

Lexicostatistics of English, German and Dutch

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DOI: <https://doi.org/10.52403/ijrr.20220536>

ABSTRACT

The purpose of this research is to determine how the relationship between English and German, English with Dutch and German with Dutch. In addition, this research is objective to finding the kinship of the three languages, the distance between the three languages is also discussed using a formula. The method used is qualitative and quantitative with data collection carried out in three stages, namely: (1) data condensation, (2) data presentation, and (3) drawing conclusions. The results showed that the percentage of kinship in English and German was 20.77% at family level with a separation time of 2,500 – 5,000 years. The percentage of kinship in English and Dutch is 32.36% at family level with separation time between 2,500 – 5,000 years and the percentage of kinship in German and Dutch is 49.75% at family level with separation time between 500 – 2,500 years. The split between English and German was 3707 years ago. The time of separation of English and Dutch was 2624 years ago and the time of separation of German and Dutch was 1642 years ago. The error range for English and German is 2193 years, the error range for English and Dutch is 1574 years and the error range for German and Dutch is 942 years.

Keywords: Lexicostatistics, English, German, Dutch

INTRODUCTION

In the history of language development, the journey of a person in this world has a very long and long span. According to Chomsky (Keraf, 1988) language began to develop for the first time 100,000 years ago. At first language

development was very limited but over time language development was so fast. In the process, each language that appears is a language that comes from the same proto or from a different proto. The kinship of a language cannot be separated from the existence of identical similarities or similarities in the vocabulary of a language. (Syafi'i & Ibrahim, 2019) stated that linguistic experts classify the world's languages into several groups, namely there are at least 14 (fourteen) major groups of languages in the world. The fourteen groups are as follows, Niger-Corofanian, Trans-New Guinea, Indo-European, Afro-Asiatic, Sino-Tibetan, Australian, Nilo-Saharan, Oto-Manguean, Austro-Asiatic, Sepi-Ramu, Dravidian, Tai- Kadai, and Tupi. Of the fourteen languages, English, German and Dutch are included in the proto-Indo-European languages.

This language classification is one way to see the kinship of a language. The grouping of related languages is discussed in the study of comparative historical linguistics. The comparative method is one method to see the kinship and similarities of the two languages. The technique that can be used is the lexicostatistic technique. (Crowley & Bower, 2010) states that lexicostatistics is able to determine the level of relationship between two languages by comparing vocabulary and determining the level of similarity in the languages being compared. In line with Clowey's opinion, (Dardanila, 2018) states that lexicostatistics is a technique that allows us to determine

the level of relationship between two languages using the easiest way, namely by comparing the vocabulary in these languages which can then be seen and determined. the degree of similarity between the vocabularies of the two languages. Thus, the extent to which the kinship of one language with another language can be known.

Research on lexicostatistics has been carried out by several researchers. (Mayangsari, 2020) conducted research on the lexicostatistics of Bugis and Toraja languages. This study focuses on knowing the relationship between Bugis and Toraja languages and knowing the distance between these languages. From the results of the study it was found that the percentage of kinship between the two languages was 53% and Bugis and Toraja languages began to separate from Proto languages between 393-723 AD (calculated from 2020). The same research was also conducted by (Wahab & Halin, 2021) but in different languages, namely Banjarese and Malay. From the results of this study, it was found that the Banjarese and Malay languages were separated from the 17th century to the 19th century.

From the results of research by several researchers on lexicostatistics that have been carried out, almost most of the research on lexicostatistics discusses regional languages and originates from proto-Austronesian. In this study, the Indo-European proto became the research data in the study of lexicostatistics. The Indo-European proto languages used as data are English, German, and Dutch. All three languages are of proto-Indo-European origin. Proto Indo-European is the proto group of related languages with the largest number of speakers in the world. There are hundreds of languages currently spoken that belong to this language family. Many languages belonging to this family has a very long written history (the second oldest after the Afroasiatic language family) so that the study is relatively accurate and language comparisons can be applied more

carefully. Approximately half of the 6 billion people on earth speak the mother tongue of one of these language families. The name Indo-European is used because the native speakers inhabit the region stretching from India to Europe, given by its first researcher, Sir William Jones. After the imperialism era in the 19th century, the speakers of this language family even spread to the Pacific and the American continent. The languages being compared are English and German, English and Swedish, and German and Swedish.

In the research, the problems discussed are about how the relationship between English and German, English and Dutch and German and Dutch are related. In addition to finding the kinship of the three languages, the distance between the three languages is also discussed using a formula.

METHODS

The approach used in this research is a qualitative and quantitative approach. A qualitative approach was used to find Swadesh data for the three languages and then analyzed to find vocabularies that have the same vocabulary in looking for kinship in the three languages. After the data from the qualitative approach is obtained, then the data will be calculated using a quantitative approach to find the results of the separation and determine the level of kinship in the form of numbers. Data collection on a qualitative approach in research was carried out in three stages, namely: (1) data condensation, (2) data presentation, and (3) drawing conclusions (Miles et al., 2014).

RESULT

The results showed that the percentage of kinship in English and German was 20.77% at family level with a separation time of 2,500 – 5,000 years. The percentage of kinship in English and Dutch is 32.36% at family level with separation time between 2,500 – 5,000 years and the percentage of kinship in German and Dutch is 49.75% at family level with separation

time between 500 – 2,500 years. The split between English and German was 3707 years ago. The time of separation of English and Dutch was 2624 years ago and the time of separation of German and Dutch was 1642 years ago. The error range for English and German is 2193 years, the error range for English and Dutch is 1574 years and the error range for German and Dutch is 942 years.

DISCUSSION

The data for the Swadesh vocabulary of the three languages are taken from the Wiktionary. The Swadesh vocabulary data is 207 words. In analyzing the data, there are several steps that must be taken, namely; 1) register 207 Swadesh words into the table and check the basic vocabulary of the three languages, 2)

determine related words by considering the similarity of sound and meaning, sound changes that occur between the three languages and the possibility of contact and borrowing of words those, 3) list the glosses that are considered related. These glosses are then totaled and calculated using the formula for the level of kinship of the language under study, 4) after the level of kinship is found, it can be calculated the length of time apart from the language under study, 5) after obtaining data on the time of separation, the next step is to know the term standard error between the languages studied (Shafi'i and Ibrahim, 2019). The following data are English, German, and Dutch Swadesh data along with their glosses.

Table 4.1 Gloss and Swadesh English and German

Number	Data Number	Gloss	English	German
1.	2	You	ju:	du:
2.	3	He	'hi:	zi:
3.	7	This	ðis	di:s
4.	9	Here	hiə	hi:ç
5.	30	Thick	θik	dik
6.	35	Thin	θin	dyn
7.	37	Man	mæn	Man
8.	43	Father	'fa:ðə	'fa:te
9.	45	Fish	fɪʃ	fɪʃ
10.	48	Louse	laʊs	laʊs
11.	53	Stick	stɪk	ʃtɔk
12.	54	Fruit	fru:t	fʁʊxt
13.	60	Grass	grɑ:s	çʁɑ:s
14.	64	Blood	blʌd	blu:t
15.	66	Fat	fæt	fet
16.	68	Horn	hɔ:n	hɔ:n
17.	70	Feather	'feðə	'fe:ðe
18.	71	Hair	heə	ha:ç
19.	79	Fingernail	'fɪŋgənɪl	'fɪŋnɑ:gəl
20.	80	Foot	fʊt	fu:s
21.	82	Knee	ni:	kni:
22.	89	Breast	bɹɛst	bʁœst
23.	92	Drink	drɪŋk	'tʁɪŋkən
24.	125	Stand	stænd	'ʃte:ən
25.	127	Fall	fɔ:l	'falən
26.	146	Swell	swel	'ʃvelən
27.	155	Salt	sɔ:lt	zalts
28.	156	Stone	stəʊn	ʃtaɪn
29.	163	Wind	wɪnd	vɪnt
30.	164	Snow	snəʊ	ʃne:
31.	165	Ice	aɪs	aɪs
32.	166	Smoke	sməʊk	ʁəʊx
33.	168	Ash	æʃ	'aʃə
34.	173	Green	ɡri:n	çʁɛ:v:n
35.	177	Night	naɪt	naxt
36.	180	Warm	wɔ:m	vɑ:rm
37.	182	Full	fʊl	fɔl
38.	183	New	nju:	nɔʏ
39.	185	Good	ɡʊd	qu:t
40.	190	Round	raʊnd	çʁʊnt

41.	191	Sharp	ʃɑ:p	ʃaʃf
42.	199	Right	raɪt	ʁeçt
43	202	In	ɪn	ɪn

From the data that has been analyzed, it was found that 43 data had similar sounds and meanings. From the forty-three data, it is calculated based on the equation of the word kin with the following formula:

Description:

Kinship words

$$c = \frac{k}{n} \times 100\%$$

c = cognate (percentage of language kinship)

k = the amount of kinship words

n = the amount of words compared

The number of related words in the data is 43 and the number of words compared is 207. So the calculation of the comparison data for English and German is as follows:

$$c = \frac{43}{207} \times 100$$

$$c = 0,2077 \times 100$$

$$c = 20,77\%$$

Then after getting the results of the percentage of language kinship, the next step is to categorize the language into a family, clump, or phylum based on the following table.

Group	Time Depth	Kinship Level
Language	0-500 years	81 – 100%
Family	500 – 2.500 years	36 – 81%
Clump	2.500 – 5.000 years	12 – 36%
Microphylum	5.000 – 7.500 years	4 – 12 %
Mesophylum	7.500 – 10.000 years	1 – 4 %
Macrophylum	Up to 10.000 years	1%

If seen from the table data, English and German are grouped in Swadesh at the family level with a separation time of 2,500 – 5,000 years with a percentage of 20.77%. After that, to find out the time span between the two languages, it is calculated by the following formula:

$$t = \frac{\log c}{2 \log r}$$

Description:

t = time depth

r = retention

c = cognate

Based on the formula, it is known that the vocabulary endurance (r) is 805 and the percentage of kin is 20.77%. Then the calculation of the separation time is as follows;

$$t = \frac{\log c}{2 \log r}$$

$$t = \frac{\log 20}{2 \log 805}$$

$$t = \frac{2 \times 217}{1609}$$

$$t = 3,707$$

From the calculation of the separation time in the two languages then multiply by a thousand and it can be concluded that the English and German groups separated 3707 years ago.

After knowing the distance between English and German, the next step is to calculate the error range of the two languages using the following formula:

$$S = \frac{\sqrt{c(1-c)}}{n}$$

Description:

S = Standard error of words kinship

c = kinship percentage

n = the amount of words compared

It is known that c = 20.77% or equal to 0.20, n = 207, then the results of the calculation of the formula are:

$$S = \frac{\sqrt{c(1-c)}}{n}$$

$$S = \frac{\sqrt{0,20(1-0,20)}}{207}$$

$$S = \frac{\sqrt{0,20 \times 0,8}}{207}$$

$$S = \frac{\sqrt{0,16}}{207}$$

$$S = \sqrt{0,00077}$$

$$S = 0,02$$

Based on the standard error value, the error term is obtained using the following formula:

$$t_1 = \frac{\log(c+s)}{2 \log r}$$

$$t_1 = \frac{\log(0,20+0,02)}{2 \log 805}$$

$$t_1 = \frac{\log 0,22}{434}$$

$$t_1 = \frac{6575}{434}$$

$$t_1 = 15,14$$

Thus the error term is:
 $t - t_1 = 3707 - 1514 = 2193$

From these calculations, it can be concluded that the error term for English and German is 2193 years.

The following languages are compared, namely English and German. Here are English and Dutch glosses and Swadesh.

Table 4.2 Gloss and Swadesh English and Dutch

Number	Data Number	Gloss	English	Dutch
1.	3	He	'hi:	hei
2.	4	We	wi:	wei
3.	6	They	ðei	zei:
4.	7	This	ðis	dit
5.	8	That	ðæt	dat
6.	9	Here	hiə	hi:r
7.	12	What	wɒt	vət
8.	15	How	haʊ	hu
9.	16	Not	nɒt	nit
10.	17	All	ɔ:l	al
11.	23	Two	tu:	twe:
12.	24	Three	θri:	dri
13.	26	Five	faiv	veif
14.	28	Long	lɒŋ	lan
15.	30	Thick	θɪk	dɪk
16.	33	Short	ʃɔ:t	kɔrt
17.	35	Thin	θɪn	dɪn
18.	37	Man	mæn	man
19.	42	Mother	'mʌðə	'mudər
20.	43	Father	'fa:ðə	'va:dər
21.	45	Fish	fɪʃ	vis
22.	50	Worm	wɜ:m	vɔrm
23.	53	Stick	stɪk	stɔk
24.	60	Grass	grɑ:s	ɣras
25.	64	Blood	blʌd	blut
26.	65	Bone	bəʊn	be:n
27.	66	Fat	fæt	vət
28.	67	Egg	eg	ei
29.	68	Horn	hɔ:n	'hɔ:rn
30.	78	Tongue	tʌŋ	tɔŋ
31.	79	Fingernail	'fɪŋgənɪl	'vɪŋər'na:yəl
32.	80	Foot	fʊt	vut
33.	82	Knee	ni:	kni
34.	87	Neck	nek	nek
35.	89	Breast	brɛst	bɔrst
36.	90	Heart	hɑ:t	hart
37.	91	Liver	'lɪvə	'le:vər
38.	92	Drink	driŋk	'driŋkə
39.	107	Sleep	sli:p	'sla:pə
40.	124	Sit	sɪt	'zɪtə
41.	125	Stand	stænd	sta:n
42.	141	Sing	sɪŋ	'ziŋə
43.	145	Freeze	fri:z	'vri:zə
44.	146	Swell	swel	'zvelə
45.	148	Moon	mu:n	ma:n
46.	149	Star	stɑ:	ster
47.	150	Water	'wɔ:tə	'vɑ:tər
48.	151	Rain	reɪn	're:yən
49.	152	River	'rɪvə	ri'vi:r
50.	156	Stone	stəʊn	ste:n
51.	163	Wind	wɪnd	vɪnt
52.	164	Snow	snəʊ	sne:w
53.	165	Ice	aɪs	eis
54.	168	Ash	æʃ	as

Table no: 4.2 continued....

55.	173	Green	gri:n	γrun
56.	177	Night	nait	naxt
57.	180	Warm	wɔ:m	varm
58.	181	Cold	kəold	kout
59.	182	Full	fɒl	vɒl
60.	183	New	nju:	ni:w
61.	184	Old	əold	out
62.	185	Good	gud	γut
63.	190	Round	raʊnd	rɔnt
64.	191	Sharp	ʃa:p	sxerp
65.	196	Correct	kə'rekt	kə'rekt
66.	202	In	in	in
67.	204	And	ænd	en

From the data above, it was found 67 data that have sound similarity and sound similarity and meaning. From the sixty-seven data, it is calculated based on the similarity of the word kin with the formula that has been described previously:

$$c = \frac{k}{n} \times 100\%$$

$$c = \frac{67}{207} \times 100$$

$$c = 0,3236 \times 100$$

$$c = 32,36\%$$

From this data, the cognates, which amounted to 32.36%, were included in the category of clump level with a separation time of 2,500-5,000 years. After that, to find out the time span between the two languages, it is calculated by the formula and the calculation is as follows:

It is known that the vocabulary endurance (r) is 805 and the percentage of kin is 32.36%. Then the calculation of the separation time is as follows;

$$t = \frac{\log c}{2 \log r - \log 32}$$

$$t = \frac{2 \log 805}{1139}$$

$$t = \frac{2 \times 217}{1139}$$

$$t = \frac{434}{434}$$

$$t = 2,624$$

From the calculation of the separation time in the two languages then multiply by a thousand and it can be concluded that the English and Dutch groups separated 2624 years ago.

After knowing the distance between English and Dutch, the next step is

to calculate the error range of the two languages using the following formula:

$$S = \frac{\sqrt{c(1-c)}}{n}$$

it is known that c = 32.36% or equal to 0.32, n = 207, then the results of the calculation in the formula are:

$$S = \frac{\sqrt{c(1-c)}}{n}$$

$$S = \frac{\sqrt{0,32(1-0,32)}}{207}$$

$$S = \frac{\sqrt{0,20 \times 0,68}}{207}$$

$$S = \frac{\sqrt{0,2176}}{207}$$

$$S = \sqrt{0,00105}$$

$$S = 0,03$$

Based on the standard error value, the error term is obtained using the following formula:

$$t_1 = \frac{\log(c+s)}{2 \log r}$$

$$t_1 = \frac{\log(0,32+0,03)}{2 \log 805}$$

$$t_1 = \frac{\log 0,35}{434}$$

$$t_1 = \frac{4559}{434}$$

$$t_1 = 10,50$$

Thus the error term is:

$$t - t_1 = 2624 - 1050 = 1574$$

From these calculations, it can be concluded that the error term for English and Dutch is 1574 years.

The following languages are compared, namely German and Dutch. Here are German and Dutch glosses and Swadesh.

Table 4.3 Gloss and Swadesh German and Dutch

Number	Data Number	Gloss	German	Dutch
1.	1	I	ɪç	ik
2.	7	This	di:s	dɪt
3.	8	That	das,	dat
4.	9	Here	hi:ç	hi:r
5.	10	There	da:	da:r
6.	16	Not	nɪçt	nit
7.	17	All	'alə	al
8.	20	Few	've:nɪç	'vɛinəç
9.	21	Other	'and(ə)ʁə	'andər
10.	24	Three	dʁaɪ	dri
11.	25	Four	fi:ç	vi:r
12.	28	Long	laŋ	laŋ
13.	29	Wide	bʁaɪt, vaɪt	bre:t, vɛit
14.	30	Thick	dɪk	dɪk
15.	32	Small	kleɪn	kleɪn
16.	33	Short	kœʁts	kœrt
17.	34	Narrow	'ʃma:l	smal
18.	35	Thin	dʏn	dʏn
19.	36	Woman	fʁaʊ	vrou
20.	37	Man	Man	man
21.	38	Human	mɛnʃ	mens
22.	39	Child	kɪnt	kɪnt
23.	40	Wife	fʁaʊ	vrou
24.	41	Husband	man	man
25.	42	Mother	'mœtə	'mudər
26.	43	Father	'fa:tə	'va:dər
27.	45	Fish	fiʃ	vis
28.	46	Bird	'fœ:gəl	'vo:yəl
29.	47	Dog	hœnt	hont
30.	49	Snake	'ʃlaŋə	slan
31.	50	Worm	vœʁm	vœrm
32.	51	Tree	baʊm	bo:m
33.	53	Stick	'stœk	stœk
34.	55	Seed	za:t	za:t
35.	56	Leaf	blat	blat
36.	57	Root	vœʁtsəl	'vœrtəl
37.	59	Flower	'blu:mə	blum
38.	60	Grass	gʁɑ:s	gras
39.	64	Blood	blu:t	blut
40.	66	Fat	fœt	vœt
41.	67	Egg	ɑɪ	ɛi
42.	68	Horn	hœʁn	'ho:rn
43.	71	Hair	ha:ç	ha:r
44.	72	Head	kœpf	kœp
45.	73	Ear	œ:ç	œ:r
46.	76	Mouth	mœnt	mœnt
47.	77	Tooth	tʁa:n	tant
48.	79	Fingernail	'fɪŋə:nɑ:gəl	'vɪŋər'na:yəl
49.	82	Knee	kni:	kni
50.	83	Hand	hant	hant
51.	84	Wing	'fli:gəl	'vlœ:yəl
52.	89	Breast	bœʁst	bœrst
53.	90	Heart	hœʁts	hart
54.	91	Liver	'le:bœ	'le:vœr
55.	92	Drink	'tʁɪŋkœn	'drɪŋkœ
56.	98	Blow	'bla:zœn	'bla:zœ
57.	100	Laugh	'lɑ:xœn	'lɑ:xœ
58.	102	Hear	'hœ:kœn	'ho:rœ
59.	104	Think	'dœŋkœn	'dœŋkœ
60.	107	Sleep	'flɑ:fœn	'slɑ:pœ
61.	111	Fight	'fœçtœn	'vœxtœ
62.	112	Hunt	'jɑ:gœn	'jɑ:gœ
63.	114	Cut	'fnaɪdœn	'sneɪdœ
64.	115	Split	'ʃpaltœn	'splɛɪtœ
65.	120	Fly	'fli:gœn	'vli:yœ
66.	122	Come	'kœmœn	'ko:mœ
67.	127	Fall	'falœn	'valœ
68.	137	Tie	'bindœn	'bindœ
69.	141	Sing	'ziŋœn	'ziŋœ

Table no :4.3 continued...

70.	146	Swell	'fvelən	'zuelə
71.	147	Sun	'zənə	zən
72.	149	Star	'stɛr	stɛr
73.	151	Rain	'ke:gən	're:yən
74.	157	Sand	zant	zant
75.	159	Earth	'e:ɝdə	'a:rdə
76.	161	Fog	'ne:bəl	'ne:vəl
77.	162	Sky	'hɪmə	'he:məl
78.	163	Wind	vɪnt	vɪnt
79.	164	Snow	'fne:	sne:w
80.	165	Ice	aɪs	eɪs
81.	166	Smoke	'vəʊk	ro:k
82.	168	Ash	'aʃə	as
83.	171	Mountain	bɛrk	berx
84.	172	Red	rɔ:t	ro:t
85.	173	Green	grɛ:n	grun
86.	177	Night	naxt	naxt
87.	179	Year	ja:ɝ	ja:r
88.	180	Warm	vɔ:rm	vɔ:rm
89.	182	Full	fəl	vəl
90.	185	Good	gu:t	yut
91.	186	Bad	'flekt	slext
92.	190	Round	rəʊnt	rəʊnt
93.	191	Sharp	'ʃɔ:rp	sxɛrp
94.	192	Blunt	'blʊnt	stɔmp
95.	193	Smooth	glat	ylat
96.	194	Wet	nas	nət
97.	198	Far	fɛr	vɛr
98.	199	Right	raxt	rɛxts
99.	200	Left	lɪft	lɪfts
100.	201	At	an	a:n
101.	202	In	ɪn	ɪn
102.	203	With	mit	met
103.	207	Name	'na:mə	na:m

From the data above, it was found 103 data which have similar sounds and sound similarities and meanings. Of the one hundred and three data, it is calculated based on the similarity of the word kin with the formula that has been described previously:

$$c = \frac{k}{n} \times 100\%$$

$$c = \frac{103}{207} \times 100$$

$$c = 0,4975 \times 100$$

$$c = 49,75\%$$

From this data, 49.75% of cognates fall into the category of family level (family) with a separation time of 500-2,500 years. After that, to find out the time span between the two languages, it is calculated by the formula and the calculation is as follows:

It is known that the vocabulary endurance (r) is 805 and the percentage of kin is 49.75% or fulfilled to 50%. Then the calculation of the separation time is as follows;

$$t = \frac{\log c}{2 \log r - \log 49}$$

$$t = \frac{2 \log 805}{713}$$

$$t = \frac{2 \times 217}{713}$$

$$t = \frac{434}{434}$$

$$t = 1,642$$

From the results of the calculation of the separation time in the two languages then multiply by a thousand and it can be concluded that the German and Dutch language groups separated 1642 years ago.

After knowing the distance between German and Dutch, the next step is to calculate the error range of the two languages using the following formula:

$$S = \frac{\sqrt{c(1-c)}}{n}$$

it is known that c = 49.75% or equal to 0.49, n = 207, then the results of the calculation in the formula are:

$$S = \frac{\sqrt{c(1-c)}}{\frac{n}{207}}$$

$$S = \frac{\sqrt{0,49(1-0,49)}}{207}$$

$$S = \frac{\sqrt{0,49 \times 0,51}}{207}$$

$$S = \frac{\sqrt{0,2499}}{207}$$

$$S = \sqrt{0,00120}$$

$$S = 0,034$$

Based on the standard error value, the error term is obtained using the following formula:

$$t_1 = \frac{\log(c+s)}{2 \log r}$$

$$t_1 = \frac{\log(0,49+0,03)}{2 \log 805}$$

$$t_1 = \frac{\log 0,52}{434}$$

$$t_1 = \frac{2839}{434}$$

$$t_1 = 6,54$$

Thus the error term is:

$$t - t_1 = 1596 - 654 = 942$$

From these calculations, it can be concluded that the error term for German and Dutch is 942 years.

CONCLUSION

The results showed that the percentage of kinship in English and German was 20.77% at family level with a separation time of 2,500 – 5,000 years. The percentage of kinship in English and Dutch is 32.36% at family level with separation time between 2,500 – 5,000 years and the percentage of kinship in German and Dutch is 49.75% at family level with separation time between 500 – 2,500 years. The split between English and German was 3707 years ago. The time of separation of English

and Dutch was 2624 years ago and the time of separation of German and Dutch was 1642 years ago. The error range for English and German is 2193 years, the error range for English and Dutch is 1574 years and the error range for German and Dutch is 942 year.

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How to cite this article: Dewi Nurmala, Dwi Widayati. Lexicostatistics of English, German, and Dutch. *International Journal of Research and Review*. 2022; 9(5):281-289. DOI: <https://doi.org/10.52403/ijrr.20220536>
