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Age acquisition norms from elderly Spanish people: characteristics and the prediction of word recognition performance in Alzheimer's disease

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Age of acquisition is possibly the single most potent variable affecting lexical access. It is also a variable that determines the retention or loss of words in patients who have suffered brain injury, and in patients with Alzheimer's disease. But the norms of age of acquisition currently available have largely been obtained from university students whereas the ages of acquisition for some words are very different for young people compared with the elderly. The aim of this study was to develop age of acquisition norms for a sample of 500 words with people over 60 years. When these norms were compared with others from young people in predicting the results of a group of Alzheimer patients in a lexical selection task we found that the elderly ratings made a better prediction of the data. We recommend that for studies using older participants appropriate norms should be used in place of those obtained from young adults.

Healthy adult participants can recognize and generate some words more quickly than others. One of the most powerful predictors of the speed with which different words can be produced in tasks like picture naming, or recognized in tasks like lexical decision, is the age at which those words are typically learned. Early learned words can be processed more quickly than later learned words, even allowing for the effects of other factors such as the frequency with which words are encountered in adulthood or across the lifespan (Ghyselinck, Lewis & Brysbaert, 2004; Johnston & Barry, 2006; Juhasz, 2005). Lexical processing advantages have now been demonstrated

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in several different languages for picture naming (Alario, Ferrand, Lagnaro, New, Frauenfelder & Seguí, 2004; Barry, Hirsh, Johnston & Williams, 2001; Barry, Morrison & Ellis, 1997; Bates, Burani, D'Amico, & Barca, 2001; Bonin, Chalard, Meot & Fayol, 2002; Carroll & White, 1973; Cuetos, Ellis & Alvarez, 1999; Pérez, 2007) and also for visual word recognition (reading aloud and lexical decision: Alija & Cuetos, 2006; Bonin, Fayol & Chalard, 2001; Brysbaert, Lange & Wijnendaele; 2000; Cuetos & Barbón, 2006; Ellis & Morrison, 1998; Menenti & Burani, 2007; Morrison & Ellis, 1995, 2000).

Age of acquisition (AoA) is also a powerful predictor of which words are lost and which are retained in patients suffering from language disorders (aphasia) as a consequence of brain lesions (Cuetos, Aguado, Izura & Ellis, 2002; Nickels & Howard, 1995); also in neurodegenerative conditions such as semantic dementia (Lambon Ralph, Graham, Ellis & Hodges, 1998; Woollams, Cooper-Pye, Hodges, & Patterson, 2008) and Alzheimer's disease (Cuetos, González-Nosti & Martínez, 2005; Cuetos, Herrera & Ellis, 2010; Holmes, Fitch & Ellis, 2006; Forbes-MacKay, Ellis, Shanks & Venneri, 2005; Rodríguez-Ferreiro, Davies, González-Nosti, Barbón & Cuetos, 2009; Tippett, Meier, Blackwood & Diaz-Asper, 2007). In all of these conditions, early-learned words are more likely to survive the effects of brain damage than later-acquired words (Ellis, 2011).

One of the key issues regarding AoA is how to measure this variable. There are two main approaches. One is to gather objective data; for example by examining when words first appear in books aimed at children of different ages (Monaghan & Ellis, 2010), or by determining the youngest age at which a certain proportion of children can name different object pictures (Morrison, Chappell & Ellis, 1997). Objective AoA norms of this sort are now available for samples of words in English (Morrison et al., 1997), French (Chalard, Bonin, Méot, Boyer & Fayol, 2003), Icelandic (Pind, Jónsdóttir, Tryggvadóttir & Jónsson, 2000), Italian (Barbarotto, Laiacona & Capitani, 2005) and Spanish (Álvarez & Cuetos, 2007; Pérez & Navalón, 2005). This procedure is, however, very time-consuming, especially when it involves gathering data from children.

The second method for obtaining AoA values that has been used is to ask adults to estimate the age at which they think that they or others learned different words. This can be done using a scale where, for example, 1 = learned before the age of 2 years while 7 = learned after the age of 12 (Gilhooly & Logie, 1980). Adult ratings correlate surprisingly highly with objective measures. For example, Morrison, Chappell and Ellis (1997) found a correlation between of .759 between objective and rated AoA while for Álvarez and Cuetos (2007) the correlation was .558. Subjective AoA

ratings of this nature have been published for a range of languages including English (Bird, Franklin & Howard, 2000; Gilhooly & Logie, 1980; Morrison, Chappell & Ellis, 1997; Stadthagen-Gonzalez & Davis, 2006), French (Alario & Ferrand, 1999), Italian (DellÁcqua, Lotto & Job, 2000), Spanish (Cuetos & Alija, 2003, Cuetos, Ellis & Alvarez, 1999) and Dutch (Ghyselinck, De Moor & Brysbaert, 2000).

Usually, subjective scales are collected from young adults (mainly students), although they are then applied to other, very different populations. That can be a problem, especially when used with older people, both healthy individuals and people with brain injuries or neurodegenerative diseases as Alzheimer's disease. Vocabulary changes over time as new concepts enter the language, or become more common, while others fade away. For example, there are many words relating to new technologies that are familiar to young children today but which are late acquired for older people; words such as computer, video, printer, etc. Even exotic fruits such as kiwi, papaya or avocado that have only been recently introduced into Western Europe are familiar to most of today's children but were only learned by older people when they were already adults. Conversely, some words and concepts were more familiar to children in the past than they are to children today; words like yoke, saddlebag or bellows. It is potentially important that a researcher interested in exploring the effect of AoA on lexical processing in older adults who may have dementia or stroke should use an AoA measure that is sensitive to the age of acquisition of words by people in that age group (Biundo, 2010).

The aim of this study was to obtain data on AoA for Spanish adults aged over 60 years in order to have a better measure of this variable in studies to be carried out with this age group, both normal and people suffering from brain damage (lesions or neurodegenerative disease). In addition to making the AoA ratings available to other researchers, we report some comparisons of the elderly AoA ratings with ratings obtained from younger adults and objective AoA data obtained from young children. We also report analyses of the ability of ratings from young and older adults to predict the performance of a group of patients with Alzheimer's disease aged 71-90 years on a word recognition task (Cuetos, Herrera & Ellis, 2010).

METHOD

Participants. Thirty participants, 19 women and 11 men with a mean age of 71 years (a range between 61 and 85), with good cognitive status, provided the AoA ratings. The male participants, though in many cases retired, had occupied a range of professions including mining, services and construction while the female participants were predominantly housewives. All the participants were native speakers of Spanish living in the Asturias region of Spain.

Stimuli. Five hundred morphologically simple nouns with an average frequency of 38 per million (range 0.18-705) and an average length of 6.18 letters (range 3-14) were selected for this study. The selection took advantage of the fact that the words overlap with those employed in other studies that also obtained AoA ratings from young adults and children. Specifically, 388 of these words coincided with those used by Davies et al. (submitted) for which rated AoA data taken from young adults were available, as well as values of word frequency and imageability taken from the database LEXESP (Sebastian, Martí, Carreiras & Cuetos, 2000). Objective AoA values obtained from Spanish children aged 2-15 years (Álvarez & Cuetos, 2007) were available for 262 of the words (picturable nouns).

In addition, data were available for 118 words on the performance of a group of 22 Alzheimer patients aged 71 to 90 years in a lexical selection task (Cuetos, Herrera & Ellis, 2010). In that task, patients were presented with four stimuli on a screen consisting of one real word and three invented pseudowords. Participants had to decide which of the four stimuli was a real word. The dependent variable was the number of correct responses given by the patients. Age-matched controls made few errors on this task but the AD patients recognized significantly more of the early than the late acquired words as familiar.

Procedure. The participants in the present study were asked to indicate the approximate age at which they thought they had learned each word was presented to them. That is, rather than use a rating scale, participants were asked simply to state the age at which they thought they had learned different words. The task was done in the homes of the participants in an appropriate location, using a laptop to record the data.

Before providing the AoA estimates, participants received detailed instructions for the task they had to make. Then two stimuli similar to the

experimental ones were shown as practice to confirm that instructions had been understood. The experimenter named each one of the words and recorded the response of the participant about its AoA. Since it was a long list of 500 words, several breaks were made throughout the test and, in many cases that the participants showed signs of tiredness, in which case the task was interrupted and continued another day.

RESULTS

Given the wide range of AoA values in the elderly data (from 2 to 40 years), and in order to make it equivalent to the ratings that are used with young people, the values expressed as age in years were transformed to a scale of 1 to 8, where 1 = before the age of 2 years, 2 = 3-4 years, 3 = 5-6 years, 4 = 7-8 years, 5 = 9-10 years, 6 = 11=12 years, 7 = between 13 and 20 years, and 8 = over 20 years. (The last value was not used in the rating scales for young adults.) The average according to this scale was 5.04, equivalent to an estimated age of around 9 years, with a minimum value of 2.63 for gato (cat) and cama (bed), and a maximum value of 7.83 for ordenador (computer). The value for each of the 500 words is presented in the Appendix.

As expected, the values given by the young adults and the elderly raters differed dramatically for some words. Examples of words given much earlier ratings by the young adults than by the elderly raters are robot (robot) which had an average rating of 2.86 for the young adults and 7.30 for the elderly group, televisión (television: 2.24 for the young and 7.30 for the older adults) and tortuga (turtle: 1.83 and 4.87 respectively). In contrast, tinta (ink) was rated at 6.06 by the young adults and 4.13 by the older raters while cal (lime) was rated at 6.00 by the young adults and 4.53 by the older raters and toro (bull) was rated at 5.53 by the young adults and 4.20 by the older raters.

In order to test the validity of this scale and explore its characteristics, several comparisons were made with the other scales at our disposal, particularly with the scales collected with students (subjective with young people) and with children (objective). As shown in Table 1, the elderly AoA ratings correlate significantly with those obtained from young people and, to a lesser extent, with the objective values obtained with children. This result is logical, not only because the difference of age is greater with children than with young people, but also because the procedure for collecting data was similar to that of young people with subjective

estimations, while the values for young children were collected using an objective measure.

Table 1. Correlations between the three measures of AoA

	Young adult	Children
Elderly	.772**	.320**
Young	----	.445**

Correlations were also made with the three main psycholinguistic variables: log of frequency, imageability and length. And as can be seen in Table 2, correlations with the three variables are significant and in the expected direction: the later the age of acquisition of a word, the lower its frequency and imageability values (hence the negative correlations) and the longer it tends to be. The tendency for more abstract words to be learned later in childhood or adulthood accounts for the correlations between imageability and AoA.

Table 2. Correlations between the three measures of AoA and the main psycholinguistic variables.

	Log freq	Imageability	Length
Elderly	-.140**	-.546**	.234**
Young adults	-.154**	-.575**	.263**
Children	-.341**	-.203*	.101

We then tested the predictive power of different measures of AoA with the results obtained with Alzheimer's patients in the lexical selection task (Cuetos et al, 2010). In this test 20 Alzheimer's patients had to identify 120 real words when each one was presented with 3 pseudowords. Frequency, imageability and length values were available for these items, as well as rated AoA.

First, a correlation analysis was performed between the three measures of AoA and performance on the lexical selection task. As can be seen in Table 3, the AoA of the old people is mostly highly correlated, followed by the young adult ratings and the objective values from children. These correlations are negative because better performance in the test by the Alzheimer's patients is associated with lower values of AoA (better recognition of early than later acquired words).

Table 3: Correlations of the Alzheimer results with the three measures of AoA.

	Elderly	Young	Children
	n = 118	n = 115	n = 15
Alzheimer performance	-.434**	-.409**	-.284

Table 4. Results of the regression analyses of lexical selection performance in Alzheimer patients.

	t	sig
AoA (young adult)	-5.43	.000
Log freq	3.04	.003
Imageability	1.14	ns
Length	1.10	ns

	t	sig
AoA (elderly)	-6.37	.000
Log freq	2.45	.016
Imageability	0.83	ns
Length	1.87	ns

Then, two regression analyses were performed, both taking as the dependent variable the scores of the patients on each word and as predictors the four variables log of frequency, imageability, length and AoA. In the first analysis the rated AoA values collected from young people were used. In the second analysis we used the ratings collected from the elderly participants. As can be seen in Table 4, both sets of AoA ratings predicted word recognition scores, though the size of the *t* value is higher for the elderly ratings than for the young adult ratings. The percentage of variance explained was also higher when using the rating of the old people (R^2 = 0.301) than when using the ratings from the young adults (R^2 = 0.245). Word frequency made an independent contribution to predicting word recognition scores in both analyses.

DISCUSSION

AoA ratings from young and older adults correlate quite highly (Table 1). Both share similar correlations with imageability, frequency and length, suggesting that older and younger raters share a similar tendency to rate more imageable, higher frequency and shorter words as earlier acquired than less imageable, lower frequency and longer words. This may be in part a reflection of fact: objective measures of AoA show similar patterns of correlation with imageability, frequency and length (Álvarez & Cuetos, 2007; Barbarotto et al., 2005; Morrison et al., 1997; Pérez & Navalón, 2005; Pind et al., 2000). We also note, however, that objective AoA values from children correlate more highly with word frequency than do the ratings of either the younger or the older adults (Table 2). In contrast, imageability and length correlated less strongly with objective AoA from children than with either of the sets of adult ratings. This suggests that adults may be rather more influenced than they should be by imageability and length when making AoA ratings, but rather less influenced than they should be by word frequency. The over-reliance on imageability, giving higher values to more abstract words and lower values to more concrete words, is compatible with the proposal that AoA is a lexical-semantic variable like imageability (Brysbaert & Ghyselinck, 2006; Steyvers & Tenenbaum, 2005).

The correlations presented in Table 1 also show that objective AoA values obtained from children correlate more highly with ratings from young adults (.445) than with ratings from older adults (.320). This may be a generational issue: the undergraduates who provided the AoA ratings for young adults were 10 to 15 years older than the children from whom the objective data were derived whereas the older raters were 50 or more years older. Hence there are likely to have been more items with substantially

different AoA values for the children and the older adults than for the children and the younger adults.

The AoA ratings of younger and older adults both predicted the word recognition (lexical selection) scores of AD patients to a significant extent, with the elderly ratings correlating more highly with patient performance on the different words than did the young adult ratings (Table 3). In the regression analyses (Table 4), AoA ratings from both young and older adults showed a significant ability to predict recognition scores from AD patients on the different words. The proportion of the variance accounted for in the analysis using elderly ratings was, however, higher than the proportion accounted for in the analysis using young adult ratings, and the *t* values associated with AoA were higher for the older adult than the young adult ratings. Cuetos et al. (2010) matched their early and late acquired word sets on two separate measures of word frequency when performing their factorial investigation of the impact of AoA on word recognition in AD patients, and the results of the regression analyses confirm an effect of AoA than is independent from, and larger than, the effect of words frequency. The regression analyses demonstrate, however, that word frequency exerts an independent (if smaller) effect on the ability of Alzheimer's patients to recognise different words as familiar (Table 4). Independent effects of AoA and word frequency on picture naming in AD have been reported by Rodríguez-Ferreiro et al. (2009) and by Tippett et al. (2007), though the independent contribution of word frequency has proved harder to find than the independent contribution of AoA (Cuetos et al., 2005; Silveri et al., 2002). To the best of our knowledge, the analyses presented here are the first demonstration of independent effects of AoA and word frequency on word recognition (rather than word production) in patients with Alzheimer's disease.

There is some commonality between the age or order of acquisition of words by young people today and young people 60 to 80 years ago, but there are also differences, with some words being learned earler now than they were in the past and other words being learned later. That commonality presumably explains the ability of AoA ratings from young adults to predict the performance of Alzheimer's patients on different words in a number of published studies (Ellis, 2011). Nevertheless, our analyses show that AoA ratings from older participants are better predictors of the performance of Alzheimer's patients than the ratings of young adults. When effects of AoA are being examined in older adults, including patients with aphasia or dementia, then ratings from similar-age people like those presented here, are likely to be able to account for variation in performance on different words (and concepts) better than objective or rated values obtained from children

or young adults. We would expect that other factors such as nationality and socio-economic status could also affect the precise ages of acquisition of different words, though we also note that the shared experience of children learning to talk in different societies and countries results in significant correlations between AoA measures for equivalent words in different languages (Álvarez & Cuetos, 2007).

RESUMEN

Normas de edad de adquisición obtenidas con personas mayores: Características y predicción del reconocimiento de palabras en la enfermedad de Alzheimer. La edad de adquisición es una de las variables más determinante del acceso léxico. También es la que mejor determina los procesos de pérdida de las palabras en los pacientes que han sufrido lesión cerebral, así como en la enfermedad de Alzheimer. Pero las escalas de edad de adquisición de que se dispone actualmente han sido todas construidas con jóvenes universitarios. Y obviamente las edades de adquisición para muchas palabras no son las mismas en los jóvenes actuales que en las personas mayores. El objetivo de este estudio fue elaborar normas de edad de adquisición para una muestra de 500 palabras con personas mayores de 60 años. Al comparar la capacidad de predicción de esta escala con otra elaborada con jóvenes de los resultados de un grupo pacientes de Alzheimer en una tarea de selección léxica se encontró que efectivamente esta escala predice mejor los datos. En consecuencia, en los estudios que se realicen con personas mayores debería de utilizar esta escala en vez de las obtenidas con jóvenes.

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APPENDIX

Word	AoA	Word	AoA	Word	AoA
abeja	3,87	espíritu	5,20	patín	5,63
abismo	6,33	esqueleto	5,13	pato	4,23
abrigo	3,63	estatuto	7,57	patria	5,77
acera	4,33	estimulo	6,37	patrón	6,07
acordeón	4,87	estrella	3,57	pausa	6,53
aduana	6,73	estrés	7,20	payaso	4,67
afición	4,97	exilio	6,83	paz	5,13
agonía	5,87	éxito	6,50	pecado	4,03
águila	4,97	fábrica	5,50	peine	3,13
aguja	3,53	factura	6,67	pelo	2,90
aire	3,47	falda	4,17	pelota	3,00
alcoba	6,47	fama	5,77	peonza	3,87
alicates	4,30	farsa	6,40	pepita	4,43
alma	4,10	felpudo	4,73	pera	3,57
almendra	5,13	fiscal	6,90	percha	4,57
almohada	3,00	flauta	4,77	pereza	5,03
aluminio	5,80	flecha	5,23	periódico	5,10
ambición	6,03	flor	3,23	perro	3,07
amistad	5,20	flotador	6,20	pez	4,10
ancla	6,60	fobia	7,20	piano	5,97
andén	5,67	foca	6,20	pie	3,07
anécdota	6,67	fondo	5,23	pierna	3,07
anillo	4,57	fosa	5,67	pimiento	4,33
ansiedad	6,83	foto	4,30	pincel	4,83
antifaz	6,00	fregadero	4,40	pingüino	6,23
antorcha	5,60	fresa	4,13	pinza	4,67
año	3,03	fuente	3,40	piña	4,50
araña	3,17	fugitivo	6,53	pipa	4,77
árbol	3,20	furia	6,13	pirata	5,97
ardilla	4,97	furor	6,27	pistola	4,87
armazón	6,13	gabinete	6,77	plaga	5,37
arpa	6,57	gafas	5,13	plátano	4,27
arroz	3,10	galán	6,53	pluma	4,27
astucia	6,27	gallo	3,33	podio	6,70
ataud	5,43	garaje	5,77	policía	5,00
atlas	6,93	gato	2,63	pomo	6,47
átomo	7,73	gen	7,10	pompa	5,47
autobús	6,03	germen	6,93	porche	6,90
avestruz	5,40	gloria	4,57	pozo	3,80

avión	3,97	gorila	5,83	prenda	5,40
azote	4,30	gorra	3,93	prisa	4,67
bacteria	7,03	granero	6,10	prismáticos	5,90
bala	4,83	grifo	6,10	prójimo	5,50
balanza	5,33	gripe	4,23	pudor	6,40
balón	3,60	guante	4,00	puerta	3,17
bandera	4,50	guitarra	5,63	pulmón	4,97
baranda	5,33	gusano	4,30	quirófano	6,43
barco	4,90	hábito	5,53	ración	5,47
barril	3,97	hacha	3,87	radio	5,17
bastón	4,27	hada	5,20	rana	4,07
bebé	4,53	harén	7,03	raqueta	6,47
bicicleta	4,20	helicóptero	6,50	ratón	3,37
bigote	3,97	hiedra	4,40	realidad	5,90
blusa	4,83	hilo	3,63	récord	6,43
bolígrafo	5,83	histeria	6,70	red	5,77
bolso	4,43	historia	5,30	regadera	4,77
bombilla	3,70	hoguera	4,50	región	5,43
bondad	5,60	hoja	3,37	regla	4,90
bota	3,83	honor	6,53	reliquia	5,90
botella	3,40	honra	5,67	reloj	4,03
botón	3,27	hormiga	3,17	renta	5,63
bóveda	6,40	horror	5,67	repisa	5,77
bronce	5,87	huerta	3,90	reportaje	7,03
bruja	4,40	humildad	5,10	retina	6,17
bruma	5,70	humor	4,90	revólver	5,53
buey	3,97	iglesia	3,43	rincón	4,37
búho	5,37	ilusión	5,43	rinoceronte	5,63
cabalgata	5,17	imagen	5,33	riñón	5,53
caballo	3,20	incienso	4,60	robot	7,30
cabra	3,80	índice	4,93	rueca	5,50
cacahuete	4,37	infierno	3,70	rueda	3,93
cadena	3,90	interruptor	6,23	rugido	5,73
caja	3,90	ira	6,20	sabor	4,13
cal	4,53	ironía	6,63	salero	3,97
calabaza	4,27	islam	7,63	saltamontes	4,13
calcetín	2,90	jabón	3,47	salud	4,70
cama	2,63	jarra	3,53	sandía	6,33
camello	4,90	jarrón	4,30	sandwich	7,47
camión	4,23	jeringuilla	4,83	sartén	4,57
camisa	3,33	jersey	3,60	sastre	4,97

campana	3,37	jirafa	5,33	sauna	7,17
cáncer	7,00	junio	4,40	secreto	5,40
candado	5,10	justicia	5,57	semáforo	7,03
canguro	6,03	ladrillo	4,73	semilla	5,13
canoa	6,63	lámpara	5,47	sermón	4,90
cantina	6,30	lápiz	3,37	serpiente	4,47
capricho	4,37	láser	7,60	seta	4,93
capucha	5,03	látigo	5,80	sierra	5,03
caracol	3,03	lazo	4,00	siesta	3,73
cariño	4,87	lechera	3,63	siglo	5,80
casa	2,93	lecho	6,57	silbato	4,20
cascabel	3,97	lechuga	4,20	silencio	4,27
cascada	6,03	lentitud	5,63	silla	3,37
caseta	4,17	león	5,13	simpatía	5,77
castillo	5,00	leopardo	5,70	soberbia	5,97
cazo	3,67	libro	3,53	sofá	6,33
cebolla	3,17	licor	5,73	soga	4,67
cebra	6,10	limón	3,93	sol	2,73
célula	6,90	linterna	4,47	soledad	5,30
cenicero	4,73	llave	3,33	sombrero	3,70
cepillo	3,93	luna	3,50	sonido	5,33
cereza	3,20	lupa	5,87	sueldo	5,87
cerilla	3,33	mafia	7,17	suerte	5,20
cesta	3,10	mago	4,70	sujetador	6,07
chaleco	4,17	maíz	3,47	sultán	5,93
chaqueta	3,93	malaria	6,93	susto	4,07
cheque	6,93	maleta	4,50	tabú	7,10
cintura	4,80	manía	5,40	taburete	5,53
cinturón	4,43	mano	3,17	taladro	6,20
círculo	4,83	manopla	5,60	talante	6,40
cisne	5,27	manzana	3,03	tambor	4,10
claustro	6,93	marfil	5,97	tapíz	6,17
clima	5,63	marioneta	6,00	tarta	4,83
coche	4,70	mariposa	3,43	taza	2,97
cocina	2,93	martillo	3,50	teléfono	7,00
cocodrilo	4,93	marzo	4,10	televisión	7,30
collar	4,60	mechero	3,73	temor	5,70
columpio	4,40	mensaje	6,60	temporal	5,10
cómplice	5,97	mente	6,10	tenedor	2,90
concepto	6,70	merienda	3,33	tigre	5,17
conejo	3,27	mesa	3,20	tijeras	3,40

congreso	7,30	mezquita	6,60	tinta	4,13
convento	4,93	ministro	6,63	toalla	3,40
copa	4,27	misterio	5,37	tocadiscos	6,40
coraje	5,87	molino	4,27	toldo	6,03
corazón	4,30	monja	4,73	tomate	4,13
corbata	4,67	mono	4,73	tormento	6,27
corona	4,33	montaña	3,80	tornillo	4,63
cosmos	7,63	moral	5,73	toro	4,20
cresta	3,90	mosca	2,87	torrente	6,53
crisis	7,03	moto	4,90	tortuga	4,87
crueldad	5,87	muelle	5,67	traidor	5,57
cualidad	6,57	muerte	4,03	trámite	6,83
cucaracha	3,83	muro	5,10	trauma	6,87
cuchara	2,70	muslo	5,43	tregua	6,50
cuchillo	2,90	nación	5,40	tren	4,43
cuenco	5,77	nariz	3,07	trenza	4,67
cueva	4,47	nieto	4,63	trineo	6,10
cumbre	5,73	novela	5,73	tripa	4,80
dedal	3,63	nube	4,40	trompeta	5,30
dedo	2,73	nuez	3,50	tropa	5,87
desastre	5,33	obispo	5,17	tuerca	5,37
destornillador	4,60	obsesión	6,30	tumba	4,90
dinero	4,47	ocio	6,47	tumor	6,90
diploma	6,37	ojo	3,13	uranio	7,40
discurso	6,30	olfato	4,80	uvas	4,13
dogma	7,40	opinión	6,03	vaca	2,80
dosis	6,47	ordenador	7,83	valor	5,93
dragón	5,90	oreja	3,10	vaso	3,47
drama	6,40	origen	6,33	vela	3,23
economía	6,70	oruga	4,93	veneno	4,40
edad	5,00	oso	5,17	ventana	3,47
elefante	5,33	oveja	3,53	verdad	4,40
enano	5,07	ozono	7,40	víctima	6,00
enchufe	5,13	paella	5,63	victoria	5,90
energía	6,27	pájaro	3,63	vidriera	6,37
enigma	7,13	palmera	5,60	violín	5,77
época	5,87	pancarta	7,00	vocación	5,83
escalera	3,07	pánico	5,83	voluntad	5,60
escena	5,77	pantalón	3,60	yeso	6,47
escoba	3,13	pantera	5,60	zanahoria	4,93
escondite	3,70	paquete	4,80	zapatillas	3,27

escopeta	4,37	paradoja	6,47	zapato	3,50
escorpión	4,90	paraguas	3,50	zorro	4,90
espada	5,17	pasaporte	6,50		
espárrago	6,30	pasión	6,03		
especie	6,10	pastor	4,60		
espina	4,17	patata	3,03		

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