

Supplementary Information for

Historical language records reveal a surge of cognitive distortions in recent decades.

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Table S1. English (US): Cognitive distortion types and corresponding 1- to 5-grams (Cognitive Distortion Schemata). All data are available at: https://github.com/jbollen/cognitivedistortions_gbooks.

Category	Cognitive Distortion Schemata
Catastrophizing: Exaggerating the importance of negative events	will fail, will go wrong, will end, will be impossible, will not happen, will be terrible, will be horrible, will be a catastrophe, will be a disaster, will never end, will not end
Dichotomous Reasoning: Thinking that an inherently continuous situation can only fall into two categories	only, every, everyone, everybody, everything, everywhere, always, perfect, the best, all, not a single, no one, nobody, nothing, nowhere, never, worthless, the worst, neither, nor, either or, black or white, ever
Disqualifying the Positive: Unreasonably discounting positive experiences	great but, good but, OK but, not that great, not that good, it was not, not all that, fine but, acceptable but, great yet, good yet, OK yet, fine yet, acceptable yet
Emotional Reasoning: Thinking that something is true based on how one feels, ignoring the evidence to the contrary	but I feel, since I feel, because I feel, but it feels, since it feels, because it feels, still feels
Fortune-telling: Making predictions, usually negative ones, about the future	I will not, we will not, you will not, they will not, it will not, that will not, he will not, she will not
Labeling and mislabeling: Labeling yourself or others while discounting evidence that could lead to less disastrous conclusions	I am a, he is a, she is a, they are a, it is a, that is a, sucks at, suck at, I never, he never, she never, you never, we never, they never, I am an, he is an, she is an, they are an, it is an, that is an, a burden, a complete, a completely, a huge, a loser, a major, a total, a totally, a weak, an absolute, an utter, a bad, a broken, a damaged, a helpless, a hopeless, an incompetent, a toxic, an ugly, an undesirable, an unlovable, a worthless, a horrible, a terrible
Magnification and Minimization: Magnifying negative aspects or minimizing positive aspects	worst, best, not important, not count, not matter, no matter, the only thing, the one thing
Mental Filtering: Paying too much attention to negative details instead of the whole picture	I see only, all I see, all I can see, can only think, nothing good, nothing right, completely bad, completely wrong, only the bad, only the worst, if I just, if I only, if it just, if it only
Mindreading: Believing you know what others are thinking	everyone believes, everyone knows, everyone thinks, everyone will believe, everyone will know, everyone will think, nobody believes, nobody knows, nobody thinks, nobody will believe, nobody will know, nobody will think, he believes, he knows, he thinks, he does not believe, he does not know, he does not think, he will believe, he will know, he will think, he will not believe, he will not know, he will not think, she believes, she knows, she thinks, she does not believe, she does not know, she does not think, she will believe, she will know, she will think, she will not believe, she will not know, she will not think, they believe, they know, they think, they do not believe, they do not know, they do not think, they will believe, they will know, they will think, they will not believe, they will not know, they will not think, we believe, we know, we think, we do not believe, we do not know, we do not think, we will believe, we will know, we will think, we will not believe, we will not know, we will not think, you believe, you know, you think, you do not believe, you do not know, you do not think, you will believe, you will know, you will think, you will not believe, you will not know, you will not think
Overgeneralizing: Making sweeping negative conclusions based on a few examples	all of the time, all of them, all the time, always happens, always like, happens every time, completely, no one ever, nobody ever, every single one of them, every single one of you, I always, you always, he always, she always, they always, I am always, you are always, he is always, she is always, they are always
Personalizing: Believing others are behaving negatively because of oneself, without considering more plausible or external explanations for behavior	all me, all my, because I, because my, because of my, because of me, I am responsible, blame me, I caused, I feel responsible, all my doing, all my fault, my bad, my responsibility
Should statements: Having a fixed idea on how you and/or others should behave	should, ought, must, have to, has to

Table S2. Spanish: Cognitive distortion types and corresponding 1- to 5-grams (Cognitive Distortion Schemata).

Category	Cognitive Distortion Schemata
Catastrophizing: Exaggerating the importance of negative events	va a terminar, terminará, va a ser un desastre, será un desastre, va a ser terrible, será terrible, va a ser imposible, será imposible, va a fracasar, fracasará, va a fallar, va a fracasar, fallará, será una catástrofe, va a ser una catástrofe, será horrible, va a ser horrible, nunca va a terminar, nunca terminara, no va a terminar, no va a pasar, no pasará
Dichotomous Reasoning: Thinking that an inherently continuous situation can only fall into two categories	todo el mundo, toda la gente, todo, todas partes, sólo, solamente, sin valor, siempre, perfecto, perfecta, jamás, nunca, ninguno, ninguna, ni un, ni una, ni el, ni la, nadie, nada, en ninguna parte, el peor, la peor, el mejor, la mejor, cada, todos, todas, blanco y negro, todo el mundo, todos, nadie, esto o
Disqualifying the Positive: Unreasonably discounting positive experiences	no tan bueno, no tan, muy bien sin embargo, genial pero, eso no fue, bueno pero, buena pero, bien pero, aceptable pero, OK pero, no tan, bueno pero, bueno sin embargo, bien sin embargo, aceptable sin embargo
Emotional Reasoning: Thinking that something is true based on how one feels, ignoring the evidence to the contrary	ya que yo siento, ya que se siente, todavía se siente, porque yo siento, como yo siento, porque se siente, pero yo siento, pero se siente
Fortune-telling: Making predictions, usually negative ones, about the future	Yo no voy a, Nosotros no vamos a, Nosotras no vamos a, Tú no vas a, Usted no va a, ellos no van a, ellas no van a, esto no va a, eso no va a, él no va a, Él no va a, ella no va a
Labeling and mislabeling: Labeling yourself or others while discounting evidence that could lead to less disastrous conclusions	Yo soy un, Yo soy una, Yo soy un, Yo soy una, Yo nunca, una mala, un mal, una completa, una carga, un perdedor, una perdedora, un gran, una gran, un completo, completa, Tú nunca, Tú nunca, Usted nunca, tóxico, tóxica, totalmente, total, terrible, sin valor, sin esperanza, desesperanzado, desesperanzada, roto, rota, Nosotros nunca, Nosotras nunca, no amable, indeseable, indefenso, indefensa, incompetente, horrible, feo, fea, Esto es un, Esto es una, Esta es una, Esta es un, Esto es un, Esto es una, Eso es una, Eso es un, Esa es una, Esa es un, Eso es un, Eso es una, Ellos son unos, Ellas son unas, Ellos son unos, Ellas son unas, Ellos nunca, Ellas nunca, Ella nunca, Ella es una, Ella es una, Él nunca, él nunca, él es, Él es, él es un, Él es un, débil, dañada, dañado, apesto, absoluto, absoluta, no sirve, chupa, mayor, un completo, una completa
Magnification and Minimization: Magnifying negative aspects or minimizing positive aspects	peor, mejor, no es importante, no importante, no cuenta, no importa, no importante, la única cosa, lo único
Mental Filtering: Paying too much attention to negative details instead of the whole picture	Yo sólo veo, Todo lo que veo, Todo lo que yo veo, Todo lo que puedo ver, Todo lo que puedo ver, Sólo puedo pensar, Nada bueno, Nada bien, completamente malo, completamente mal, completamente equivocado, sólo lo malo, sólo lo peor, Si yo sólo, Si sólo yo, Si yo solamente, Si solamente yo, Si eso solo, si sólo
Mindreading: Believing you know what others are thinking	Todos creen, Todas creen, Todo el mundo cree, Todos saben, Todas saben, Todo el mundo sabe, Todos piensan, Todas piensan, Todo el mundo piensa, Todos creeran, Todas creeran, Todo el mundo creera, Todos van a saber, Todas van a saber, Todos va a pensar, Todas van a pensar, Todos pensarán, Todas pensarán, Nadie cree, Nadie sabe, Nadie piensa, Nadie va a creer, Nadie creerá, Nadie va a saber, Nadie sabrá, Nadie va a pensar, Nadie pensará, él cree, Él cree, él sabe, Él sabe, él piensa, Él piensa, él no cree, Él no cree, él no sabe, Él no sabe, él no piensa, Él no piensa, él va a creer, Él va a creer, él creerá, Él creerá, él va a saber, Él va a saber, Sabra, él va a pensar, Él va a pensar, él pensará, Él pensará, él no va a creer, Él no va a creer, Él no creerá, él no va a saber, Él no va a saber, él no sabrá, Él no sabrá, él no va a pensar, Él no va a pensar, él no pensará, Él no pensará, Ella cree, Ella sabe, Ella piensa, Ella no cree, Ella no sabe, Ella no piensa, Ella va a creer, Ella creerá, Ella va a saber, Ella sabrá, Ella va a pensar, Ella va a pensar, Ella pensará, Ella no va a creer, Ella no creerá, Ella no va a saber, Ella no sabrá, Ella no va a pensar, Ella no pensará, Ellos creen, Ellas creen, Ellos saben, Ellas saben, Ellos piensan, Ellas piensan, Ellos no creen, Ellas no creen, Ellos no saben, Ellas no saben, Ellos no piensan, Ellas no piensan, Ellos van a creer, Ellas van a creer, Ellos creeran, Ellas creeran, Ellos van a saber, Ellos sabrán, Ellas van a saber, Ellas sabrán, Ellos van a pensar, Ellas van a pensar, Ellos pensarán, Ellas pensarán, Ellos no van a creer, Ellas no van a creer, Ellas creerán, Ellos creerán, Ellos no van a saber, Ellas no van a saber, Ellos no sabrán, Ellas no sabrán, Ellos no van a pensar, Ellas no van a pensar, Ellos no pensarán, Ellas no pensarán, Nosotros creemos, Nosotras creemos, Nosotros sabemos, Nosotras sabemos, Nosotros pensamos, Nosotras pensamos, Nosotros no creemos, Nosotras no creemos, Nosotros no sabemos, Nosotras no sabemos, Nosotros no pensamos, Nosotras no pensamos, Nosotros vamos a creer, Nosotras vamos a creer, Nosotros creeremos, Nosotras creeremos, Nosotros vamos a saber, Nosotras vamos a saber, Nosotros vamos a pensar, Nosotras vamos a pensar, Nosotros vamos a saber, Nosotras vamos a saber, Nosotros vamos a pensar, Nosotras vamos a pensar, Nosotros vamos a creer, Nosotras vamos a creer, Nosotros no vamos a saber, Nosotras no vamos a saber, Nosotros no sabemos, Nosotras no sabemos, Nosotros no vamos a pensar, Nosotras no vamos a pensar, Nosotros no pensaremos, Nosotras no pensaremos, tú crees, usted cree, tú sabes, usted sabe, tú piensas, usted piensa, tú no crees, usted no crees, tú no sabes, usted no sabes, tú no piensas, usted no piensas, tú vas a creer, tú creerás, usted va a creer, usted creerá, tú vas a saber, tú sabrás, usted va a saber, usted sabrá, tú vas a pensar, tú pensarás, usted va a pensar, usted pensará, tú no vas a creer, tú no creerás, usted no va a creer, usted creerá, tú no vas a saber, tú no sabrás, usted no va a saber, usted no sabrá, tú no vas a pensar, tú no pensarás, usted no va a pensar, usted no pensará
Overgeneralizing: Making sweeping negative conclusions based on a few examples	Yo siempre estoy, Tú siempre estás, Tú siempre eres, Usted siempre está, Ellos siempre, Ellas siempre, Ella siempre, él siempre, Él siempre, Todo el tiempo, Todos ellos, Todas ellas, Siempre pasa, Siempre sucede, siempre como, pasa siempre, sucede siempre, completamente, nadie ha, nunca nadie, nunca alguien, todos y cada uno de, todos y cada uno de, todos y cada uno de, Yo siempre, Tú siempre, Usted siempre, Ella siempre, Ellos siempre, Ellas siempre
Personalizing: Believing others are behaving negatively because of oneself, without considering more plausible or external explanations for behavior	Yo soy responsable, Yo me siento responsable, Yo causé, Todos mis, Todas mis, Todo mi culpa, Toda mi culpa, Toda mi, Todo mi, Porque yo, Porque mí, Por mí, mi responsabilidad, mala mía, Cúlpenme a mí, Por mi
Should statements: Having a fixed idea on how you and/or others should behave	tienes que, tiene que, debería, deberías, debo, tengo

Table S3. German: Cognitive distortion types and corresponding 1- to 5-grams (Cognitive Distortion Schemata). The n-grams are in some cases formulated as regular expressions to match a range of relevant expressions.

Category	Cognitive Distortion Schemata
Catastrophizing: Exaggerating the importance of negative events	wird versagen, werden versagen, werde versagen, wirst versagen, werdet versagen, wird schiefgehen, wird nicht klappen, wird nicht funktionieren, wird (schlimm schlecht) (enden ausgehen), ist unm(ö)glich, wird nicht passieren, wird schrecklich sein, wird horrend sein, wird eine Katastrophe sein, wird in eine Katastrophe führen, wird nie enden, werden nie enden, wird nicht enden, werden nicht enden
Dichotomous Reasoning: Thinking that an inherently continuous situation can only fall into two categories	nur, all(e em en er es)?, jed(e em en er es)?, überall, immer, perfekt, ausgezeichnet, der beste, das beste, die beste, nicht ein(e)? einzig(e em en er es)?, kein(e em en er es)?, niemand, nichts, nirgendwo, nie, niemand, wertlos, das schlimmste, der schlimmste, die schlimmste, weder, entweder, schwarz und weiß(ss ß), je b, jemals
Disqualifying the Positive: Unreasonably discounting positive experiences	gro(ß ss)artig (, , ,)? ?(allerdings aber jedoch), gut (, , ,)? ?(allerdings aber jedoch), okay (, , ,)? ?(allerdings aber jedoch), schön (, , ,)? ?(allerdings aber jedoch), akzeptabel (, , ,)? ?(allerdings aber jedoch), nicht so gut, es war nicht, nicht so sehr
Emotional Reasoning: Thinking that something is true based on how one feels, ignoring the evidence to the contrary	aber ich fühle, weil ich fühle, da ich fühle, aber es fühlt sich, weil es sich so anfühlt, da es sich so anfühlt, es fühlt sich so an
Fortune-telling: Making predictions, usually negative ones, about the future	ich werde nicht, wir werden nicht, du wirst nicht, ihr werdet nicht, sie werden nicht, es wird nicht, das wird nicht, er wird nicht, sie wird nicht
Labeling and mislabeling: Labeling yourself or others while discounting evidence that could lead to less disastrous conclusions	ich bin ein(e em en er es)?, du bist ein(e em en er es)?, er ist ein(e em en er es)?, sie ist ein(e em en er es)?, sie sind ein(e em en er es)?, wir sind ein(e em en er es)?, ihr seid ein(e em en er es)?, es ist ein(e em en er es)?, das ist ein(e em en er es)?, schlecht (bei beim im), ich war nie ein(e em en er es)?, er war nie ein(e em en er es)?, sie war nie ein(e em en er es)?, es war nie ein(e em en er es)?, du warst nie ein(e em en er es)?, wir waren nie ein(e em en er es)?, sie waren nie ein(e em en er es)?, ihr ward nie ein(e em en er es)?, ihr wart nie ein(e em en er es)?, ich bin eine Last, du bist eine Last, er ist eine Last, ihr seid eine Last, sie ist eine Last, sie sind eine Last, wir sind eine Last, es ist eine Last, das ist eine Last, ein(e em en er es)? komplett(e em en er es)?, ein(e em en er es)? riesig(e em en er es)?, ein(em)? Versager, eines Versagers, ein(em)? Verlierer, eines Verlierers, ein(e em en er es)? hochgradig(e em en er es)?, ein(e em en er es)? total(e em en er es)?, ein(e em en er es)? schwach(e em en er es)?, ein(e em en er es)? absolut(e em en er es)?, ein(e em en er es)? ganz(e em en er es)?, ein(e em en er es)? schlecht(e em en er es)?, ein(e em en er es)? kaput(e em en er es)?, ein(e em en er es)? beschädigt(e em en er es)?, ein(e em en er es)? hilflos(e em en er es)?, ein(e em en er es)? hoffnungslos(e em en er es)?, ein(e em en er es)? inkompetent(e em en er es)?, ein(e em en er es)? giftig(e em en er es)?, ein(e em en er es)? h(ä ae)ßlich(e em en er es)?, ein(e em en er es)? unbegehr(e em en er es)?, ein(e em en er es)? nicht liebensw(ü ue)rdig(e em en er es)?, ein(e em en er es)? wertlos(e em en er es)?, ein(e em en er es)? horrend(e em en er es)?, ein(e em en er es)? schrecklich(e em en er es)?, ein(e em en er es)? widerlich(e em en er es)?, ein(e em en er es)? abscheulich(e em en er es)?
Magnification and Minimization: Magnifying negative aspects or minimizing positive aspects	schlimmste, beste, nicht wichtig, zählt nicht, zaehlt nicht, unwichtig, egal, die einzige Sache, die eine Sache, aber
Mental Filtering: Paying too much attention to negative details instead of the whole picture	ich sehe nur, alles was ich sehe, alles , was ich sehe(n)?, kann nur denken, nichts gutes, nichts Gutes, nichts richtiges, nichts Richtiges, total (schlecht falsch), komplett (schlecht falsch), nur d(er e es) (schlechte schlimmste), wenn (ich es) nur
Mindreading: Believing you know what others are thinking	alle glauben, jede(r)? glaubt, man glaubt, alle wissen, jede(r)? wei(ß ss), man wei(ß ss), alle denken, jede(r)? denkt, alle werden glauben, jeder wird glauben, alle werden wissen, man wird wissen, jede(r)? wird wissen, alle werden denken, jeder wird denken, man wird denken, keine(r)? glaubt, niemand wei(ß ss), niemand denkt, niemand wird glauben, keine(r)? wird glauben, niemand wird wissen, keine(r)? wird wissen, niemand wird denken, keine(r)? wird denken, er glaubt, er wei(ß ss), er denkt, er glaubt nicht, er wei(ß ss) nicht, er denkt nicht, er wird glauben, er wird wissen, er wird denken, er wird nicht glauben, er wird nicht wissen, er wird nicht denken, sie glaubt, sie wei(ß ss), sie denkt, sie wei(ß ss) nicht, sie glaubt nicht, sie denkt nicht, sie wird glauben, sie wird wissen, sie wird denken, sie wird nicht glauben, sie wird nicht wissen, sie wird nicht denken, sie glauben, sie wissen, sie denken, sie glauben nicht, sie wissen nicht, sie denken nicht, sie werden glauben, sie werden wissen, sie werden denken, sie werden nicht glauben, sie werden nicht wissen, sie werden nicht denken, wir glauben, wir wissen, wir denken, wir glauben nicht, wir wissen nicht, wir denken nicht, wir werden glauben, wir werden wissen, wir werden denken, wir werden nicht glauben, wir werden nicht wissen, wir werden nicht denken, du glaubst, ihr glaubt, du wei(ss ß)t, ihr wi(ss ß)t, du denkst, ihr denkt, du glaubst nicht, ihr glaubt nicht, du wei(ss ß)t nicht, ihr wi(ss ß)t nicht, du denkst nicht, ihr denkt nicht, du wirst glauben, ihr werdet glauben, du wirst wissen, ihr werdet wissen, du wirst denken, ihr werdet denken, du wirst nicht glauben, ihr werdet nicht glauben, du wirst nicht wissen, ihr werdet nicht wissen, du wirst nicht denken, ihr werdet nicht denken
Overgeneralizing: Making sweeping negative conclusions based on a few examples	jedes Mal, jedes mal, jedesmal, alle von ihnen, immer, passiert immer, immer wie, passiert jedes mal, passiert jedesmal, total, ganz, niemand je, jeder einzelne von, jede einzelne von, ich bin immer, du bist immer, er ist immer, sie ist immer, es ist immer, wir sind immer, ihr seid immer, sie sind immer, ich habe immer, du hast immer, er hat immer, sie hat immer, es hat immer, wir haben immer, ihr habt immer, sie haben immer
Personalizing: Believing others are behaving negatively because of oneself, without considering more plausible or external explanations for behavior	ganz Ich, ganz ich, nur Ich, nur ich, alles mein, weil ich, weil mein(e)?, wegen mein(e em en er es)?, wegen mir, Ich bin verantwortlich, gib mir die Schuld, verursacht habe, Ich fühle mich verantwortlich, meine Tat, meine Schuld, ich bin schuld, ich trage die Schuld, meine Verantwortung
Should statements: Having a fixed idea on how you and/or others should behave	sollte, soll, mu(ß ss), mü(ß ss)te, mue(ß ss)te

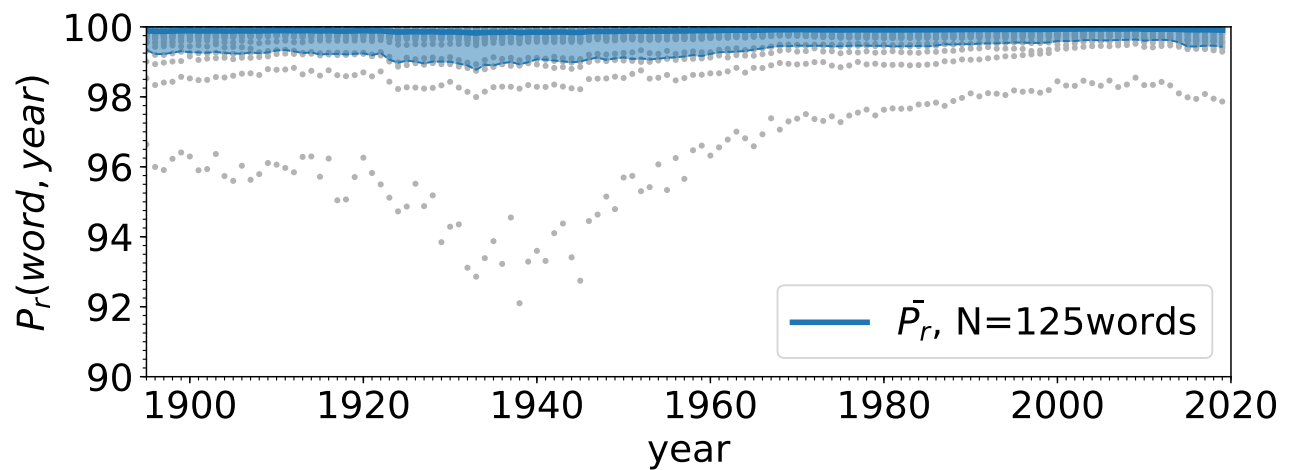


Fig. S1. Graph showing the mean and distribution of the percentiles of the individual words used in English CDS n-grams ($N=125$), e.g. “will”, “I”, and “am”, hence including the CDS 1-grams, over time in the distribution of all 1-grams (single words) in the Google Book data. The blue bands show the 95% confidence interval of the distribution of individual word percentiles. The blue line \bar{P}_r indicates the mean of the percentile scores of the set of words for each year. Gray dots indicate the percentile time series for each individual word. We exclude all Google Books 1-grams that contain non-alphabetical symbols from the distribution of 1-gram frequencies to reduce the inclusion of non-word forms. As shown, the 125 individual words in the CDS n-grams are among the most frequent words in the English language since 1895 (average percentile $M(P_r) = 99.885$, $SD = 0.346$). All CDS words are more frequent than 98.0% of the 1-grams in the Google Books data for every year since 1895, with the exception of one word: “unlovable” which nevertheless remained more frequent than 92% of 1-grams since 1895.

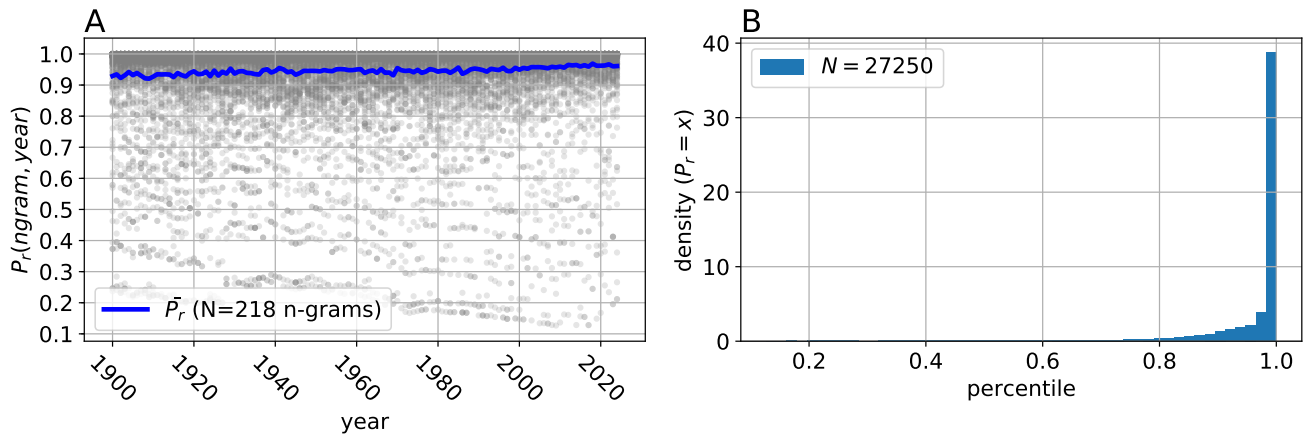


Fig. S2. (A) Distribution of the percentiles of all English CDS 2, 3, 4, and 5-grams ($N = 96, 86, 34,$ and $2,$ respectively), over time in the yearly frequency distribution of all n-grams of equal length in the Google Books data. Gray dots indicate the percentile for each individual CDS n-gram for that year. The blue line indicates the mean percentile value per year for all CDS n-grams. We exclude all Google Books n-grams from the frequency distribution that contain non-alphabetical symbols to reduce the inclusion of non-word forms. As shown, the CDS n-grams are among the most frequent n-grams in the English language since 1895. CDS n-grams are on average more frequent than 94.6% of all n-grams in the Google Books data for every year since 1895 (mean percentile $M(P_r) = 0.946,$ $SD = 0.0103$). (B) Distribution of all 218 n-gram percentile values across all years (218×125 years) indicates that CDS n-gram percentiles from 1895 to 2019 are concentrated in the highest 5% of the distribution of all n-grams.

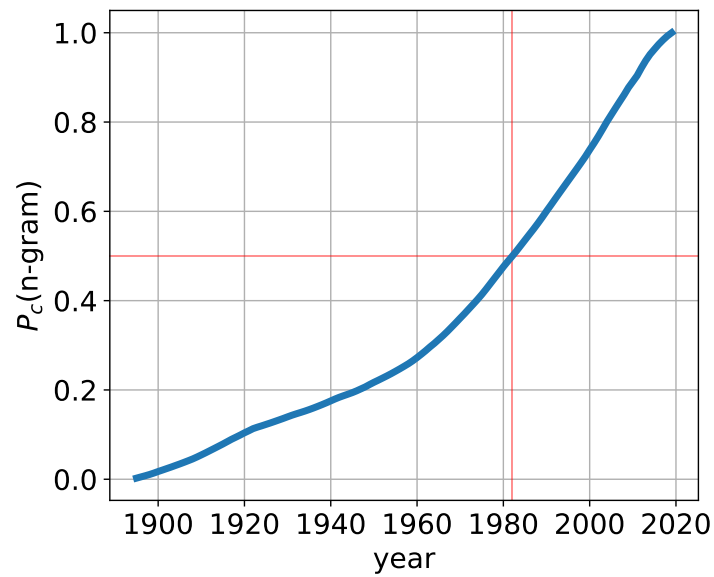


Fig. S3. Cumulative probability P_c of an n-gram being randomly selected from books published in English (US) up to that year. Red lines indicate the point in time (year=1983) at which the probability of an n-gram being chosen from a book published before that time exceeds $P_c = 0.5$. The number of books published in English (US) grew from 1895 to 2019 at an accelerating rate, thus increasing the probability of an n-gram being randomly selected from more recently published books. This causes a bias in our null-model that favors more “modern” language, because n-grams are sampled from more recently published books, proportional to the growth of the number of books published over time. Since the null-model serves as a basis of comparison to our observations, our observations of a recent surge in the expression of markers of cognitive distortion are compensated for a recency bias. Note: our CDS prevalence values are normalized not by number of books published, but by an estimation of publishing volume from the amount of end-of-sentence punctuation (SI Fig. S4).

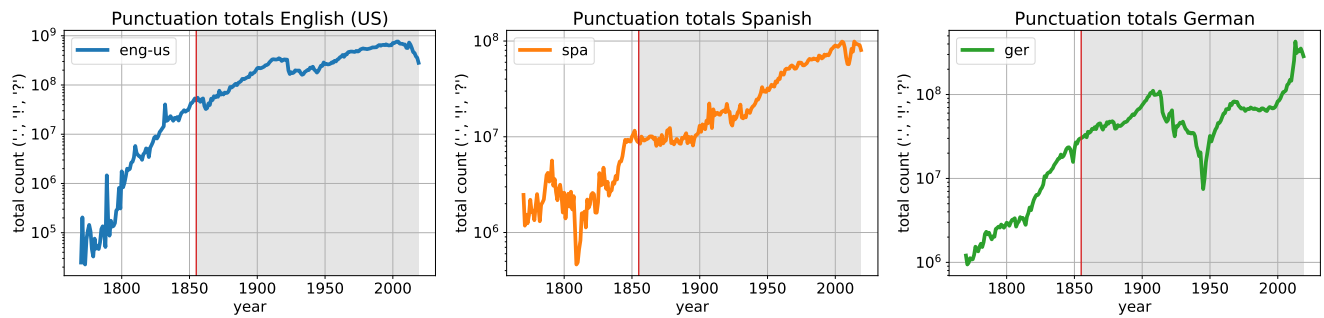


Fig. S4. End-of-sentence punctuation frequencies were used to normalize individual CDS n-gram time series to account for changes in publication volume and sentence length over time. Publication volume increased rapidly since 1770 for English (US), Spanish, and German across several order of magnitude. The graphs show the time range from 1770 to 2019 to highlight why we select the time period from 1855 to 2019 for our analysis: it represents a period of comparatively high and stable publication volumes for all three languages (starting with red vertical line, marked by gray background). Publication volume drops in German from 1900 to 1946, possibly due to the effects of World War I and World War II.

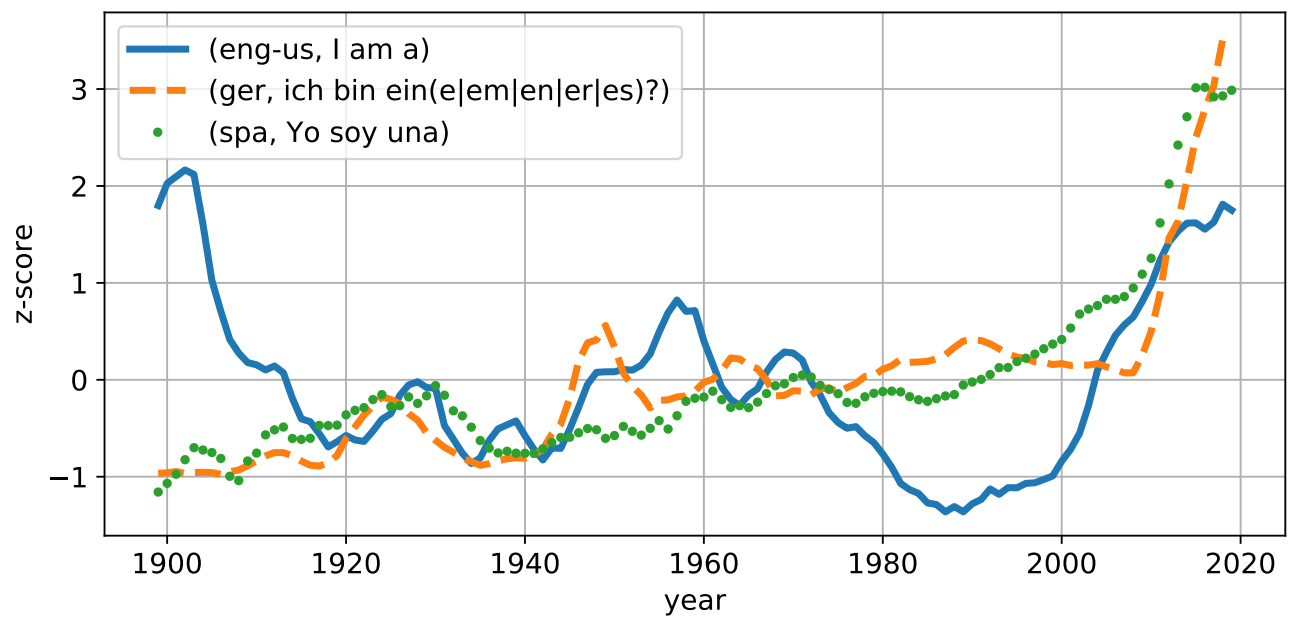


Fig. S5. Example of prevalence time series (yearly frequencies normalized by publication volume and z-score) for “I am a” and its Spanish and German translations. Note that the German and Spanish time series correspond to a regular expression that matches a number of grammatical variations (gender and plural) which have been summed into a single z-score normalized time series.

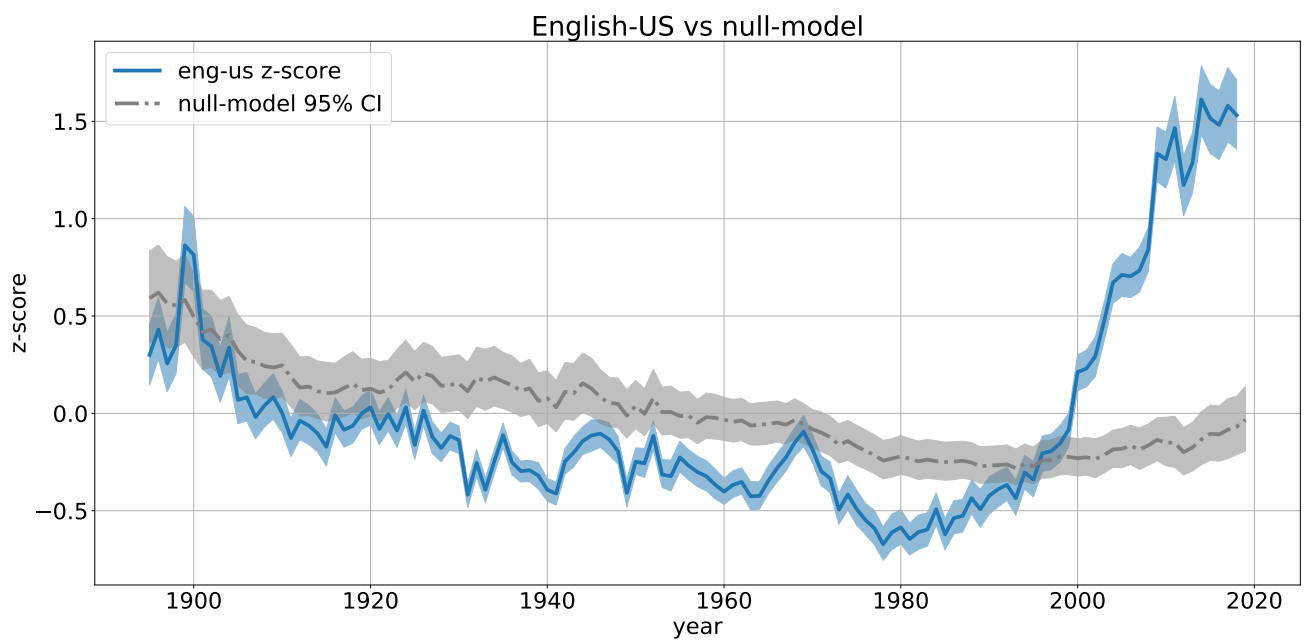


Fig. S6. Time series (z-score) and 95% CI (bootstrapped 10,000-fold) for English (US) CDS n-grams vs a null-model of 10,000-fold randomly selected n-grams (each sample $N=241$) with the same length distribution as the English (US) set of CDS n-grams. The prevalence of English (US) CDS n-grams deviates significantly from the null-model in two specific periods: it is significantly *lower* than the null-model from approximately 1920 to 1990, and significantly *higher* than the null-model from the late 1990s to 2019.

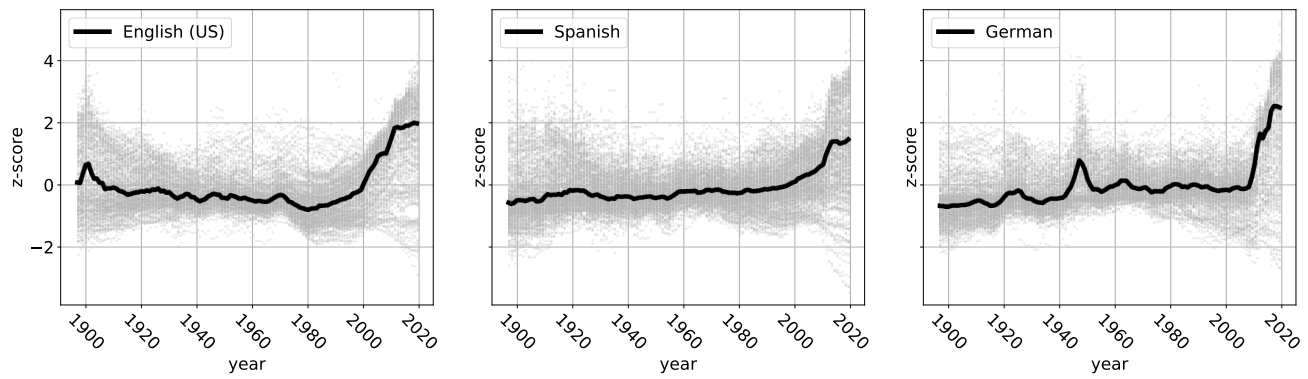


Fig. S7. Individual CDS n-grams prevalence time series (z-score) superimposed with median z-scores (smoothed by 3-year rolling mean) for English, Spanish, and German.