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BRIEF REPORT

Letter transpositions within and across morphemic boundaries: Is there a cross-language difference?

Claudia Sánchez-Gutiérrez · Kathleen Rastle

Abstract Research on the impact of letter transpositions that arise across morpheme boundaries has yielded conflicting results. These results have led to the suggestion that a cross-linguistic difference may exist in the recognition of Spanish and English words. In two masked-priming experiments run on separate groups of Spanish and English speakers, we tested this hypothesis by comparing the impacts of primes with letter transpositions that arose within morphemes or across morpheme boundaries on the recognition of identical or near-identical Spanish–English cognate targets. The results showed transposed-letter benefits in both Spanish and English that were not modulated by the position of the transposed letter in the prime stimulus. Our findings therefore add to the growing body of literature suggesting that the transposed-letter benefit is not affected by the position of the transposed letters relative to the morpheme boundary, and they dispel previous suggestions that there might be a genuine difference in orthographic coding across the Spanish and English writing systems.

Keywords Visual word recognition · Orthography · Masked priming

The recognition of a printed word such as *pot* requires the analysis of letter identity (*p*, *o*, *t*) as well as of letter order (that the *p* goes before both the *o* and the *t*). In the absence of an analysis of letter order in the word recognition process, readers would be unable to detect the difference between anagram stimuli such as *pot*, *opt*, and *top*, which share the same letters, but in different configurations. Yet, despite the importance of letter order for disambiguating similar words, recent research has shown that letter position coding is surprisingly imprecise (see Davis, 2005; Grainger, 2008).

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Some of the key phenomena in this respect concern the recognition of printed stimuli with transposed letters, such as *waht*. Despite the transposition of letters in this stimulus, research has shown that it is perceived as being very similar to its base word, *what*. Using a masked-priming technique, Forster, Davis, Schoknecht, and Carter (1987) established that identity primes (e.g., what–WHAT) and transposed-letter primes (e.g., waht–WHAT) yielded equivalent facilitation on word recognition, and further, that both of these types of primes yielded more facilitation than did replaced-letter primes (e.g., wrut–WHAT). This basic finding has now been observed across a number of the world's languages (e.g., Lee & Taft, 2009; Perea & Lupker 2004; Schoonbaert & Grainger, 2004).

The *transposed-letter benefit* observed in masked priming (i.e., primes with transposed letters are more effective than those with replaced letters) has been interpreted as reflecting a degree of perceptual uncertainty in the coding of letter position (e.g., Davis, 2010; Gomez, Ratcliff, & Perea, 2008). Yet, there may be limits to readers' tolerance for imprecision in letter order during word recognition. For example, research has suggested that tolerance for letter transpositions is reduced when the transpositions occur in external, as opposed to internal, positions (e.g., judeg–JUDGE vs. jugde–JUDGE; Johnson, Perea, & Rayner, 2007). The study of these limits of the transposed-letter benefit is important because it gives rise to a deeper understanding of the abstract representations at the foundation of reading.

One key controversy in this area concerns the impact of letter transpositions when they occur at a morpheme boundary (e.g., *urneal* for *unreal*). Christianson, Johnson, and Rayner (2005) investigated readers' tolerance for these kinds of transpositions in a series of reading-aloud experiments using masked priming. In their third experiment, they compared the effects of letter transpositions on morphologically complex targets (e.g., BOASTER) and morphologically simple targets (e.g., BLUSTER, as *blust* is not a morpheme in English). The primes were identical to the targets (e.g., *boaster*, *bluster*), had a transposed letter at the morpheme boundary (e.g., *boasetr*, *blusetr*), or had a letter substitution (e.g., *boasler*, *blusler*). Simple-effects comparisons revealed different patterns of priming effects across the two sets of targets: While identity primes yielded facilitation in both conditions, transposed-letter primes facilitated recognition only for the morphologically simple targets, appearing to indicate that readers' tolerance for letter transpositions is reduced if the transpositions arise across a morpheme boundary. However, the critical interaction between target type (morphologically complex vs. morphologically simple) and prime condition (identity, transposition, or substitution) did not approach significance, indicating an unacceptably high probability that the numerical trends reported may have arisen by chance. Furthermore, though similar patterns of data were evident in the other two experiments that they reported (both of which used compound targets—e.g., *sunshine*, *silkworm*), similar difficulties over statistical reliability were also present.

Duñabeitia, Perea, and Carreiras (2007) sought to address the limitations of Christianson et al. (2005) in a series of three experiments conducted in Basque and Spanish. In both of the first two experiments, the authors contrasted masked-priming effects on morphologically complex versus morphologically simple targets. The primes for morphologically complex targets had a transposed or substituted letter across the morpheme boundary (e.g., mesoenro–MESONERO vs. mesoasro–MESONERO). The primes for morphologically simple targets had a transposed or substituted letter in the same location as in primes for the morphologically complex targets (e.g., escobmro–ESCOMBRO vs. escohcro–ESCOMBRO). The results in both experiments showed an interaction between target type and prime type, such that transposed-letter primes yielded facilitation on target recognition (relative to substitution primes) only for morphologically simple targets. The transposed-letter benefit vanished when the targets were morphologically complex words. Both of these initial experiments involved between-target comparisons, in which any number of uncontrolled differences could have existed across the sets of targets. Thus, in a third, more compelling experiment, conducted in Spanish, the authors examined the transposed-letter priming effect on recognition of a single set of morphologically complex targets, when the letter transpositions fell within the stem or across the morpheme boundary. These results revealed a significant 21-ms benefit for transposed-letter primes (relative to letter substitution primes) when the transposition fell within the morpheme, but no benefit (–1 ms) when the transposition fell across the morpheme boundary, although this interaction between prime type and transposed-letter condition missed significance in the analysis by items ($p < .11$).

The latter study on Spanish word recognition seems to indicate that orthographic coding demands sufficient precision to identify morphemic units, perhaps in order to facilitate the morphemic segmentation processes thought to characterize the initial stages of visual word recognition (e.g., Rastle, Davis, & New, 2004; see Rastle & Davis, 2008, for a review). However, subsequent investigations in English have failed to replicate these findings (Beyersmann, Coltheart, & Castles, 2012; Beyersmann, McCormick, & Rastle, 2013; Rueckl & Rimzhim, 2011). In particular, Rueckl and Rimzhim reported five masked-priming experiments in which they demonstrated persuasively that (a) the processing of a target word is facilitated by the prior presentation of a masked prime with two letters transposed; (b) this facilitation is observed even in cases in which the transposed letters straddle a morpheme boundary; and (c) this facilitation is equivalent when the transposed letters arise within a stem or across a morpheme boundary.

The strength of the findings reported by Duñabeitia et al. (2007) against all of the subsequent literature investigating English has led to the suggestion that important linguistic differences between Spanish and English might account for the discrepant results (Beyersmann et al., 2012; Beyersmann et al., 2013). The work of Velan and Frost (2009) on Hebrew word recognition has persuasively shown that letter transpositions can have very different effects on the recognition of words in languages with qualitatively different morphological characteristics. While Spanish and English have a similar morphological structure, Beyersmann et al. (2012) argued that Spanish is characterized by far greater morphological diversity and productivity than English. They pointed out that unlike English, Spanish morphology is used to express diminutives, augmentatives, pejoratives, and gender-related information (Beyersmann et al., 2012). In light of these differences, it is not unlikely that precision in the orthographic coding of the morphemic boundary may be more important in Spanish than it is in English.

Accordingly, we conducted a masked-priming study in which we investigated the effects of within-morpheme and across-morpheme letter transpositions on word recognition in groups using the Spanish and English languages. In order to avoid the difficulties associated with between-target comparisons, we selected Spanish–English cognates that were identical (e.g., ANTISOCIAL–ANTISOCIAL) or near identical (e.g., INCORRECT–INCORRECTO) as targets. The use of cognates ensured that there could be no idiosyncratic differences in the target stimuli across languages, and critically, also allowed us to perform identical manipulations to the stimuli across language groups when creating the transposed-letter primes. This very tight control over the stimulus characteristics across languages was vital in addressing our central question of whether the languages differ in their sensitivity to letter transpositions within morphemes and across morpheme boundaries. Because of difficulties related to statistical robustness in some of the key previous work, we used a much larger sample than in those studies (cf. Christianson et al., 2005, Exp. 3, $N = 27$; Duñabeitia et al., 2007, Exp. 3, $N = 32$).

On the basis of previous findings (cf. Duñabeitia et al., 2007; Rueckl & Rimzhim, 2011), our prediction was that the transposed-letter benefit should be apparent for both language groups when the letter transposition arises within a morpheme, but should vanish for the Spanish-language group when the letter transposition arises across a morpheme boundary.

Method

Participants

The participants in Experiment 1a were 63 students from the University of Salamanca, all of whom were native Spanish speakers. The participants in Experiment 1b were 64 students from Royal Holloway, University of London, all of whom were native English speakers. None of the participants had any history of language or literacy impairment. The participants in Experiment 1a completed the experiment as part of a course requirement, while those in Experiment 1b were paid £5 for their participation.

Materials

The targets were 88 Spanish–English cognates matched very closely on log frequency (Spanish 0.70, English 0.69; $t < 1$), length (Spanish 9.18, English 8.99; $t = 1.03$), and N (Spanish 0.34, English 0.35; $t < 1$). In order to secure sufficient numbers of Spanish–English cognate targets, we included both prefixed ($N = 44$; e.g., COOPERACIÓN–COOPERATION) and suffixed ($N = 44$; e.g., ACCESIBLE–ACCESSIBLE) words. We had no theoretical or empirical reason to expect that the nature of affixation would modulate the effects of interest (see also Duñabeitia et al., 2007), and we did not attempt to match the prefixed and suffixed sets.

For each target, two transposed-letter (TL) nonword primes were created by transposing adjacent letters, either within the stem (TL-within) or across the morpheme boundary (TL-across). These transpositions involved *identical* letters across the Spanish and English primes (e.g., TL-across: atléitco, athleitc; TL-within: atéltico, atheltic) in 97 % of the cases. Two replaced-letter (RL) nonword primes were also created for each target by substituting other letters for the transposed letters, either within the stem (RL-within) or across the morpheme boundary (RL-across). RL primes were created by substituting vowels for vowels, consonants for consonants, ascending letters for ascending letters, and descending letters for descending letters, as far as possible in an identical manner across the languages. No transpositions involved the target's initial or final letter, and TL-within transpositions never involved the stem's initial or final letter. In all, 67 % of the transpositions in the TL-across condition and 74 % of the transpositions in the TL-within condition involved a consonant and a vowel. All prime stimuli are included in the Appendix.

Eighty-eight English–Spanish cognate nonwords were also designed to serve as the "No" responses. These nonwords all appeared morphologically complex and mirrored the word stimuli (half prefixed—e.g., ANTITOLM–ANTITOLMO—and half suffixed—e.g., FROMOLISM–FROMOLISMO).

The primes for the nonword targets were constructed in the same way as those for the word targets.

The assignment of primes to targets for each language version of the experiment was counterbalanced over four lists, such that each participant was exposed to all four priming conditions of the experiment but saw each target item only once.

Procedure and apparatus

Stimulus presentation and data recording were controlled by DMDX software (Forster & Forster, 2003). Each trial of the experiment consisted of a forward mask of hash marks presented for 500 ms, followed by a prime in lowercase, presented for four screen refreshes (because of a slight variation in refresh rates across the laboratories, this resulted in prime durations of 66 ms in Exp. 1a and 57 ms in Exp. 1b).[1] This lowercase prime was then masked by presentation of an uppercase target that remained on screen until participants decided whether the item was or was not a word in Spanish (Exp. 1a) or in English (Exp. 1b). The stimuli were presented on CRT monitors, and responses were collected using the keyboard. The target stimuli were presented in a different randomized order for each participant and were preceded by 13 practice trials constructed in a similar fashion to those in the main experiment.

Results

Reaction times (RTs) for correct responses were cleaned to remove outliers. Two of the target items were removed from Experiment 1b (COAUTHOR and COPILOT) because they yielded more than 40 % errors. Data points greater than 2,000 ms were also removed from each experiment. This led to the exclusion of 30 data points in Experiment 1a (0.54 % of the data) and 67 data points in Experiment 1b (1.2 % of the data). Data from all participants were retained in both experiments.

The data in both experiments were analyzed by subjects and by items in three-factor analyses of variance (ANOVAs). Condition (TL or RL) and Position (within morpheme or across morphemes) were treated as repeated factors in both analyses. Affix Type (prefixed or suffixed) was also included in the analysis, as a repeated factor in the by-subjects analysis

[1] We do not believe that this slight difference is cause for concern. Rueckl and Rimzhim (2011) used prime durations between 48 and 80 ms and observed a consistent pattern, and the prime durations used here were very close to those used by Duñabeitia et al. (2007; 66 ms).

and an unrepeated factor in the by-items analysis. List was treated as an unrepeated factor in both analyses. Our analyses focused on the effect of condition and its interaction with position across languages.

The latency analyses from Experiment 1a (Spanish) revealed a main effect of condition, in which responses to words preceded by TL primes were faster than those to words preceded by RL primes [$F_1(1, 60) = 18.87$, $MSE = 5{,}855.82$, $p < .01$; $F_2(1, 80) = 24.71$, $MSE = 2{,}933.85$, $p < .01$]. Critically, this main effect was not modulated by position [$F_1(1, 60) < 1$; $F_2(1, 80) < 1$], and no three-way interaction emerged between condition, position, and affix type [$F_1(1, 60) < 1$; $F_2(1, 80) < 1$]. The accuracy analyses from Experiment 1a revealed no significant effects of condition, nor any interactions between condition, position, and affix type (all *p*s > .10).

Like the Spanish data, the latency analyses from Experiment 1b (English) revealed a main effect of condition, in which responses to words preceded by TL primes were faster than those to words preceded by RL primes [$F_1(1, 60) = 13.12$, $MSE = 3{,}507.56$, $p < .01$; $F_2(1, 78) = 6.82$, $MSE = 4{,}014.36$, $p < .02$]. Critically, this main effect was not modulated by position [$F_1(1, 60) < 1$; $F_2(1, 78) < 1$], and no three-way interaction emerged between condition, position, and affix type [$F_1(1, 60) = 3.59$, $p = .06$; $F_2(1, 78) = 2.21$, $p = .14$]. The accuracy analyses from Experiment 1b revealed no significant effects of condition, nor any interactions between condition, position, and affix type (all *p*s > .18).

The RT and error data for both experiments are shown in Table 1. We display the critical Condition × Position contrast broken down by affix types for interest, although it is important to remember that we did not attempt to match the prefixed and suffixed targets.

Discussion

Recent studies of the transposed-letter benefit have provided evidence central to our understanding of the basic processes underlying the early stages of visual word recognition. The purpose of this study was to investigate the transposed-letter benefit in the context of the recognition of morphologically complex words. Specifically, we wished to investigate the impact of letter transpositions when they arise within morphemes or across morpheme boundaries. This is an issue that has seen considerable controversy in recent years, with some studies reporting a reduction in the transposed-letter benefit when letter transpositions arise across morpheme boundaries (e.g., Duñabeitia et al., 2007), and others reporting no difference in the magnitudes of the transposed-letter benefit as a function of the position of the transposed letter (e.g., Beyersmann et al., 2012; Beyersmann et al., 2013; Rueckl & Rimzhim, 2011). Critically, Duñabeitia et al. conducted their most compelling study in Spanish, while the other statistically reliable studies have used English stimuli, leading to speculation that there might be a cross-linguistic difference in orthographic coding (Beyersmann et al., 2012).

In order to assess this hypothesis, we created parallel Spanish and English experiments, using Spanish–English cognate stimuli matched very closely across languages (e.g., IDEALISTA–IDEALIST; ACCIDENTAL–ACCIDENTAL). These target stimuli were preceded by masked primes containing transposed letters within the stem morphemes or across morpheme boundaries, and the transposed-letter benefit was calculated relative to a replaced-letter priming condition in which letters were replaced within the stem morphemes or across morpheme boundaries. By using Spanish–English cognate stimuli that were identical or virtually identical, we ensured that any differences observed across our Spanish and English experiments could not be attributed to idiosyncratic aspects of the items chosen, and instead would need to be attributed to a genuine cross-linguistic difference in orthographic coding.

The results were unambiguous in showing transposed-letter benefits in both Spanish and English that were not modulated by the position of the transposed letter in the prime stimulus. For both language versions of the experiment, the sizes of the transposed-letter benefit were equivalent when the transposed letter occurred within the stem and when it occurred across the morpheme boundary. These results are inconsistent

Table 1 Reaction times (in milliseconds) and percentages of errors (in parentheses) for Experiments 1a and 1b, shown by condition (transposed-letter [TL] or replaced-letter [RL]), position (within or across morphemes), and affix type (prefixed or suffixed)

	Experiment 1a (Spanish)		Experiment 1b (English)	
Position	TL	RL	TL	RL
Across morphemes	767 (1.9 %)	799 (1.9 %)	767 (4.7 %)	785 (5.8 %)
Suffixed	734 (1.4 %)	766 (1.0 %)	732 (3.5 %)	761 (3.8 %)
Prefixed	800 (2.4 %)	831 (2.8 %)	803 (5.9 %)	810 (7.8 %)
Within morphemes	770 (1.4 %)	797 (2.3 %)	766 (5.7 %)	787 (5.6 %)
Suffixed	754 (1.1 %)	774 (2.1 %)	754 (5.5 %)	768 (5.1 %)
Prefixed	785 (1.7 %)	820 (2.5 %)	779 (5.9 %)	806 (6.0 %)

with the findings reported by Duñabeitia et al. (2007), but are consistent with all of the statistically reliable English studies (Beyersmann et al., 2012; Beyersmann et al., 2013; Rueckl & Rimzhim, 2011). Because our stimuli were so closely matched across language versions of the experiment, we can be assured that there is no difference between Spanish and English in the coding of orthographic information, as had seemed to be implied by the previous literature.

Our findings therefore add to the growing body of literature suggesting that the transposed-letter benefit is not affected by the position of the transposed letters relative to the morpheme boundary. The work of Duñabeitia et al. (2007) is a clear outlier in this body of literature. In light of our findings, we believe that the findings of Duñabeitia et al. reflected idiosyncratic properties of the stimuli or the participants, or a Type I error.

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Appendix

Target	TL-Across	TL-Within	RL-Across	RL-Within
Spanish Stimuli				
abundancia	abunadncia	abnudancia	abunotncia	abrodancia
accesible	acceisble	acecsible	acceerble	acarsible
accidental	accidenatl	acicdental	accidenefl	acerdental
acrobático	acrobáitco	acorbático	acrobáelco	acasbático
activar	actiavr	acitvar	actiozr	acelvar
acusación	acuasción	aucsación	acuección	aorsación
adaptable	adapatble	adpatable	adapilble	adjotable
admirable	admiarble	amdirable	admiexble	artirable
adopción	adocpión	aodpción	adorjión	aebpción
alcohólico	alcohóilco	alochólico	alcohóetco	alashólico
asistencia	asisetncia	assitencia	asisilncia	ascatencia
atlético	atléitco	atéltico	atléofco	atoftico
banquero	banqeuro	baqnuero	banqoaro	bagsuero
clasicismo	clasiicsmo	claiscismo	clasiezsmo	claercismo
comparable	compaarble	copmarable	compaecble	cojnarable
confesión	confeisón	cofnesión	confeacón	cohresión
contable	conatble	cnotable	conolble	cretable
idealista	ideailsta	iedalista	ideaufsta	iotalista
dictatorial	dictatoiral	ditcatorial	dictatoecal	dilsatorial
editorial	editoiral	edtiorial	editousal	edhaorial
evaluación	evalaución	evlauación	evaleoción	evtouación
generación	genearción	geenración	geneosción	geasración
heroísmo	heríosmo	hreoísmo	hereasmo	hsuoísmo
imaginable	imagianble	imgainable	imagiorble	imjoinable
legendario	legenadrio	legnedario	legenotrio	legrudario
liberalismo	liberailsmo	libearlismo	liberaofsmo	libeoslismo
limonada	limoanda	liomnada	limoerda	liesnada
marginal	margianl	magrinal	margiorl	mapcinal
miserable	misearble	miesrable	miseonble	miocrable
molecular	molecualr	moelcular	molecuetr	moatcular
oriental	orienatl	oreintal	orienofl	oroantal
perversión	perverisón	pevrersión	perverecón	pensersión
pintor	pinotr	pnitor	pinalr	prator

racista	raicsta	rcaista	raersta	rsoista
razonable	razoanble	raoznable	razoerble	raesnable
realismo	reailsmo	raelismo	reaotsmo	roulismo
recital	reciatl	rceital	reciefl	rsoital
simbolismo	simboilsmo	sibmolismo	simboetsmo	sidvolismo
sintáctico	sintácitco	sitnáctico	sintácelco	silsáctico
tropical	tropiacl	trpoical	tropiorl	trgaical
urgencia	urgecnia	uregncia	urgarnia	urapncia
verbal	verabl	vrebal	verodl	vsobal
vocacional	vocacioanl	voaccional	vocacioerl	voencional
invitación	inviatción	inivtación	inviolción	inastación
antisocial	antsiocial	antisoical	antraocial	antisoesal
antítesis	anttíesis	antíteiss	antfoesis	antíteacs
biosfera	bisofera	biosfrea	bicafera	biosfcoa
impersonal	ipmersonal	imperosnal	ignersonal	imperarnal
coautor	caoutor	coatuor	ceiutor	coaleor
copiloto	cpoiloto	copiolto	cjeiloto	copiafto
desconectar	decsonectar	descoenctar	dervonectar	descoavctar
deshonesto	dehsonesto	deshonseto	detronesto	deshonruto
desilusión	deislusión	desilsuión	deorlusión	desilcaión
desleal	delseal	deslael	detceal	desluol
desorden	deosrden	desodren	deacrden	desotsen
disparidad	dipsaridad	dispardiad	digraridad	disparbead
impaciente	ipmaciente	impaceinte	iqnaciente	impacounte
imperfecto	ipmerfecto	impefrecto	igrerfecto	impelsecto
imparcial	ipmarcial	impacrial	ijnarcial	impasnial
impropio	ipmropio	improipo	igsropio	improajo
incoherente	icnoherente	incohreente	irsoherente	incohnaente
incorrecto	icnorrecto	incorercto	isrorrecto	incorascto
indecente	idnecente	indecnete	itrecente	indecrite
indirecto	idnirecto	indirceto	ifsirecto	indirsuto
indiscreto	idniscreto	indisrceto	ilriscreto	indisnseto
informal	ifnormal	infomral	itsormal	infoncal
inhumano	ihnumano	inhuamno	ilrumano	inhuirno
injusticia	ijnusticia	injusitcia	ipsusticia	injuselcia
interacción	intearcción	interacicón	inteozcción	interacarón
invisible	ivnisible	inviisble	icrisible	invierble
prehistoria	prheistoria	prehitsoria	prloistoria	prehifroria
prematuro	prmeaturo	premtauro	prniaturo	premlouro
presuponer	prseuponer	presupnoer	prcauponer	presupraer
reactivar	raectivar	reactviar	ruoctivar	reactzoar
reconstruir	rceonstruir	recontsruir	rsaonstruir	reconlcruir
reformado	rfeormado	refomrado	rlaormado	refonsado
regenerar	rgeenerar	regenrear	rqoenerar	regensoar
rehabilitar	rheabilitar	rehaiblitar	rfoabilitar	rehaedlitar
reproducir	rperoducir	reprdoucir	rgaroducir	reprbaucir
reunir	ruenir	reuinr	roanir	reuacr
semifinal	semfiinal	semifnial	semloinal	semifroal
semicírculo	semciírculo	semicíruclo	semraírculo	semicíraslo
subatómico	suabtómico	subatmóico	suodtómico	subatneico
subdividir	sudbividir	subdivdiir	sutlividir	subdivboir
submarino	sumbarino	submairno	sundarino	submaesno

subnormal	sunbormal	subnomral	suvdormal	subnonsal
supermercado	supemrercado	supermecrado	supensercado	supermesnado
unilateral	unliateral	unilatreal	unfeateral	unilatcoal
English Stimuli				
abundance	abunadnce	abnudance	abunotnce	abrodance
accessible	accesisble	acecssible	acceserble	acarssible
accidental	accidenatl	acicdental	accidenefl	acerdental
acrobatic	acrobaitc	acorbatic	acrobaelc	acasbatic
activate	actiavte	acitvate	actiozte	acelvate
accusation	accuastion	acucsation	acuection	acorsation
adaptable	adapatble	adpatable	adapilble	adjotable
admirable	admiarble	amdirable	admiexble	artirable
adoption	adopiton	aodption	adorjion	aebption
alcoholic	alcohoilc	alocholic	alcohoetc	alasholic
assistance	assisatnce	asssitance	assisilnce	asscatance
athletic	athleitc	atheltic	athleofc	athoftic
banker	banekr	bnaker	banotr	bruker
classicism	classiicsm	clasiscism	classiezsm	clasercism
comparable	compaarble	copmarable	compaecble	cojnarable
confession	confesison	cofnession	confesacon	cohression
countable	counatble	conutable	counolble	coretable
idealist	ideailst	iedalist	ideaufst	iotalist
dictatorial	dictatoiral	ditcatorial	dictatoecal	dilsatorial
editorial	editoiral	edtiorial	editousal	edhaorial
evaluation	evalaution	evlauation	evaleotion	evtouation
generation	geneartion	geenration	geneostion	geasration
heroism	heriosm	hreoism	hereasm	hsuoism
imaginable	imagianble	imgainable	imagiorble	imjoinable
legendary	legenadry	legnedary	legenotry	legrudary
liberalism	liberailsm	libearlism	liberaofsm	libeoslism
lemonade	limoande	liomnade	limoerde	liesnade
marginal	margianl	magrinal	margiorl	mapcinal
miserable	misearble	miesrable	miseonble	miocrable
molecular	molecualr	moelcular	molecuetr	moatcular
oriental	orienatl	oreintal	orienofl	oroantal
perversion	perverison	pevrersion	perverecon	pensersion
painter	painetr	paniter	painalr	parator
racist	raicst	rcaista	raerst	rsoist
reasonable	reasoanble	reaosnable	reasoerble	reaeznable
realism	reailsm	raelism	reaotsm	roulism
recital	reciatl	rceital	reciefl	rsoital
symbolism	symboilsm	sybmolismo	symboetsm	sydvolism
syntactic	syntacitc	sytnactic	syntacelc	sylsactic
tropical	tropiacl	trpoical	tropiorl	trgaical
urgency	urgecny	uregncy	urgarny	urepscy
verbal	verabl	vrebal	verodl	vsobal
vocational	vocatioanl	voactional	vocatioerl	voentional
invitation	inviattion	inivtation	invioltion	inastation
antisocial	antsiocial	antisoical	anlriocial	antisoesal
antithesis	anttihesis	antitheiss	antfohesis	antitheacs
biosphere	bisophere	biosphree	bicaphere	biosphcoe
impersonal	ipmersonal	imperosnal	ignersonal	imperarnal

coauthor	caouthor	coatuhor	ceiuthor	coalehor
copilot	cpoilot	copiolt	cjeilot	copiaft
disconnect	dicsonnect	disconenct	dervonnect	desconavct
dishonest	dihsonest	dishonset	ditronest	dishonrut
disillusion	diisllusion	disillsuion	diorllusion	desillcaion
disloyal	dilsoyal	dislyoal	ditcoyal	disljel
disorder	diosrder	disodrer	diacrder	disotser
disparity	dipsarity	dispartiy	digrarity	disparbey
impatient	ipmatient	impateint	iqnatient	impacount
imperfect	ipmerfect	impefrect	igrerfect	impelsect
impartial	ipmartial	impatrial	ijnartial	impasnial
improper	ipmroper	improepr	igsroper	improajr
incoherent	icnoherent	incohreent	irsoherent	incohnaent
incorrect	icnorrect	incorerct	isrorrect	incorasct
indecent	idnecent	indecnet	itrecent	indecrit
indirect	idnirect	indircet	ifsirect	indirsut
indiscreet	idniscreet	indisrceet	ilriscreet	indisnseet
informal	ifnormal	infomral	itsormal	infoncal
inhuman	ihnuman	inhuamn	ilruman	inhuirn
injustice	ijnustice	injusitce	ipsustice	injuselce
interaction	intearction	interaciton	inteozction	interacalon
invisible	ivnisible	inviisble	icrisible	invierble
prehistory	prheistory	prehitsory	pcleistory	prehifrory
premature	prmeature	premtaure	psneature	premloure
presuppose	prseuppose	presuppsoe	prcauppose	presupprae
reactivate	raectivate	reactviate	ruoctivate	reactzoate
reconstruct	rceonstruct	recontsruct	rsaonstruct	reconlcruct
reformed	rfeormed	refomred	rlaormed	refonsed
regenerate	rgeenerate	regenreate	rqoenerate	regensoate
rehabilitate	rheabilitate	rehaiblitate	rfoabilitate	rehaedlitate
reproduce	rperoduce	reprdouce	rgaroduce	reprbauce
reunite	ruenite	reuinte	roanite	reuacte
semifinal	semfiinal	semifnial	semloinal	semifroal
semicircle	semciircle	semicricle	semraircle	semicsacle
subatomic	suabtomic	subatmoic	suodtomic	subatneic
subdivide	sudbivide	subdivdie	sutlivide	subdivboe
submarine	sumbarine	submairne	sundarine	submaesne
subnormal	sunbormal	subnomral	suvdormal	subnonsal
supermarket	supemrarket	supermakret	supensarket	supermatset
unilateral	unliateral	unilatreal	unfeateral	unilatcoal

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