factors has been investigated in healthy speakers (e.g. Barry et al. 1997; Bonin et al. 2002, 2003) in a number of languages. Variables influencing healthy individuals' spoken word production include visual complexity, imageability, age of acquisition, naming latency and name agreement, concreteness, image agreement, frequency, familiarity and age of acquisition (e.g. Alario and Ferrand 1999; Snodgrass and Vanderwart 1980; Gilhooly and Logie 1980; Barry et al. 1997; and Bonin et al. 2003).

This warrants developing normative databases for pictorial stimuli and their corresponding nouns, to enable researchers to draw accurate conclusions from a given set of data and to compare across datasets. Investigators of languages lacking normative databases of pictorial representation, such as Arabic, use non-standardised stimuli, which may lead to erroneous conclusions.

The Arabic language can be classified into three separate dialects, Classical Arabic, Modern Standard Arabic and Spoken Arabic. Classical Arabic is the Arabic variety that is exclusively found in religious and classical Arabic literature contexts. It is the language of the Qur'an and old literature. It is learned by Muslims across the world and considered the sacred language. Nowadays Classical Arabic is spoken in religious contexts only. Modern Standard Arabic is considered to be the modernisation of the syntactic structures and vocabulary of Classical Arabic. It is widely spoken among educated and intellectual individuals within the Arab world and used in formal and official contexts in Arabic-speaking countries.

Spoken Arabic is the colloquial form of Arabic that has many variations depending on the region and country. It has been classified by Arabic sociolinguists into six major groups: North-west African, Egyptian, Levantine, Iraqi, Gulfian and Yemeni (Zughoul 2007). Each group may contain two or more spoken sub-dialects. Spoken Arabic is a mixed form of Arabic that derives from Modern Standard Arabic and the influence of dominant languages that existed before the introduction of Arabic to the region.

Levantine Arabic includes Lebanese, Syrian, Palestinian and Jordanian dialects, which share common features. They overlap in terms of lexical, morphological and syntactic features, but differ in the pronunciation of consonantal phonemes and vowel quality (Cleveland 1963). Sociolinguists distinguish between three major sub-varieties of Levantine Arabic: Urban, Rural and Bedawi Levantine Arabic (Zughoul 2007; Cleveland 1963). The dialect in question in the current study is Urban Levantine Arabic.

Normative databases have been available for English (e.g. Snodgrass and Vanderwart 1980) and a number of other languages (e.g. French: Alario and Ferrand 1999; Bonin et al. 2003; Icelandic: Pind et al. 2000; Spanish: Sanfeliu and Fernandez 1996; Dutch: Martein 1995). Arabic in general and Levantine Arabic in particular lack normative data for variables affecting lexical retrieval. A number of databases have been formulated for Arabic word frequency only, such as the ARALEX (Boudelaa and Marslen–Wilson 2010). However, these databases are based on written Modern Standard Arabic.

Furthermore, Arabic lacks studies investigating the determinants of noun lexical retrieval that have been established in a number of languages (e.g. Dutch: Martein 1995; English:

Barry et al. 1997; French: Alario and Ferrand 1999; Bonin et al. 2003; Icelandic: Pind et al. 2000; Spanish: Sanfeliu and Fernandez 1996).

In addition to the above, Arabic nouns have underlying morpho-syntactic properties that are more complex than the morpho-syntax of nouns in English. Investigating the effect of such morpho-syntactic properties on lexical retrieval could shed light on the role of underlying morpho-syntax on bare noun production. Of interest to the current study are two morpho-syntactic features of Arabic nouns: pluralisation and rationality. Arabic has two plural types. Dual plurals refer to two items only. Plurals that refer to three or more items are divided into sound and broken plurals. Dual and sound plurals are formed through gender-inflected suffixation of the singular form of a given noun, and are deemed the regular form. Broken plurals are formed through changing the vocalic pattern of the noun, and are deemed the irregular form. Example (1) demonstrates this process.

(1) Singular noun → /rədʒʊl/
[Masculine-singular-noun]
'man'

Stage one: extraction of triliteral root: → /r-dʒ-l/

Stage two: selection of broken plural pattern: → c1-ɪ-c2-æ-c3

Stage three: plural output: → /rɪdʒæl/
[Masculine-plural-noun]
'men'

Rationality in Arabic nouns is a semantic concept that classifies nouns into two categories: rational and irrational nouns. Rationality effects morpho-syntactic forms of Arabic noun phrases when they are pluralised. This semantic phenomenon exists in other languages, such as Tamil but does not exist in English. Rational nouns are those which refer to human beings and deities. They are also called intelligent nouns. In addition to human beings, nouns referring to angels and the devil are included in this class. Some examples of rational nouns are /dəktu:r/'doctor' and /wələd/ 'boy'. Irrational nouns are those which refer to non-human beings and non-deities. They are also called non-intelligent nouns. Irrational nouns refer to non-living objects and concepts (abstract nouns) and living non-human beings, like animals and plants. Some examples of irrational nouns are /kəlb/'dog' and /kɪtæb/ 'book'. There is a significant difference in the plural form of rational and irrational nouns. The plurals of rational nouns of both genders, i.e. masculine and feminine, are treated as true plurals (they abide by the norms of Arabic morpho-syntax), whereas the plurals of irrational masculine nouns are treated as feminine singular plurals. When an irrational masculine noun is pluralised and modified by an adjective or/and a pronoun, it is, morpho-syntactically, treated as a singular feminine noun. In other words, when an irrational masculine noun is pluralised, it fails to fulfill agreement canons within the noun phrase (NP). Plurals of irrational feminine nouns are treated canonically i.e. as true plurals. The example below presents a case of a singular feminine adjective i.e. /saɣer-at/ modifying a plural irrational masculine noun i.e. /kilab/. The NP in example (2) below demonstrates how the adjective fails to agree with the noun it modifies for gender and number.

(2) /kɪlɑ:b səɣɪrə/

[PLURAL IRRATIONAL MASCULINE NOUN]-[SINGULAR FEMININE ADJECTIVE]

'small dogs'

The Current Study

The aim of this study is twofold. First, this study aims to devise a normative database of pictures and associated values for a subset of psycholinguistic variables, from which pictorial stimuli could be selected for current and future research projects examining Levantine Arabic noun production. Second, this study investigates the effect of psycholinguistic and morpho-syntactic variables on picture naming in Levantine Arabic.

Naming accuracy and naming latencies data for a set of culturally appropriate picture stimuli were collected from healthy native speakers of Levantine Arabic. The participants also provided ratings for visual complexity, imageability and age of acquisition. This resulted in a database providing name agreement, naming latencies, visual complexity, imageability and age of acquisition values for words. The database included frequency of orthographic form for each word, and other variables which are intrinsic features of words (can be determined directly from their surface structure): gender, animacy, rationality, pluralisation, number of syllables and number of phonemes. In the current study, visual (visual complexity), semantic (imageability), lexical (age of acquisition, name agreement), phonological (word length) and morpho-syntactic (rationality, pluralisation) were included.

It is worth mentioning that frequency corpora for spoken Levantine Arabic are not readily available. Available frequency corpora on Arabic are on written Arabic (see Buckwalter Arabic Corpus 1986–2003, An-Nahar Corpus, ELRA ELRA), and Modern Standard Arabic (e.g. Aralex database, Boudelaa and Marslen–Wilson 2010). Therefore, the frequency of orthographic form for each word was included as a compensatory measure for spoken frequency. Orthographic frequency values were extracted from the ARALEX (Boudelaa and Marslen–Wilson 2010) taking into consideration dialectal variations.

Effects of Variables on Production of Nouns

Previous studies aiming at collecting normative data for pictorial material (e.g. Alario and Ferrand 1999; Snodgrass and Vanderwart 1980; Gilhooly and Logie 1980; Barry et al. 1997; and Bonin et al. 2003) included other variables that contribute to the process of picture naming, such as image variability, image agreement, familiarity and concreteness. Reviewing all the variables affecting spoken word production is beyond the scope of the project from which this study is taken. Only variables investigated in this study are discussed below: visual complexity, imageability, age of acquisition, length (phoneme number) and name agreement. These variables are presented according to their effect locus within the picture naming process.

Visual Complexity

Visual complexity has been defined by Snodgrass and Vanderwart (1980, p. 183) as "the amount of detail or intricacy of lines in [a] picture". Complexity refers to the level of difficulty of visual analysis of the picture rather than the complexity of the object itself (Bonin et al. 2003; Snodgrass and Vanderwart 1980). Previous studies investigating factors influencing picture naming (Alario and Ferrand 1999; Bonin et al. 2003; Hartje et al. 1986; Snodgrass and Vanderwart 1980) have measured visual complexity by means of a 5-point rating scale where 1 indicated a very simple picture and 5 indicated a very complex one.

A number of researchers (e.g. Humphreys et al. 1988; Hartje et al. 1986) maintain that visual complexity is an important predictor of naming speed in picture naming. It has been found to contribute to the degree of ease of visual recognition in German (Hartje et al. 1986) and English (Ellis and Morrison 1998) speakers and thus, potentially, to naming accuracy and response latency.

However, other studies have argued that visual complexity of pictures does not contribute robustly to naming latencies (English: Barry et al. 1997; French: Bonin et al. 2002 and 2003; Bulgarian, Chinese, English, German, Hungarian, Italian and Spanish: Bates et al. 2003). In spite of the significant correlations found between naming latencies and visual complexity in these studies, multiple regression analyses have shown that visual complexity did not independently contribute to predicting naming latencies, suggesting that this influence is not robust in healthy populations.

Imageability

Imageability is a semantic feature of a lexical concept (Nickels and Howard 1995). It has been described as the degree of ease or difficulty in forming a mental image in response to a word (Bonin et al. 2003; Gilhooly and Logie 1980; Nickels 1997; Paivio et al. 1968). Previous studies have measured imageability using rating scales (Gilhooly and Logie 1980; Bonin et al. 2003). These were 7-point scales where 1 indicated that it is difficult to form a mental image of the given word and 7 indicated that it is easy.

Research into the effect of imageability on picture naming is limited. This is due to the fact that picturable objects are necessarily highly imageable (Nickels and Howard 1995). Therefore, pictures within a picture naming task would be located at the higher end of the imageability scale and will necessarily have limited imageability variance. However, it has been reported that pictures rated with high imageability are responded to faster in picture naming tasks (English: Gilhooly and Logie 1980; Barry et al. 1997; French: Bonin et al. 2003). However, Morrison et al. (1992) investigated the effect of rated imageability on the speed of naming items from the Medical Research Council database. They stated that imageability was not a significant predictor of naming speed for the dataset in question.

Age of Acquisition

Age of acquisition has been described as the age at which a word is learnt in its written or spoken form (Alario and Ferrand 1999; Bonin et al. 2003; Gilhooly and Logie 1980). Nickels (1997) proposed that the effect of age of acquisition on lexical processing is primarily a characteristic of the word production system as age of acquisition has failed to predict outcomes in auditory or visual word recognition studies (e.g. Gilhooly and Logie 1981). Previous studies have used two different methods for collecting norms for age of acquisition: the rating scale method (e.g. Alario and Ferrand 1999; Barry et al. 1997; Bonin et al. 2003; Gilhooly and Logie 1980; Kremin et al. 2001) and the follow-up longitudinal method (e.g. Gathercole and Baddeley 1989). The majority of studies use rating scales as a means of identifying at which age a particular word has been learned. Rating scales use an established 7-point scale where 1 indicates a word has been learned between 0 and 2 years old and 7 indicates a word has been learned at age 13+ years old. Caroll and White (1973) used a 9-point scale to collect norms for age of acquisition. The second method involves longitudinal studies (Gathercole and Baddeley 1989) in which children's language is monitored to establish the exact age at which particular words are learned. Practical constraints have limited the degree to which this method has been used.

Age of acquisition has been found to contribute significantly to latency and accuracy of lexical retrieval in a number of studies (Belgian Dutch: Severens et al. 2005; English: Barry et al. 1997; Brysbaert 1996; Caroll and White 1973; Gilhooly and Gilhooiy 1979; Lachman et al. 1974; French: Bonin et al. 2002 and 2003; Icelandic: Pind and Tryggvadottir 2002).

Frequency

Frequency refers to the estimate counts of the number of occurrences of individual words in a language or variety. Research into psycholinguistics has shown that word frequency is one of the most crucial factors in the lexical access and therefore should be accounted for in experimental tasks. It has been shown that this factor is a major predictor of speed and accuracy of lexical access (e.g. Brysbaert 1996; Oldfield and Wingfield 1965). In their study on predictors of naming in seven languages, Bates et al. (2003) found cross-linguistic frequency effects on naming. They reported strong cross-language correlations between naming latencies and frequency. Pind and Tryggvadottir (2002), have found that word frequency has a significant effect on the time it takes to name an object or read a word.

A number of proposals have been put forward to explain frequency effects (e.g. Brown and Watson 1987; Caroll and White 1973; Morrison 1993), of interest to the current study is the assumption that frequency effects may rather reflect an underlying effect of age of acquisition, since both variables have been found to be highly correlated ($r=0.77$) in Caroll and White 1973). Caroll and White (1973) conducted a multiple regression to check for independent predictors, and found that age of acquisition was the only significant independent predictor of naming latencies. These findings have been replicated in other studies on English and other languages (Dewhurst et al. 1998; Ellis and Morrison 1998; Gerhand and Barry 1999; Morrison et al. 1992). Of considerable interest is the paper by Morrison et al. (1992), in which they reanalyzed the original picture naming study of Oldfield and Wingfield (1965). This reanalysis showed rated age of acquisition to have the highest correlation with naming speed ($r=-0.83$), with log word frequency showing a lower correlation ($r=0.69$). Multiple regression showed age of acquisition to be the only significant predictor of naming speed, suggesting that the frequency effect reported by Oldfield and Wingfield (1965) was artifactual. In spite of this, other studies reported independent effects of age of acquisition and frequency (e.g. Ellis and Morrison 1998; Gerhand and Barry 1999).

Due to the importance of this factor, frequency databases have been developed for a number of languages e.g. American English (CELEX: Kucera and Francis 1967), British English, Dutch and German (Baayen et al. 1995). Such databases may include frequencies for words in their spoken form or written (orthographic) form or both. A number of databases have been formulated for Arabic word frequency, such as the ARALEX (Boudelaa and Marslen–Wilson 2010). However, these databases are based on written Modern Standard Arabic.

While the current study is on spoken Levantine Arabic, word frequency counts included in the current database were based on orthographic form occurrences, and not spoken, due to the fact that frequency corpora for spoken Levantine Arabic are not readily available. Available frequency corpora on Arabic are on written Arabic (see Buckwalter Arabic Corpus 1986–2003, An-Nahar Corpus, ELRA ELRA), and Modern Standard Arabic (e.g. Aralex database, Boudelaa and Marslen–Wilson 2010).

Within the context of the current research project, frequency has been computed from occurrence counts in the 40-million-word corpus i.e. ARALEX, as the rate of occurrence per 1 million words of text, given by:

$$\mathrm{Freq}(w) = \frac{\mathrm{occ}(w)}{T/k},$$

where occ(w) is the number of occurrences of word w in the corpus, T is the total number of words in the corpus, and k = 1,000,000 (Boudelaa and Marslen–Wilson 2010).

Word Length

It has been suggested that word length predicts successful lexical retrieval in healthy (Santiago et al. 2000) and brain-damaged (patient EST) populations. Word length in the current project is taken as the number of phonemes that constitute a word. The existence of a word length effect on naming has been disputed in relation to healthy speakers but not to brain-damaged speakers. Studies that have found a significant unique contribution of word length to naming in healthy speakers have been limited (English: Bates et al. 2003; Roelofs 2002; Santiago et al. 2000; Spanish: Bates et al. 2003). Others have found a significant correlation between naming speed and word length but no significant contribution in multiple regression analyses (English: Barry et al. 1997; Morrison et al. 1992; Chinese Mandarin: Bates et al. 2003). Consequently, it has been postulated that word length does not contribute significantly to naming speed in healthy participants (Belgian Dutch: Severens et al. 2005; French: Bonin et al. 2002 and 2003).

Name Agreement

Name agreement has been described as the degree to which participants produce the same name to a given picture (Barry et al. 1997; Alario and Ferrand 1999; Bonin et al. 2003). The relationship between a picture and its name is not straightforward. A picture can call to mind more than one name. Likewise, a given name can evoke different pictorial representations.

Studies collecting norms for name agreement have used two methods to measure name agreement: (a) the percentage of participants giving the same name to a picture (Snodgrass and Vanderwart 1980; Barry et al. 1997; Bonin et al. 2003; Kremin et al. 2001), and (b) the H-Statistic measurement which computes the unbiased normally distributed picture names given by participants (Alario and Ferrand 1999; Snodgrass and Vanderwart 1980). The percentage of participants giving the same name to a picture has been the commonly used method.

Name agreement has been reported as a significant predictor of naming latencies in a number of languages (Belgian Dutch: Severens et al. 2005; English: Ellis and Morrison 1998; Gilhooly and Gilhooiy 1979; Vitkovitch and Tyrrell 1995, French: Alario and Ferrand 1999; Bonin et al. 2002 and 2003; Icelandic: Pind and Tryggvadottir 2002). Furthermore, Bates et al. (2003) conducted a pioneering study in which they investigated the effect of name agreement on timed picture naming in seven languages (Bulgarian, Chinese, English, German, Hungarian, Italian and Spanish). They reported that name agreement was found to have a large significant effect on naming latencies within and between all seven languages.

Methods

Participants

Participants were recruited from the Arabic speaking community within a city in the north of England. They were all university students living temporarily in the UK. Participants were contacted via the university's email list of international students, local mosques and Muslim communities within the city. They were first contacted via an email that contained an information sheet summarizing the project background, aims and the participant's role in the experiment. Interested participants were asked to sign a consent form. A confidentiality form was also signed by the researcher to confirm that all data would be confidential and anonymous. This experiment was approved by the Ethics Review Panel of the Department of Human Communication Sciences.

A total of 22 Levantine Arabic speakers (12 Jordanian, 6 Palestinian, 2 Syrian, 2 Lebanese) with a mean age of 28.3 years old and a standard deviation of 4.47 years, participated in the study. All participants reported normal development of speech and language, and normal hearing and vision. They temporarily resided in the United Kingdom and have been away from their country of origin for fewer than 5 years. In addition, all participants were educated in Arabic prior to their studies in the United kingdom.

Materials, Design and Procedure

A picture naming task was conducted to establish naming latency and name agreement, and three rating tasks (to establish visual complexity, age of acquisition and imageability). Each participant took part in two sessions. In the first session, participants completed the picture naming task, the visual complexity rating task, and the age of acquisition rating task. The average administration time for session one was 50 min per participant. In the second session, which was administered two weeks after the first one, 16 participants participated in the imageability rating task (6 participants of the 22 were not available at the time when the second session was administered). The average administration time for session two was 15 min per participant. The rationale for separating the two sessions was to prevent priming in the imageability task. Previous studies investigating imageability (e.g. Gilhooly and Logie 1980; Paivio et al. 1968) have not reported controlling for priming effects. Both sessions were conducted in a quiet clinic room in the Department of Human Communication Sciences.

At the beginning of each session participants were encouraged to respond carefully and consistently to each task. At the start of each task, participants were given instructions and were taken through practice items prior to commencing the task in question. Instructions were given in Arabic; rating scales and other written materials were in Arabic script. A full description of each task conducted in the current experiment is reported below. The tasks below are presented according to their order of administration. The researcher controlled the presentation of all tasks, and participants were given the opportunity to take a break.

All items were randomised using the randomising function on Microsoft Office Excel. Four different lists were generated i.e. A, B, C and D. Randomising the order was conducted to avoid the effect of word location in the set on picture naming. Each of the four different word lists was checked for semantic relatedness and initial phonemes of neighbouring words, to ensure that successive items did not share semantic features or initial phonemes. The randomisation process was repeated for all rating tasks in the current experiment.

Picture Naming Task

A set of pictures was selected depicting 235 nouns. These nouns were selected according to pluralisation type, rationality, and gender, to ensure sufficient numbers of each category. The selected pictorial stimuli were culturally appropriate for use within the Arab world, as evident from the results of a pilot study in which Arabic speaking participants judged the appropriateness of each picture. The pictures were digital photographs; 87 pictures were donated to the current project by Dr. Ruth Herbert (personal communication, unpublished), the remainder i.e. 148 pictures, were downloaded from copyright-free websites. Pictures were configured to be 885 pixels (width) by 600 pixels (height) for presentation on a laptop screen with a resolution of 1,024 by 768 pixels.

Participants were tested individually. They sat at a comfortable distance from a laptop screen. They were presented with one picture at a time on a laptop screen and were asked to name the pictures aloud as quickly as possible. They were instructed to name the item as soon as it appeared on the screen and to avoid saying ‘em’ or ‘er’, or describe the item. Participants were asked to use a single word to describe each item. They were presented with five practice items and were given feedback on their performance. The average time of administration of the picture naming task was 20 min.

The Response Recorder software (Mike Coleman, unpublished) was used to present the pictures on the computer. This software records the time between presentation of the picture, and the onset of the participant’s spoken response. A Sony headset microphone adjusted to 5 cm from the participant’s mouth was used to detect and record responses. The programme recorded a sound file of each attempt at naming each picture by each participant, recorded onto digital audio-files in the programme. A Marantz (PMD670) digital audio-recorder was also used in order to keep a second record of the responses.

For each item, the computer displayed an initial blank screen for 1,000 ms. This was followed by a central fixation cross (+) which remained on the screen for 1,500 ms. The cross served as a prompt to look at the centre of the screen in preparation for the upcoming picture. Then a picture appeared on the screen and remained until the participant started naming the picture, up to a limit of 10 s. If a participant did not name the picture within 10 s of its appearance, a blank screen would appear in preparation for the next picture. If a participant named the picture, the researcher pressed a button on the screen at the onset of production of the word, and the next stimulus would appear. The recording of response latency as well as a sound file of the response were stored automatically the Response Recorder software. All sound files were exported to PRAAT (Boersma and Weenink 2009; version 5.1.17), and each sound file was revisited to make sure that the software did not include false triggering of noise or ‘em’ or ‘err’, and that it included latencies for items named correctly. The response recorder calculated naming latencies for items named correctly. False triggering and failures to press the response time key were noted, and were revisited at the end of this task.

Responses were transcribed and coded by the researcher using a numerical coding system. It included 7 categories. Coded responses were then analysed for each item across the 22 participants. Only pictures which were named accurately within the allotted time frame (10 s) were scored as correct. The 7 categories in the adapted coding system were:

1. Correct: target response is produced.
2. Visual error: response visually related to the target picture; e.g. saying /mɪrjəle/‘apron’ for /bɔːrdæjə/ ‘curtain’.
3. Semantic error: response semantically related to the target picture; e.g. saying /ħeɪwæn/ ‘animal’ for /kəlb/ ‘dog’.
4. Phonological error: the erroneous response shares 50 % or more phonemes with the target response, e.g. /tɪlɪfuːn/ ‘telephone’ → /tɪlɪfɪzjuːn/ ‘television’
5. Other error: responses that did not fit within any of the categories above.
6. No response: failure to respond to the presented picture.

An acceptable level of naming agreement was set at 95 %, equivalent to 21 out of 22 participants. The naming latency of each correctly named item was measured using PRAAT software (Boersma and Weenink 2009; version 5.1.17). The onset of naming for each item was recalculated. This process removed the error margin created by researcher delays in clicking at the onset of speech. The data were coded twice, for intra-rater reliability. The first time was shortly after assessment. The transcribed and coded data were then recoded by the researcher. The time between the first coding procedure and the second one was greater than 3 months, to ensure reliability of coding responses.

Rating Tasks

Participants were presented with three booklets, one for each variable: visual complexity, age of acquisition and imageability. The set of 235 words were listed in each booklet. Each booklet included 14 pages with 17 words on each page.

Rating scales were taken from previous studies on English (Snodgrass and Vanderwart 1980; Gilhooly and Logie 1980). In the visual complexity booklet, a 5-point scale was presented alongside each word in which 1 indicated very simple and 5 indicated very complex. In the age of acquisition booklet, a 7-point rating scale was printed next to each word in which 1 indicated that a word is learnt at age 0–2 years, 2 at age 3–4 years, 3 at age 5–6 years, 4 at age 7–8 years, 5 at age 9–10 years, 6 at age 11–12 years and 7 at age 13+ years. The imageability booklet included a 7-point rating scale alongside each word; 1 indicated that it is difficult to form a mental image of the presented word, and 7 that it is easy to form an image for the presented word.

There were four different forms of each booklet i.e. lists A, B, C and D. Each form had a different order of presentation to avoid priming effects. Each participant was given a form of the list that was different to the lists he/she encountered in the other tasks. For example, participant X would have been allocated form B in the picture naming task, D in the visual complexity rating task, A in the age of acquisition rating task and C in the imageability rating task, and so on. This ensured that each participant was exposed to a sequence of the items that they had not been exposed to in the other tasks.

The visual complexity rating task was administered in the first session, after the picture naming task. The average time of administration of this task was 15 min per participant. The participant sat in front of the laptop screen at a comfortable distance. Participants were presented with the list of 235 words simultaneously with the pictures appearing on the laptop screen. They were instructed to look at the picture appearing on the screen and then rate its visual complexity using the 5-point scale alongside each word by circling with a pen. The researcher explained that visual complexity refers to the level of difficulty of visual analysis of the picture per se rather than the complexity of the object represented in the picture.

The age of acquisition rating task was administered at the end of the first session, after the picture naming task and visual complexity rating task. The average time of administration of this task was 15 min per participant. Each participant was presented with a booklet that included the set of 235 words. Using the 7-point scale, participants were instructed to estimate at which age they learnt each word in the list. They were informed that age of acquisition refers to the age at which a word was learnt in its written or spoken form.

The imageability rating task was administered in the second session, two weeks after the picture naming, visual complexity and age of acquisition rating tasks. The average time of administration for this task was 15 min per participant. Participants were instructed to rate how easy or difficult it was to form an image in the mind for each word in the set. The pictures were not present at this task.

Results

The data were analysed to establish norms for name agreement, naming latency, visual complexity, imageability, and age of acquisition for each item in the set. The influence of these variables, and gender, rationality, pluralisation, and number of phonemes, on speed of spoken naming in Levantine Arabic healthy speakers was then examined. Naming latency was the dependent variable. The independent variables were name agreement, visual complexity, age of acquisition, imageability, phoneme number, orthographic form frequency and morpho-syntactic variables that are intrinsic features of the nouns in question (gender, plural type and rationality).

Name Agreement Data

The initial set consisted of 235 items. Analysis of the naming responses revealed that 143 items (60.8 %) had name agreement of 100 %, 43 items (18.2 %) had name agreement of 95 % and 49 items (20.8 %) with name agreement lower than 95 %. The latter items had a range of name agreement of 45–90 %.

Items with name agreement of less than 95 % were removed from the original set. Only items with name agreement at $\geq$95 were included in the final set which included 186 items (143 items = 100 % agreement and 43 items = 95 % agreement).

Naming Latencies

The data included in the database and analyses for naming latency were the set of 186 items (range 1143–3228, mean 1530). Only latencies for accurate responses were included. The internal consistency was tested for these responses. Cronbach's alpha test was conducted to establish whether the same set of items would elicit the same responses if they were re-administered to the same respondents. This procedure was applied to the rating data as well. Cronbach's alpha revealed a significant reliability coefficient (r-coefficient) across naming latencies ($r = 0.934$, $n = 186$). This suggests that participants were responding to every item in the set consistently.

The naming latency data contained outliers which were removed using the 5 % trimmed means procedure. The trimmed latencies values were established as normative naming latencies. The Kolmogorov–Smirnov test (K–S) revealed that the current data were not normally distributed ($D\ (186) = 0.099$, $p < 0.05$), which suggests that this set of data had to be transformed to attain normal distribution. The K-S test was performed again after the transformation, and implied that the transformed naming latency data were normally distributed ($D\ (186) = 0.69$, $p > 0.05$).

Rating Tasks Data

The data included in the following analyses were the visual complexity, age of acquisition and imageability ratings of the 186 items. Cronbach's alpha revealed high internal consistency across visual complexity ratings ($r = 0.902$, $n = 186$), age of acquisition ratings ($r = 0.981$, $n = 186$) and imageability ratings ($r = 0.961$, $n = 186$). This showed that participants were rating every item in the set consistently.

The rating process gave 22 ratings for each item. The mean and standard deviation for ratings were calculated for visual complexity (range 1–3, mean 1.09), age of acquisition (range 1.43–4.57, mean 2.5) and imageability (range 5–7, mean 6.53). the resulting database is presented in "Appendix A". These means were established as norms for the items in question, and were further examined for normal distribution.

The K–S test revealed that the visual complexity data were significantly far from normally distributed ($D\ (186) = 0.264$, $p < 0.05$), thus transformation was necessary. None of the transformations produced a normal distribution for the visual complexity data (square root:

D (186) = 0.242, $p<0.05$; logarithm: D (186) = 0.265, $p<0.05$; inverse: D (186) = −0.254, $p<0.05$). Visual complexity ratings were dichotomized. The dichotomized data were the original ratings of the 186 items in the set. Each of the 4,092 (22 × 186) ratings were re-rated automatically using the re-coding procedure in the Statistical Package for Social Sciences (SPSS version 14). This procedure resulted in 186 new means for visual complexity: 122 (66 %) items were rated 1, and 64 (34 %) items were rated 2. These ratings were only used in further statistical analyses and were not used in the establishment of norms for the visual complexity of the 186 items.

A post-hoc pilot study was conducted to check the subjective ratings with an objective assessment of visual complexity to determine how valid these rating data are. A group of 13 undergraduate students whose selection criteria match the 22 participants participating in this study were asked to rate the 186 photographs according to the number of strokes and details in the presented photograph. In the questionnaire we asked them to rate each image and try to provide a rough count of the lines in each photograph. The correlation analysis showed a medium to high effect ($r=0.655$; $p=0.04$) with the original ratings. These results along with the Cronach's alpha results presented above advocate that the obtained visual complexity ratings were valid.

The K–S test revealed that the age of acquisition data were normally distributed (D (186) = 0.016, $p>0.05$), which suggests that the data were appropriate for the use in further parametric analysis. The K–S revealed that imageability data were not normally distributed (D (186) = 0.150, $p<0.05$). Transformation of the imageability data was required to attain normal distribution. According to the K–S test, the transformation resulted in an insignificant D statistic (D (186) = 0.081, $p>0.05$) implying that the transformed imageability data were normally distributed.

Variables Influencing Spoken Naming

The aim of this analysis was to investigate the relationship between each of the psycholinguistic and morpho-syntactic variables, and naming latency in the set of 186 items. A correlational analysis was performed on the data obtained. Naming latency was the dependent variable. The independent variables were name agreement, visual complexity, age of acquisition, imageability, phoneme number. Linguistic variables that are intrinsic features of the nouns in question (gender, plural type and rationality) were also included in the analysis. The results are presented in Table 1.

Only two variables significantly correlated with naming latency: age of acquisition and imageability. There was a positive correlation between age of acquisition and naming latency. This correlation indicates that words acquired earlier were named faster. Imageability and naming latency had a negative relationship, indicating that words with high imageability were named faster.

Relationships between independent variables were also present. Age of acquisition and imageability significantly correlated, which might be attributed to the assumption that humans acquire highly imageable words at an earlier age than abstract words or words with low imageability. The significant correlations found between phoneme number, and gender and plural type, can be attributed to language-specific features of Arabic. Most Arabic feminine nouns end with an extra suffix marking the feminine gender/ə/which makes feminine nouns longer than masculine nouns (e.g. /məlık/ 'king';/məlıkə/ 'queen'). Sound plurals are formed by suffixation which makes them longer than broken plurals which are formed through internal vowel change which may not affect phoneme number. The frequency of the orthographic form of words had a negative weak significant correlation with phoneme number. Phonologically

Table 1 Correlation matrix for the psycholinguistic variables

	Age of acquisition	Visual complexity	Imageability	Name agreement	Phoneme number	Gender	Plural type	Rationality	Orth. frequency
Naming latency	.354**	−.031	−.455**	.047	−.026	−.015	−.070	−.050	−.018
Age of acquisition		−.036	−.532**	.064	.040	.033	−.037	.058	−.097
Visual complexity			−.085	.075	−.006	.105	−.017	.020	.062
Imageability				−.053	−.038	−.062	.098	−.049	.046
Name agreement					.038	−.066	−.018	.008	.108
Phoneme number						.277**	−.265**	−.096	−.161**
Gender							−.037	.096	.155
Plural type								.026	.058
Rationality									.198

shorter words have higher values of orthographic frequency, suggesting that shorter words are more frequent tha longer words in the written form.

Correlational analysis revealed that age of acquisition and imageability had significant relationships with successful spoken naming. Correlations do not give information about the predictive power of variables. The next section examines whether age of acquisition and imageability significantly predicted successful spoken naming.

Predictive Power of Variables

A multiple regression procedure was conducted to examine which variables significantly predict naming latency. The dependent variable was the mean naming latencies . The independent variables included variables that significantly correlated with naming latency i.e. age of acquisition and imageability.

The model accounted for 24.5 % ($R^2 = .245$) of the naming latency variance. The regression was significantly different from zero ($F(2, 175) = 5.67$, $p < .0001$) which suggests that the model was appropriate for the investigated data. This indicates that imageability and age of acquisition together had a significant ability to predict the variance in naming latency.

The standardised beta coefficients indicate that imageability made a significant and stronger contribution to naming latency variance ($\beta = -.392$; $t(186) = -4.92$, $p < .05$). The standardised beta coefficient for age of acquisition shows that this variable was the second best predictor of naming latency. It had a statistically significant contribution to the prediction of naming latency value ($\beta = .148$; $t(186) = 1.87$, $p < .05$). These findings are in agreement with results from the correlational analysis, which suggested that words with high imageability ratings and low age of acquisition ratings were retrieved faster in Arabic healthy speakers.

At this stage it is important to mention that previous literature investigating effects of psycholinguistic variables on naming has questioned the effect of age of acquisition (Barry et al. 1997; Bonin et al. 2002, 2003; Morrison et al. 1992). These studies propose that the age of acquisition effect on naming might be due to an underlying variable such as frequency, familiarity or imageability (a full account is provided in Brown and Watson (1987)).

In the current data, imageability and age of acquisition inter-correlate ($r = -.532$, $n = 186$, $p < .01$). This suggests that the effect of age of acquisition in the current data might be a possible effect of imageability.

To identify whether there was an independent effect of age of acquisition, a hierarchical multiple regression was conducted. Naming latency was set as the dependent variable. Age of acquisition was entered into the first block and imageability into the second one. This method of entry controls for the possible effect of imageability on age of acquisition's prediction of naming latency. The model explained 22.4 % ($R^2 = .224$; $.224 \times 100 = 22.4$) of the variance in naming latency. The overall model was significant ($F(2, 183) = 26.48$, $p < .000$). Results showed that age of acquisition significantly predicted naming latency ($\beta = .155$; $t(186) = 2.02$, $p < .05$). Imageability also significantly predicted naming latency ($\beta = -.373$; $t(186) = -4.84$, $p < .05$). These results suggest that age of acquisition was still able to significantly predict naming latency when imageability was controlled for. Age of acquisition was therefore an independent predictor of speed of naming.

Discussion

Norms for name agreement, naming latency, visual complexity, age of acquisition and imageability were established for a set of 186 items. The dataset included orthographic frequency and variables which are intrinsic features of items (can be determined directly from their surface structure): gender, rationality, pluralisation, and number of phonemes. The normative database developed in this study is the first linguistically and culturally appropriate dataset for Arabic.

Bonin et al. (2003) stated that in languages in which normative databases are not available, researchers are faced with the problem of finding standardised pictorial stimuli for experiments. In the absence of standardised normative datasets, investigators are likely to develop their own picture sets that are highly idiosyncratic (Alario and Ferrand 1999). This results in difficulty comparing results between studies, and in the use of pictures that are not matched for relevant variables which could affect the conclusions drawn from these studies.

The newly developed database contributes to psycholinguistic research and experiments involving pictorial materials for the Arabic language. It enables researchers to control the experimental situation by matching pictures across variables in experimental studies. This, in turn, enables investigators to draw accurate conclusions which are not biased by the use of non-standardised pictures. Furthermore, it forms a basis from which clinicians can select stimuli for picture naming tests. The fact that norms for naming latency and accuracy are available enables clinicians to compare participants' performance to the norm.

Imageability and age of acquisition influenced healthy spoken naming. Words with higher ratings of imageability were retrieved faster than words with low imageability ratings. This effect can be interpreted within two major frameworks. Words with higher imageability have richer semantic representations, which makes them faster to retrieve (Plaut and Shallice 1993). An alternative interpretation is that words with higher imageability are coded using both a verbal and a non-verbal code and hence faster to retrieve than words with low imageability which are coded using the verbal code only (Paivio 1991).

The current findings suggest that imageability has a robust influence on picture naming in healthy Arabic speakers. These findings are consistent with findings from English (Barry et al. 1997; Gilhooly and Logie 1980) and French (Bonin et al. 2003), but incompatible with Morrison et al. (1992) who investigated the effect of rated imageability (from the Medical Research Council database) of English words on the speed of naming and found that imageability was not a significant predictor of healthy naming speed for the dataset in question.

Words learned at a later age took longer to retrieve than ones learned at an early age. This effect can be understood within the 'phonological completeness hypothesis' proposed by Brown and Watson (1987). According to this hypothesis, early acquired words have more unitary phonological representations than words acquired at a later age. This strong phonological representation could be attributed to the frequency factor i.e. early acquired words are more frequent than late acquired ones (Ellis and Lambon Ralph 2000; Morrison et al. 1992). Alternatively, the effect of age of acquisition may reflect the fact that early acquired words tend to be highly imageable, highly frequent, short, highly familiar and concrete (Nickels 1997), and therefore more accessible and faster to retrieve.

The current findings supported previous studies in which age of acquisition has been found to significantly contribute to naming latencies in a number of languages (Belgian Dutch: Severens et al. 2005; English: Barry et al. 1997; Brysbaert 1996; Caroll and White 1973; Gilhooly and Gilhooiy 1979; Lachman et al. 1974; French: Bonin et al. 2002 and 2003; Icelandic: Pind and Tryggvadottir 2002).

Visual complexity, name agreement, length, gender, plural type and rationality did not affect naming in healthy speakers. The lack of visual complexity effect on spoken naming in healthy speakers is consistent with findings from English (Barry et al. 1997), French (Bonin et al. 2002 and 2003), Bulgarian, Chinese (Mandarin), German, Hungarian, Italian and Spanish (Bates et al. 2003), which argued that the effect of visual complexity of pictures on naming speed is not consistent in healthy populations. However, this was incompatible with proposals from other studies (Hartje et al. 1986; Humphreys et al. 1988; Ellis and Morrison 1998), which maintained that visual complexity contributed to the degree of ease of visual recognition and thus to naming speed in healthy picture naming. The lack of a visual complexity effect on naming in Arabic could be attributed to either theoretical or methodological factors. The current finding could be understood within previous proposals which suggested that influence of visual complexity on naming latencies from healthy speakers is not robust (e.g. Bates et al. 2003). An alternative interpretation stems from methodological attributes. As seen in the results section, visual complexity ratings for the pictures in question were skewed towards the lower end of the scale; 94 % of the pictures were rated as simple for visual complexity. Even after dichotomizing the visual complexity ratings, 122 (66 %) items were rated one, and 64 (34 %) items were rated two on the binominal visual complexity scale. The restricted range of visual complexity may have contributed to the absence of visual complexity effect on spoken naming from pictorial stimuli.

The lack of name agreement effect on healthy naming in Arabic contrasts with findings from previous studies in which name agreement has been found to be a significant predictor of naming latencies in Belgian Dutch (Severens et al. 2005), English (Ellis and Morrison 1998; Gilhooly and Gilhooiy 1979; Vitkovitch and Tyrrell 1995), French (Alario and Ferrand 1999; Bonin et al. 2002 and 2003) and Icelandic. Furthermore, in a study conducted by Bates et al. (2003) name agreement influenced naming latencies in Bulgarian, Chinese, English, German, Hungarian, Italian and Spanish. The restricted range of name agreement variance could have resulted in a methodological implication which can be understood within the theoretical framework proposed by Vitkovitch and Tyrrell (1995). They attributed the name agreement effect to competition between alternative correct names on a structural representation level. They suggested that longer naming latencies for words with low name agreement are the result of selecting from multiple choices of alternative correct names when accessing the structural representations of the target word. The incompatibility between the current findings and cross-linguistic findings may be attributed to the fact that 142/186 (76 %) of the items in the current study had 100 % name agreement across participants. The fact that there were, in effect, no competitors for 76 % of the items could have resulted in restricted variance of naming latency, which further resulted in the absence of an effect of name agreement on spoken naming in the current set of data.

The lack of length effect on naming in Arabic is consistent with the common assumption which suggests that word length does not contribute to picture naming in healthy speakers (e.g. Belgian Dutch: Severens et al. 2005; Chinese Mandarin: Bates et al. 2003; English: Barry et al. 1997; Morrison et al. 1992; French: Bonin et al. 2002, 2003). Studies that found an effect of word length on naming speed in healthy speakers have been limited (English: Santiago et al. 2000; Spanish: Bates et al. 2003).

The fact that gender, plural type and rationality (morpho-syntactic features) did not show an effect on naming latency suggests that healthy speakers retrieve nouns in bare forms without activating lexical syntactic nodes during naming in Arabic, which is in agreement with previous findings from Heij et al. (1998); Schriefers (1993) and Vigliocco et al. (2004). Previous studies investigating the 'critical variable approach' (Shallice 1988) did not include these variables as predictors of successful naming. Therefore, results to which the current data can be compared are not available.

Visual complexity, imageability and name agreement had a restricted range of items. Most of the items in the dataset had low visual complexity ratings and high name agreement. Imageability had restricted range due to the fact that pictureable objects are necessarily highly imageable (Nickels and Howard 1995). The restricted range of items may have affected visual complexity and name agreement results as they failed to predict naming latency, which is inconsistent with findings from a number of languages. However, imageability was still able to predict naming latency despite the restricted range of items with low imageability ratings. This dissociation is an indicator of the robustness of the imageability effect on picture naming.

Conclusion

This study provides researchers and clinicians with a database of 186 picture, and variables affecting lexical retrieval in Levantine Arabic. Most studies investigating lexical processing use picture naming tasks, and need such a normative database from which they select their stimuli. The normative database is available for the use of clinicians and researchers in the Arab world in the domains of speech and language pathology, neurolinguistics and psycholinguistics. Furthermore, this study showed that research into Arabic replicated findings from previous research into other languages. Age of acquisition and imageability were the only two variables that recurred across studies from different languages. These two variables were the only significant predictors of naming in Arabic healthy speakers, which is an indicator to the robustness of their influence on lexical retrieval.

Limitations and Recommendations

This study was conducted in a non-Arabic speaking country, which restricted the number of participants. Future studies collecting normative data for Arabic should include bigger sample sizes of speakers of Arabic. In the developed dataset, it was not possible to compare objective counts of age of acquisition to subjective rated age of acquisition, since databases of corpus counts do not exist for Arabic. Moreover, it is acknowledged that there are more highly imageable items than lower imageable ones. The aim of the current study was to develop a database for words and their photographic representations, therefore abstract concepts were excluded from the study since it is difficult to depict them in an image. However, there was a substantial number of nouns with lower imageability in the original set of 235 items, but due to name disagreement and false triggering, 49 nouns and their photographic representations were removed from the dataset, leaving 186 items in the dataset. The removed nouns included 21 nouns with medium and low imageability ratings. The limited number of rational nouns compared to irrational nouns in the database is due to culture-and-language-specific features of the Arabic Language. One of the linguistic individualities of Arabic is rational nouns that refer to beings that reason, including human, deities and the devil. The number of nouns that refer to human beings such as 'father' 'mother', 'engineer', 'doctor' 'boy' and 'girl' is limited in any given language, some of the nouns that refer to human beings are difficult to depict in an image such 'uncle' and 'aunt'. This restricted our options. It was not possible to include deities and the devil related nouns in the dataset, as photographic representation for such entities is taboo in Islam and unacceptable in the Arabic culture from which all of our participant were.

Appendix A

The normative database for Arabic nouns (186 items)

Number	Word /Picture	Arabic form	Gender	Animacy	Rationality	Pluralisation	Sun/moon phonemes	Number of syllables	number of phonemes	Frequency	Name agreement	Visual Complexity		Age of Acquisition		Imageability		Naming latency	
a	*B*	*c*	*d*	*e*	*f*	*g*	*h*	*i*	*j*	*k*	*l*	*m*	*n*	*o*	*p*	*q*	*r*	*s*	*t*
												Mean	**STD**	**Mean**	**STD**	**Mean**	**STD**	**Mean**	**STD**
1	Airplane	طياره	F	I	IR	S	S	3	6	75.63	1	1.09	0.29	2.57	1.16	6.60	0.63	1206.32	246.38
2	Ant	نمله	F	A	IR	S	S	2	5	0.23	1	1.36	0.79	1.83	0.58	6.60	1.06	1613.23	554.08
3	Apple	تفاحة	F	I	IR	B	S	3	6	0.78	1	1.00	0.00	1.87	0.46	6.87	0.35	1223.86	223.25
4	Ashtray	مكتّه	F	I	IR	S	M	3	6	0.10	1	1.00	0.00	2.87	1.25	6.53	0.52	1651.36	511.36
5	Bag	شنطه	F	I	IR	B	S	2	5	0.44	1	1.09	0.29	2.87	0.87	6.53	0.64	2490.18	140.22
6	Ball	طابه	F	I	IR	S	S	2	4	65.93	1	1.09	0.29	1.74	0.92	6.60	0.63	1645.95	570.29
7	Banana	موزه	F	I	IR	S	M	2	4	0.75	1	1.05	0.21	2.22	0.60	6.53	0.83	1143.77	193.74
8	Bike	بسكليته	F	I	IR	S	M	4	9	2.78	0.96	1.32	0.65	1.74	0.54	6.80	0.41	1748.86	673.27
9	Bone	عظمه	F	I	IR	B	M	2	5	5.36	1	1.00	0.00	1.87	0.87	6.80	0.41	1210.73	305.40
10	Bottle	قنينه	F	I	IR	B	M	3	6	2.89	1	1.91	0.53	3.35	1.11	6.40	0.83	1389.82	323.99
11	Bowl	زبديه	F	I	IR	B	S	3	7	1.87	0.96	1.18	0.39	2.57	1.04	6.60	0.63	1792.41	860.25
12	Bride	عروس	F	A	R	B	M	2	5	19.92	1	1.05	0.21	2.00	0.85	6.80	0.41	1267.95	246.76
13	Broom	مقشه	F	I	IR	S	M	3	6	0.29	1	1.18	0.50	2.39	0.84	6.33	0.82	1344.27	332.04
14	Brush	فرشايه	F	I	IR	B	M	3	7	0.81	1	1.00	0.00	3.00	0.74	6.27	0.70	1725.32	380.41
15	Building	عمارة	F	I	IR	S	M	3	6	17.17	1	1.05	0.21	2.48	0.51	6.47	0.83	1454.36	357.65
16	Bulb	لمبه	F	I	IR	S	S	2	5	0.60	1	1.05	0.21	1.74	0.54	6.87	0.35	1323.68	278.11
17	Butterfly	فراشه	F	A	IR	S	M	2	6	1.25	1	1.09	0.29	2.30	0.70	6.80	0.41	1482.09	369.73
18	Camera	كاميرا	F	I	IR	S	M	3	6	4.40	1	1.05	0.21	2.13	0.46	6.80	0.56	1305.27	158.22
19	Candle	شمعه	F	I	IR	S	S	2	5	2.52	1	1.05	0.21	2.52	1.04	6.60	0.63	1726.41	470.14
20	Car	سياره	F	I	IR	S	S	3	5	84.03	0.96	1.18	0.50	2.48	0.90	6.27	0.88	2503.32	362.67
21	Cat	قطه	F	A	IR	B	M	2	6	0.96	1	1.14	0.35	1.43	0.51	6.60	0.74	1516.95	420.38
22	Chicha	أرجيله	F	I	IR	B	M	3	6	0.21	1	1.05	0.21	2.26	0.81	6.33	1.11	1492.64	102.21
23	Chicken	جاجه	F	A	IR	S	M	2	4	0.75	1	1.41	0.50	3.22	0.80	6.40	0.74	1396.45	604.80
24	Cigarette	سيجاره	F	I	IR	B	S	3	6	3.98	1	1.14	0.47	2.74	1.25	6.53	0.64	1509.91	341.37
25	coffee jug	دله	F	I	IR	B	S	2	4	2.68	1	1.05	0.21	2.78	0.80	6.33	0.72	1814.23	748.77
26	Cow	بقره	F	A	IR	S	M	3	6	1.51	1	1.45	0.51	2.91	1.24	6.13	0.52	1560.77	437.38
27	Dancer	رقاصه	F	A	R	S	S	3	6	3.17	1	1.00	0.00	2.35	0.78	6.67	0.62	1451.86	476.81
28	doctor (female)	دكتوره	F	A	R	S	S	3	7	1.20	1	1.00	0.00	2.65	1.19	6.40	1.12	1676.23	335.08
29	Doll	لعبه	F	I	IR	B	S	2	5	33.3	1	1.05	0.21	2.26	0.75	6.93	0.26	1385.77	252.10
30	Egg	بيضه	F	I	IR	B	M	2	4	2.55	1	1.32	0.57	2.87	1.01	6.27	0.80	1431.27	387.79
31	Fan	مروّحه	F	I	IR	B	M	3	7	0.44	1	1.00	0.00	2.13	0.81	6.67	0.62	1317.82	381.39
32	Feather	ريشه	F	I	IR	B	S	2	4	2.52	1	1.05	0.21	2.70	1.18	6.80	0.41	1196.27	202.39
33	Fish	سمكه	F	A	IR	S	S	3	6	2.03	1	1.00	0.00	3.26	1.10	6.47	0.64	1160.27	123.66
34	Flower	ورده	F	I	IR	S	M	2	5	5.20	1	1.00	0.00	2.48	0.95	6.73	0.46	1449.91	251.90
35	Fork	شوكة	F	I	IR	B	S	2	4	2.68	0.96	1.09	0.29	1.91	0.51	6.80	0.41	1257.00	409.83
36	Fountain	نافورة	F	I	IR	B	S	3	6	1.07	1	2.32	0.89	3.17	0.94	5.80	1.01	2037.86	430.34
37	Giraffe	زرافه	F	A	IR	S	S	3	6	0.10	1	1.05	0.21	2.04	0.77	6.87	0.35	1437.86	450.10
38	Girl	بنت	F	A	R	S	M	1	4	9.32	1	1.00	0.00	3.09	1.62	6.53	0.64	1209.86	277.31
39	Glass	كاسه	F	I	IR	S	M	2	4	4.41	0.96	1.05	0.21	3.09	1.50	6.53	1.13	1583.09	587.75
40	Glove	كفة	F	I	IR	B	M	2	4	0.31	1	1.09	0.43	2.43	1.16	6.80	0.41	1333.18	229.07
41	Hanger	عُلّاقه	F	I	IR	S	M	3	6	2.21	0.96	1.09	0.43	2.78	1.13	6.73	0.59	1836.59	412.12
42	Hat	طاقيه	F	I	IR	B	S	3	5	1.82	1	1.68	0.99	2.87	0.87	6.27	0.70	2457.32	849.09
43	Heater	صوبه	F	I	IR	S	S	2	4	0.26	1	1.45	0.74	2.52	0.85	6.53	0.83	2118.95	719.68
44	Iron	مكوايه	F	I	IR	B	M	3	7	0.08	1	1.27	0.77	3.43	2.11	6.80	0.41	1388.05	728.16
45	Jumper	بلوزه	F	I	IR	B	M	2	5	1.56	0.96	1.32	0.57	4.57	1.62	6.53	0.74	1555.14	642.39
46	Knife	سكينه	F	I	IR	B	S	3	6	1.64	1	1.27	0.46	2.96	1.02	6.33	0.72	2130.55	1205.20
47	Lemon	ليمونه	F	I	IR	S	S	3	6	0.29	0.96	1.05	0.21	2.17	0.78	6.80	0.41	1595.41	668.05
48	Lighter	قداحة	F	I	IR	S	M	3	6	0.13	0.96	1.59	0.73	2.83	1.07	6.27	0.80	1501.05	495.62
49	Match	كبريته	F	I	IR	S	M	3	7	0.62	1	1.27	0.55	2.57	0.84	6.47	0.64	1547.00	478.32
50	Medal	ميدالية	F	I	IR	S	M	4	7	0.08	1	1.41	0.59	3.17	1.44	6.20	1.08	1589.00	434.81
51	mirror	مراي	F	I	IR	S	M	3	5	0.18	0.96	1.14	0.47	3.57	1.08	6.13	0.92	1717.86	652.14
52	needle	إبره	F	I	IR	B	M	2	4	0.23	1	1.09	0.29	2.61	1.23	6.67	0.72	1790.77	706.67
53	nurse	مُمرضه	F	A	R	S	M	4	8	0.16	1	1.00	0.00	2.39	0.66	6.60	0.51	1623.59	490.47
54	orange	بردقانه	F	I	IR	S	M	4	9	0.23	1	1.09	0.29	1.96	0.64	6.53	0.64	1423.45	393.36
55	owl	بومه	F	A	IR	S	M	2	4	0.10	1	1.27	0.55	1.65	0.57	6.67	0.62	1631.36	1432.50
56	palm	نخلة	F	I	IR	S	S	2	5	3.04	1	1.09	0.29	1.74	0.81	6.00	1.13	1505.09	473.37
57	pear	نجاصه	F	I	IR	S	S	3	5	0.03	1	1.00	0.00	1.74	0.62	6.73	0.59	1376.18	326.98
58	pigeon	حمامه	F	A	IR	S	M	3	6	3.43	1	1.09	0.29	2.13	1.10	6.73	0.46	1317.09	297.39
59	pillow	وساده	F	I	IR	B	M	3	6	1.33	1	1.18	0.50	2.35	0.71	6.67	0.62	1673.73	665.27
60	pineapple	أناناس	F	I	IR	NC	M	3	6	0.03	1	1.05	0.21	1.83	0.72	6.67	0.49	1760.50	1498.95
61	pocket	جيبه	F	I	IR	B	M	2	4	9.00	1	3.05	1.73	2.52	0.79	6.07	1.44	1784.95	839.89
62	policewoman	شرطيه	F	A	R	S	S	3	6	0.73	0.96	1.09	0.29	2.78	0.74	6.60	0.63	1396.36	479.29
63	potato	بطاطا	F	I	IR	NC	M	3	6	0.44	1	1.23	0.43	3.17	0.83	6.40	0.63	1338.18	306.37
64	queen	ملكه	F	A	R	S	M	3	6	10.33	1	1.05	0.21	2.61	0.89	6.60	0.74	1356.68	454.32
65	refrigerator	ثلاجه	F	I	IR	S	S	3	6	1.14	0.96	1.32	0.57	1.96	0.71	6.53	0.64	1358.82	427.22
66	rosary	مسبحه	F	I	IR	B	M	3	7	0.44	1	1.86	0.77	1.83	0.65	6.47	0.74	1563.91	888.86
67	ruler	مسطره	F	I	IR	B	M	3	7	0.39	1	1.18	0.59	2.09	0.67	6.80	0.41	1168.14	157.30
68	safe	قاصه	F	I	IR	S	M	2	4	0.03	1	1.05	0.21	2.35	0.83	6.53	0.64	1221.00	277.69
69	saucepan	طنجره	F	I	IR	B	S	3	7	0.13	1	1.05	0.21	2.17	0.49	6.60	0.63	1518.09	582.37
70	scorpion	عقربه	F	A	IR	B	M	3	7	0.60	1	1.23	0.43	3.17	1.40	6.47	0.64	1536.41	446.97
71	ship	سفينه	F	I	IR	B	S	3	6	21.2	0.96	1.00	0.00	2.48	0.90	6.47	0.74	1399.18	423.65
72	singer (female)	مغنيه	F	A	R	S	M	4	7	1.90	1	1.00	0.00	2.91	1.00	6.07	0.96	1492.18	846.04
73	sink	مغسله	F	I	IR	B	M	3	7	0.18	1	1.64	0.85	2.83	0.83	6.13	1.25	1578.77	918.87
74	skirt	تنوره	F	I	IR	B	S	3	6	1.35	1	1.09	0.29	2.22	0.90	6.80	0.56	1282.55	231.76
75	snake	حيّه	F	A	IR	B	M	1	4	0.18	1	1.05	0.21	1.91	0.79	6.60	0.74	1494.32	558.76
76	sock	جرابه	F	I	IR	S	M	2	5	0.19	0.96	1.00	0.00	2.43	1.20	6.53	0.83	1786.36	968.19
77	sofa	كنبه	F	I	IR	S	M	3	6	0.42	0.96	1.55	0.60	3.30	1.29	5.87	0.92	1586.59	468.75
78	speaker	سماعه	F	I	IR	S	S	3	6	1.33	1	1.09	0.29	3.00	1.28	6.53	0.64	1642.00	800.71
79	sponge	ليفه	F	I	IR	B	S	2	4	0.08	1	1.45	0.86	3.26	0.92	6.13	0.74	3228.09	1380.23
80	spoon	معلقه	F	I	IR	B	M	3	7	0.52	1	1.05	0.21	2.39	0.72	6.60	0.63	1709.59	742.28
81	star	نجمه	F	I	IR	B	S	2	5	6.24	1	1.05	0.21	2.39	1.08	5.93	1.16	1906.41	885.03
82	table	طاوله	F	I	IR	S	S	2	5	12.74	1	1.23	0.43	2.48	0.99	6.47	0.74	1362.82	378.57
83	tank	دبابة	F	I	IR	S	S	3	6	7.98	1	1.05	0.21	1.70	0.47	6.80	0.41	1310.59	313.50
84	tap	حنفيه	F	I	IR	S	M	4	8	0.23	1	1.05	0.21	2.35	1.07	6.80	0.41	1532.27	440.03
85	taxi	تكسي	F	I	IR	B	S	2	4	2.21	1	1.05	0.21	3.09	0.73	6.53	0.74	1722.59	626.04
86	taylor	خيّاطه	F	A	R	S	M	3	6	3.12	1	1.09	0.29	2.35	0.98	6.73	0.59	1363.59	315.51
87	teacher (female)	معلمه	F	A	R	S	M	4	8	0.70	0.96	1.59	0.67	4.26	1.10	5.93	0.70	2359.55	118.68
88	tie	قرافة	F	I	IR	S	M	2	5	0.05	1	1.18	0.50	2.13	0.76	6.67	0.62	1838.23	620.23
89	tin	علبه	F	I	IR	B	M	2	5	5.64	1	1.27	0.77	2.30	0.63	6.60	0.91	1777.50	815.32
90	tray	صينيه	F	I	IR	B	S	3	5	7.00	1	1.09	0.29	2.13	0.63	6.80	0.41	1191.95	192.77
91	tree	شجرة	F	I	IR	S	S	3	6	16.59	1	1.05	0.21	2.04	0.77	6.87	0.35	1312.64	548.42
92	truck	شاحنة	F	I	IR	S	S	3	6	7.72	1	1.00	0.00	2.35	0.57	6.47	0.64	1533.50	1045.21
93	umbrella	شمسيه	F	I	IR	B	S	3	6	1.07	1	1.00	0.00	2.17	0.49	6.93	0.26	1494.95	602.16
94	washing machine	غساله	F	I	IR	S	M	3	8	0.52	1	1.00	0.00	3.00	0.90	6.67	0.62	1520.27	415.30
95	watch	ساعه	F	I	IR	S	S	2	4	117.6	1	1.00	0.00	2.43	0.79	6.67	0.72	1225.55	197.50
96	watermelon	بطيخه	F	I	IR	S	M	3	6	0.16	0.96	1.45	0.51	2.00	0.74	6.53	0.52	1788.27	488.85
97	worm	دوده	F	A	IR	B	S	2	4	1.07	1	1.09	0.29	2.39	0.99	6.60	0.51	1753.55	556.99
98	axe	فأس	M	I	IR	B	M	1	3	0.21	1	1.09	0.29	3.04	0.71	5.93	0.80	1629.05	736.51
99	baby	طفل	M	A	R	B	S	1	4	23.02	1	1.09	0.43	3.30	0.82	6.53	0.64	1531.95	455.76
100	barrel	برميل	M	I	IR	B	M	2	6	78.00	1	1.00	0.00	1.96	0.64	6.80	0.41	1528.32	643.62
101	bath	بانيو	M	I	IR	B	M	2	5	25.35	1	1.00	0.00	2.09	0.85	6.47	0.74	1370.05	201.84
102	bed	تخت	M	I	IR	B	S	1	4	7.80	0.96	2.00	0.82	2.30	0.82	6.67	0.49	1754.86	473.70
103	bell	جرس	M	I	IR	B	M	2	5	3.49	1	1.27	0.55	3.30	1.02	6.13	1.19	1865.09	1040.58
104	belt	زنار	M	I	IR	B	S	2	5	3.90	1	1.05	0.21	1.96	0.64	6.67	0.72	1369.73	294.60
105	bird	عصفور	M	A	IR	B	M	2	6	6.28	0.96	1.09	0.29	2.52	0.95	6.40	0.74	1933.14	753.24
106	book	كتاب	M	I	IR	B	M	2	4	152.85	1	1.64	0.58	2.04	0.56	6.67	0.62	1847.68	975.98
107	boy	ولد	M	A	R	B	M	2	5	167.80	1	1.05	0.21	2.30	0.63	6.20	1.15	1456.68	343.01
108	bridge	جسر	M	I	IR	B	S	1	4	14.3	1	2.00	0.62	2.74	0.69	6.07	0.59	1664.27	662.31
109	bull	ثور	M	A	IR	B	S	1	3	0.88	1	1.00	0.00	2.17	0.98	6.67	0.62	1656.68	1163.49

110	bus	باص	M	I	IR	B	M	1	3	7.78	1	1.18	0.50	3.78	1.28	6.53	0.83	1396.45	445.32
111	butcher	لحّام	M	A	R	S	S	2	6	3.45	0.96	1.68	0.84	2.91	0.90	5.93	1.16	2305.41	1347.18
112	camel	جمل	M	A	IR	B	M	2	5	2.94	1	1.09	0.29	2.74	0.86	6.33	1.11	1363.95	217.02
113	carpenter	نجّار	M	A	R	S	S	2	6	2.21	1	1.05	0.21	1.87	0.46	6.67	0.62	1261.27	258.89
114	column	عامود	M	I	IR	B	M	2	5	0.39	1	1.00	0.00	2.70	1.11	6.60	0.51	1595.23	483.40
115	comb	مشط	M	I	IR	B	M	1	4	3.65	1	1.00	0.00	1.91	0.51	6.87	0.35	1270.32	309.34
116	computer	كمبيوتر	M	I	IR	B	M	3	8	6.92	0.96	1.36	0.49	3.09	1.00	6.53	0.74	1894.32	543.40
117	cook	طبّاخ	M	A	R	S	S	2	6	0.23	1	1.05	0.21	3.30	1.18	5.53	1.30	1428.32	491.38
118	corn	ذره	M	I	IR	B	S	2	4	0.05	0.96	1.00	0.00	2.04	0.64	6.80	0.41	1818.09	1857.69
119	crown	تاج	M	I	IR	B	S	1	3	0.03	0.96	1.05	0.21	2.17	1.07	6.73	0.59	1373.09	320.41
120	cup	فنجان	M	I	IR	B	M	2	6	11.18	0.96	1.00	0.00	3.65	1.56	6.27	1.03	1834.36	1861.18
121	deer	غزال	M	A	IR	B	M	2	5	1.64	1	1.09	0.29	1.74	0.45	6.87	0.35	1163.32	160.27
122	doctor (male)	دكتور	M	A	R	B	S	2	6	18.21	0.96	1.27	0.55	3.17	0.89	6.53	0.74	2318.68	1513.47
123	dog	كلب	M	A	IR	B	M	1	4	2.94	0.96	1.23	0.43	2.30	1.06	6.00	1.00	1587.23	413.20
124	donkey	حمار	M	A	IR	B	M	1	4	1.69	1	2.59	0.73	4.09	1.08	5.67	0.72	1714.45	668.73
125	door	باب	M	I	IR	B	M	1	3	77.84	1	1.00	0.00	2.30	0.76	6.73	0.46	1448.86	691.85
126	drawer	درُج	M	I	IR	B	S	1	5	3.69	0.96	1.45	0.60	2.74	0.96	6.20	0.77	1714.32	473.02
127	dress	ثوب	M	I	IR	B	S	1	3	4.66	1	1.00	0.00	2.09	0.51	6.93	0.26	1298.27	221.36
128	elephant	فيل	M	A	IR	B	M	1	3	2.42	1	1.05	0.21	2.22	0.67	6.33	0.98	1402.09	698.74
129	envelope	مُغلف	M	I	IR	B	M	3	7	0.68	1	1.64	0.90	2.96	0.98	6.33	0.72	1733.41	427.86
130	finger	إصبع	M	I	IR	B	M	2	5	1.09	1	1.00	0.00	2.35	1.23	6.80	0.56	1225.68	213.22
131	flag	عَلم	M	I	IR	B	M	2	5	8.53	0.96	1.86	0.47	2.74	0.86	6.53	0.64	1423.36	352.23
132	football player	لاعب	M	A	R	B	M	2	5	46.97	1	1.14	0.47	3.26	1.21	6.33	0.82	1517.64	420.16
133	frog	ضفدع	M	A	IR	B	M	2	6	0.13	0.96	1.09	0.29	2.74	0.81	6.73	0.46	1819.27	1851.23
134	gun	مُسدس	M	I	IR	B	M	3	7	2.73	1	1.00	0.00	2.35	0.57	6.87	0.52	1244.73	364.25
135	hammer	شاكوش	M	I	IR	B	S	2	5	0.21	0.96	1.59	0.91	4.13	1.18	5.73	0.96	2482.00	2362.24
136	horse	حصان	M	A	IR	B	M	2	4	4.58	0.96	1.09	0.43	2.52	0.79	6.67	0.62	1755.59	1876.41
137	house	بيت	M	I	IR	B	M	1	3	100.24	1	1.00	0.00	2.22	0.60	6.80	0.41	1498.59	590.40
138	Imam	إمام	M	A	R	B	M	2	4	29.34	1	1.05	0.21	2.91	0.85	6.20	1.15	1939.64	1214.38
139	jacket	جاكيت	M	I	IR	B	M	2	5	1.51	1	1.09	0.43	2.87	0.97	6.47	0.83	1660.05	997.79
140	judge	قاضي	M	A	R	B	M	2	4	13.84	1	1.09	0.29	2.96	0.93	6.87	0.35	1843.23	1373.91
141	kettle	إبريق	M	I	IR	B	M	2	5	2.21	0.96	1.86	0.47	2.78	0.85	6.47	0.64	2363.09	1373.70
142	key	مفتاح	M	I	IR	B	M	2	6	13.76	1	1.09	0.29	2.39	0.58	6.47	0.74	1700.05	614.72
143	ladder	سلم	M	I	IR	B	S	2	5	29.05	1	1.18	0.39	2.30	0.76	6.73	0.59	1339.36	316.27
144	lion	أسد	M	A	IR	B	M	2	4	0.60	1	1.14	0.35	3.43	1.27	6.27	0.70	2433.14	1541.10
145	man	زلمه	M	A	R	B	S	3	6	112.18	1	1.09	0.29	2.91	0.67	6.40	0.63	1367.32	301.22
146	microphone	ميكروفون	M	I	IR	B	M	3	8	1.12	0.96	1.14	0.47	3.17	0.94	6.73	0.46	1457.45	302.77
147	monkey	قرد	M	A	IR	B	M	1	4	0.47	0.96	1.05	0.21	2.48	1.24	6.47	0.74	1396.36	297.26
148	mosque	مسجد	M	I	IR	B	M	2	6	23.77	1	1.05	0.21	2.74	1.14	6.47	0.74	1827.50	980.43
149	motorcycle	ماتور	M	I	IR	B	M	2	5	5.12	1	1.45	0.96	2.74	0.96	6.13	1.13	1884.45	592.40
150	mouse	فار	M	A	IR	B	M	1	3	0.70	0.96	1.05	0.21	2.26	0.54	6.40	0.91	1266.91	238.59
151	necklace	سلسال	M	I	IR	B	S	2	6	0.03	0.96	1.09	0.29	2.09	0.67	6.53	0.64	1655.45	371.87
152	nest	عِش	M	I	IR	B	M	1	3	1.69	0.96	1.09	0.43	2.35	0.71	6.73	0.70	1470.41	305.01
153	oud	عود	M	I	IR	B	M	1	3	3.38	1	2.41	0.80	2.78	1.17	6.27	0.80	1760.50	678.24
154	pants	بنطلون	M	I	IR	B	M	3	8	3.25	1	1.73	0.94	3.26	0.92	6.20	0.86	1886.77	494.18
155	pen	قلم	M	I	IR	B	M	2	5	5.33	1	1.18	0.39	2.48	0.79	6.40	0.91	1839.27	752.06
156	pick-up	بك أب	M	I	IR	B	M	2	5	7.72	1	1.18	0.39	2.61	0.89	6.67	0.82	1828.73	1111.86
157	pig	خنزير	M	A	IR	B	M	2	6	0.42	1	1.00	0.00	1.91	0.60	6.60	1.06	1508.27	741.69
158	plate	صحن	M	I	IR	B	S	2	4	5.72	1	1.05	0.21	2.65	1.34	6.60	0.74	1641.32	1464.64
159	plug	فيش	M	I	IR	B	M	1	3	1.02	0.96	1.91	1.06	2.65	0.98	5.27	0.88	1501.09	372.04
160	quran	قرآن	M	I	IR	B	M	2	6	4.30	0.96	1.00	0.00	2.26	0.92	6.80	0.41	1404.45	509.10
161	rabbit	أرنب	M	A	IR	B	M	2	5	0.05	1	1.09	0.29	3.43	1.34	6.13	1.36	1381.23	393.91
162	radio	رادو	M	I	IR	B	S	2	4	0.78	1	1.09	0.29	2.39	0.94	6.40	0.83	1707.95	968.93
163	ring	خاتم	M	I	IR	B	M	2	5	2.18	0.96	1.05	0.21	2.78	0.85	6.53	0.74	1446.50	309.20
164	rocket	صاروخ	M	I	IR	B	S	2	5	9.62	1	1.00	0.00	2.61	0.94	6.53	0.74	1487.23	322.20
165	scissors	مقص	M	I	IR	B	M	2	5	1.74	1	1.23	0.43	3.43	0.95	6.80	0.56	1281.14	186.27
166	screw	بُرغي	M	I	IR	B	M	2	5	0.16	1	1.09	0.29	2.91	0.90	6.40	0.63	1701.14	623.15
167	screwdriver	مفك	M	I	IR	B	M	2	5	0.46	1	1.00	0.00	2.57	0.66	6.33	0.62	1502.77	299.92
168	Sheikh	شيخ	M	A	R	B	S	1	3	23.77	1	1.09	0.29	2.61	0.50	6.53	0.52	1614.14	600.19
169	shirt	قميص	M	I	IR	B	M	2	5	2.11	1	1.00	0.00	2.61	0.99	6.67	0.82	1173.64	262.79
170	shovel	كريك	M	I	IR	B	M	1	4	0.36	1	1.05	0.21	4.00	1.48	6.13	1.30	1630.59	782.27
171	singer (male)	مُغني	M	A	R	S	M	3	6	1.25	1	1.14	0.35	2.48	0.95	5.80	0.86	1677.05	611.98
172	sleeve	كُم	M	I	IR	B	M	1	3	4.70	1	1.09	0.29	2.39	0.78	6.53	0.74	2414.86	1407.31
173	soldier	جندي	M	A	R	B	M	2	5	38.60	1	1.14	0.47	3.30	1.22	5.93	1.22	2392.09	1760.47
174	spider	عنكبوت	M	A	IR	B	M	3	8	0.34	1	1.68	0.57	2.39	1.16	6.13	1.13	1362.14	317.89
175	stove	غاز	M	I	IR	B	M	1	3	2.66	0.96	1.32	0.78	2.57	0.73	6.60	0.63	2507.55	2127.83
176	tape	شريط	M	I	IR	B	S	2	5	13.60	1	1.09	0.43	2.09	1.16	6.60	0.74	1321.77	629.41
177	Tape-recorder	مُسجل	M	I	IR	B	M	3	7	3.98	1	1.36	0.49	3.30	1.26	6.53	0.83	1661.73	765.96
178	teacher (male)	مُعلم	M	A	R	S	M	3	7	4.99	0.96	1.05	0.21	2.57	0.90	6.80	0.41	1409.77	449.91
179	telephone	تلفون	M	I	IR	B	S	3	7	6.14	0.96	1.36	0.66	2.78	1.04	6.07	1.22	1646.09	478.05
180	tiger	نمر	M	A	IR	B	S	1	5	12.43	1	1.05	0.21	2.83	0.78	6.73	0.70	1384.41	287.62
181	tractor	تركتر	M	I	IR	B	S	3	8	0.88	1	1.00	0.00	2.26	0.62	6.87	0.35	1184.77	298.91
182	train	قطار	M	I	IR	B	M	2	5	12.25	1	1.00	0.00	2.00	0.60	6.87	0.35	1294.05	320.71
183	wallet	جزدان	M	I	IR	B	M	3	6	3.64	1	1.09	0.29	2.43	0.95	6.80	0.56	1344.68	235.48
184	wheel	عَجَل	M	I	IR	B	M	2	5	5.31	1	1.05	0.21	2.04	0.64	6.73	0.46	1344.00	359.63
185	window	شباك	M	I	IR	B	S	2	5	6.11	1	1.18	0.50	3.00	0.80	6.07	0.80	2114.00	782.73
186	worker	عامل	M	A	R	B	M	2	5	25.28	1	1.27	0.55	2.17	0.83	6.53	0.74	1686.86	696.97
Min										0.03		1.00		1.43		5.27		1143.77	
Max										167.85		3.05		4.57		6.93		3228.09	
Mean										10.08		1.09		2.50		6.53		1530.14	

References

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 and Computers*, *31*, 531–552.

Baayen, R. H., Piepenbrock, R., & Gulikers, L. (1995). The CELEX lexical database (Release 2). Philadelphia: University of Pennsylvania, Linguistic Data Consortium.

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.

Bates, E., D'Amico, S., Jacobsen, T., Székely, A., Andonova, E., Devescovi, A., et al. (2003). Timed picture naming in seven languages. *Psychonomic Bulletin and Review*, *10*, 344–380.

Boersma, P., & Weenink, D. (2009). Praat: doing phonetics by computer (Version 5.1.17) [Computer program]. Retrieved January, 2009, from http://www.praat.org/.

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.

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, and Computers*, *35*, 158–167.

Boudelaa, S., & Marslen-Wilson, W. (2010). Aralex: A lexical database for Modern Standard Arabic. *Behavior Research Methods*, *42*(2), 481–487.

Brown, G. D. A., & Watson, F. L. (1987). First in, first out: Word learning age and spoken word frequency as predictors of word familiarity and word naming latency. *Memory and Cognition*, *15*, 208–216.

Brown, R., & McNeill, D. (1966). The tip of the tongue phenomenon. *Journal of Verbal Learning and Verbal Behavior*, *5*, 325–337.

Brysbaert, M. (1996). Word frequency affects naming latency in Dutch when age of acquisition is controlled. *European Journal of Cognitive Psychology*, *8*, 185–193.

Caplan, D. (1987). Phonological representations in word production. In E. Keller & M. Gopnik (Eds.), *Motor and sensory processes of language*. Hillsdale, NJ: Erlbaum.

Caroll, J. B., & White, M. N. (1973). Age-of-acquisition norms for 220 picturable nouns. *Journal of Verbal Learning and Verbal Behavior*, *12*, 563–576.

Cleveland, R. (1963). A classification of the Arabic dialects of Jordan. *Bulletin of the American School of Oriental Research*, *167*, 56–63.

Cohen, J. (1988). *Statistical Power Analysis for the Behavioral Sciences* (2nd ed.). New York: Academic Press.

Coleman, M. (personal communication). The response Recorder Software [unpublished].

Cubelli, R., Lotto, L., Paolieri, D., Girelli, M., & Job, R. (2005). Grammatical gender is selected in bare noun production: Evidence from the picture-word interference paradigm. *Journal of Memory and Language*, *53*, 42–59.

Dell, G. S., Schwartz, M. F., Martin, N., Saffran, E. M., & Gagnon, D. A. (1997). Lexical access in aphasic and nonaphasic speakers. *Psychological Review*, *104*, 801–838.

Dewhurst, S. A., Hitch, G. J., & Barry, C. (1998). Separate effects of word frequency and age of acquisition in recognition and recall. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *24*, 284–298.

Ellis, A., & Lambon Ralph, M. A. (2000). Age of acquisition effects in adult lexical processing reflect loss of plasticity in maturing systems: Insights from connectionist networks. *Journal of Experimental Psychology: Learning, Memory and Cognition*, *26*(5), 1103–1123.

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

Gathercole, S. E., & Baddeley, A. D. (1989). Evaluation of the role of phonological STM in the development of vocabulary in children: A longitudinal study. *Journal of Memory and Language*, *28*, 1–14.

Gerhand, S., & Barry, C. (1999). Age-of-acquisition and frequency effects in speeded word naming. *Cognition*, *73*, B27–B36.

Gilhooly, K. J., & Logie, R. H. (1981). Word age-of-acquisition, reading latencies and auditory recognition. *Current Psychological Research*, *1*, 251–262.

Gilhooly, K. J., & Gilhooiy, M. L. (1979). Age-of-acquisition effects in lexical and episodic memory tasks. *Memory and Cognition*, *7*, 214–223.

Gilhooly, K. J., & Logie, R. H. (1980). Age-of-acquisition, imagery, concreteness, familiarity, and ambiguity measures for 1,944 words. *Behavior Research Methods and Instrumentation*, *12*, 395–427.

Glaser, W. (1992). Picture naming. *Cognition*, *42*, 61–105.

Hartje, W., Hannen, P., & Willmes, K. (1986). Effects of visual complexity in tachistoscopic recognition of kanji and kana symbols by German subjects. *Neuropsychologia*, *24*, 297–300.

Herbert, R. (personal communication). A set of digital pictures [Unpublished].

Humphreys, G. W., Riddoch, M. J., & Quinlan, P. T. (1988). Cascade processes in picture identification. *Cognitive Neuropsychology*, *5*, 67–103.

Kosslyn, S. M., & Chabris, C. F. (1990). Naming pictures. *Journal of Visual Languages and Computing*, *1*, 77–95.

Kremin, H., Perrier, D., De Wilde, M., Le Bayon, A., Corbinau, M., & Lehoux, E. (2001). Age d'acquisition des mots et acces au lexique. *Revue Neurologique*, *157*(3), 120–132.

Kucera, H., & Francis, W. N. (1967). *Computational analysis of present-day American English*. Providence: Brown University Press. R1.

Lachman, R., Shaffer, J. P., & Hennrikus, D. (1974). Language and cognition: Effects of stimulus codability, name-word frequency, and age of acquisition on lexical reaction time. *Journal of Verbal Learning and Verbal Behavior*, *13*, 613–625.

La Heij, W., Mak, P., Sander, J., & Willeboordse, E. (1998). The gender-congruency effect in picture-word tasks. *Psychological Research*, *61*, 209–219.

Levelt, W. J. M., Roelofs, A. P. A., & Meyer, A. S. (1999). A theory of lexical access in speech production. *Behavioral and Brain Sciences*, *22*(1), 1–37.
Martein, R. (1995). Norms for name and concept agreement, familiarity, visual complexity and image agreement on a set of 216 pictures. *PsychologicaBelgica*, *35*, 205–225.
Morrison, C. M. (1993). Loci and roles of word age of acquisition and word frequency in lexical processing. Unpublished DPhil thesis. University of York, York, UK.
Morrison, C. M., Chappell, T. D., & Ellis, A. W. (1997). Age of acquisition norms for a large set of object names and their relation to adult estimates and other variables. *Quarterly Journal of Experimental Psychology*, *50A*, 528–559.
Morrison, C. M., Ellis, A. W., & Quinlan, P. T. (1992). Age of acquisition, not word frequency, affects object naming, not object recognition. *Memory and Cognition*, *20*, 705–714.
Nickels, L. (1997). *Spoken word production and its breakdown in aphasia*. Hove: Psychology Press.
Nickels, L., & Best, W. (personal communication). Coding system for aphasic naming [Unpublished].
Nickels, L., & Howard, D. (1995). Aphasic naming: What matters? *Neuropsychologia*, *33*(10), 1281–1303.
Oldfield, R. C., & Wingfield, A. (1965). Response latencies in naming objects. *Quarterly Journal of Experimental Psychology*, *17*, 273–281.
Paivio, A., Yuille, J. C., & Madigan, S. A. (1968). Concreteness, imagery and meaningfulness values for 925 nouns. *Journal of Experimental Psychology*, *76*, 1–25.
Pind, J., & Tryggvadottir, H. B. J. (2002). Determinants of picture naming times in Icelandic. *Scandanavian Journal of Psychology*, *43*, 221–226.
Pind, J., Jónsdóttir, H., Tryggvadóttir, H. B., & 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.
Plaut, D. C., & Shallice, T. (1993). Perseverative and semantic influences on visual object naming errors in optic aphasia: A connectionist account. *Journal of Cognitive Neuroscience*, *5*, 89–117.
Roelofs, A. (2002). Syllable structure effects turn out to be word length effects: Comment on Santiago et al. (2000). *Language and Cognitive Processes*, *17*, 1–13.
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, and Computers*, *28*, 537–555.
Santiago, J., MacKay, D. G., Palma, A., & Rho, C. (2000). Sequential activation processes in producing words and syllables: Evidence from picture naming. *Language and Cognition Processes*, *15*, 1–44.
Schriefers, H. (1993). Syntactic processes in the production of noun phrases. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *19*, 841–850.
Severens, E., Van Lommel, S., Ratinckx, E., & Hartsuiker, R. J. (2005). Timed picture naming norms for 590 pictures in Dutch. *Acta Psychologica*, *119*, 159–187.
Shallice, T. (1988). *From neuropsychology to mental structure*. Cambridge: Cambridge University 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.
Tabachnick, B. G., & Fidell, L. S. (2001). *Using Multivariate Statistics* (5th ed.). Boston: Allyn and Bacon.
The ELRA. (2001). An-Nahar Newspaper Text Corpus. The European Language Resources Association. Available from: http://catalog.elra.info/product_info.php?products_id=767.
Vigliocco, G., Vinson, D. P., Indefrey, P., Levelt, W. J. M., & Hellwig, F. (2004). Role of grammatical gender and semantics in German word production. *Journal of Experimental Psychology: Learning Memory and Cognition*, *30*, 483–497.
Vitkovitch, M., & Tyrrell, L. (1995). Sources of disagreement in object naming. *Quarterly Journal of Experimental Psychology*, *48A*, 822–848.
Zughoul, M. R. (2007). *Studies in Contemporary Arabic-English Socio-Linguistics*. Irbid: Hamada Establishment for University Studies and Publishing and Distribution.