Choice and complexity: In naturally occurring data, absolute complexity does not necessarily trigger relative complexity

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Abstract

This article interrogates two related assumptions widespread in many approaches to language: (1) languages do not like synonymy; (2) absolute complexity (i.e. the length of the grammatical description of a language) tends to be proportional to relative complexity (i.e. difficulty). Against this backdrop, we explore the link between syntactic synonymy (i.e., grammatical variation and optionality) and relative complexity (i.e., cognitive load) using methods from both corpus and psycholinguistics. We test two predictions: First, if synonymy avoidance is a design feature of human language, then grammatical variation should be sub-optimal and cause a measurable increase in production difficulty. Second, optionality will necessarily increase the absolute complexity of a language system. This increased absolute complexity will, in turn, increase relative complexity, i.e., cognitive load, also measured by increased production difficulty. Contrary to these predictions, analyses based on the SWITCHBOARD corpus of American English shows that the presence of choice contexts does not positively correlate with two metrics of production difficulty, namely filled pauses (*um* and *uh*) and unfilled pauses (speech planning time), not even when a typology of grammatical alternation type (insertion/deletion, substitution, permutation) is taken into account. These results challenge the view that grammatical optionality is sub-optimal and difficult for speakers, and that absolute complexity is necessarily proportional to relative complexity.

Keywords: variation; dysfluency; isomorphism; alternation; repeated measures correlation; SWITCHBOARD.

1. Introduction

Using naturalistic, conversational corpus data and focusing on "structurally and/or lexically different ways to say functionally very similar things" (Gries 2017: 8; see also Labov 1972a: 188), this paper interrogates two widespread assumptions in many approaches to language, ranging from functional linguistics to corpus linguistics and beyond: (1) synonymy and optionality are sub-optimal and (2) absolute language complexity is a determinant of relative language complexity. More specifically:

(1) Languages and language users disfavor synonymy and form-function asymmetries, and favor isomorphism instead.
(2) Relative language complexity is proportional to absolute language complexity.

While these two core ideas are prevalent in the general thinking about language (see a recent reaction against this idea by Wälchli & Sjöberg 2025 in this journal), ranging from functional linguistics to corpus linguistics and beyond, they are usually seen as opposite to fundamental concepts in variationist (socio)linguistics. Variationist linguists approach language from the position that there are times in which an identical meaning or grammatical function can be expressed using different formal means, be it in terms of lexical choice (3), grammatical construction (4), or phonological form (5). According to variationist linguistics, when people speak, sign, or write, they will need to make choices between "alternate ways of saying the same thing" (Labov 1972a: 188).

(3) Using *awesome/great/brilliant* etc. for highly positive evaluations (Tagliamonte & Pabst 2020)
(4) Using a synthetic or analytic construction for comparative adjectives, e.g., *happier than* vs *more happy than* (Suikkanen 2018)
(5) Using a released or unreleased plosive word-finally: *east* [istʰ] vs [ist̚] (Eckert 2008)

The primary data source in variationist linguistics typically consists of natural or naturalistic corpus data (Labov 1972b; 1984; Szmrecsanyi 2017), although experimental approaches are also used (see, e.g., Bresnan & Ford 2010). Patterns of variation, like those in (3)-(5), often delineate groups of speakers (interspeaker

variation); however, optionality is also typical of the speech of a single individual (intraspeaker variation). In this paper, we make use of a corpus that samples naturalistic dialogic speech to investigate options that are, in principle, available to all speakers of American English (so-called type-3 variability by van Hout & Muysken 2016).

The variationist approach is at odds with constructionist postulates, such as Goldberg's (1995: 67) Principle of No Synonymy:

> *The Principle of No Synonymy*: If two constructions are syntactically distinct, they must be semantically or pragmatically distinct (cf. Bolinger 1968; Haiman 1985; Clark 1987; MacWhinney 1989). Pragmatic aspects of constructions involve particulars of information structure, including topic and focus, and additionally stylistic aspects of the construction such as register […].
> *Corollary A*: If two constructions are syntactically distinct and Semantically synonymous, then they must not be Pragmatically synonymous.
> *Corollary B*: If two constructions are syntactically distinct and P[ragmatically] synonymous, then they must not be S[emantically] synonymous.
> (Goldberg 1995: 67)

This Principle of No Synonymy amplifies Haiman's Principle of Isomorphism (Haiman 1980: 516: "the commonly accepted axiom that no true synonyms exist, i.e., that different forms must have different meaning", citing linguists like Bloomfield and Bolinger), and largely assumes a structuralist view of language. Goldberg treats semantic or pragmatic distinctions as if they were analogous to distinctive features of phonemes (see, especially, Goldberg 2019: 23). Recent work points out, correctly, that Goldberg ignores the social role of variation. Leclerq & Morin (2023) instead suggest a Principle of No Equivalence:

> The *Principle of No Equivalence*: If two competing constructions differ in form (i.e. phonologically, morpho-syntactically or even orthographically), they must be semantically, pragmatically and/or socially distinct. (Leclercq & Morin 2023: 10)

While improving on Goldberg's proposal, the Principle of No Equivalence still does not account for patterns of semantic/functional equivalence without pragmatic differentiation or that are below the level of conscious social evaluation (i.e., Labov's [1972] Principle II), as in (6).

(6) Infinitive vs. gerund complementation:

   She started **to eat** the apple vs. She started **eating** the apple. (Mair 2002)

Uhrig (2015) and others call these principles overrated given their obvious contradictions to the large body of variationist research (among other reasons). If contexts exist in which speakers can choose between alternative ways to express the same message, then the semantic boundaries between those formal structures must be at a minimum fuzzy. This notion of vagueness between forms (i.e., synonymy) is noted by linguists such as Erdmann (1910) and is inherent in the prototypicality effects that echo through cognitive linguistics and constructionist approaches. We additionally note that this issue has attracted considerable debate in sociolinguistics since at least the 1970s (see, e.g., Lavandera 1978; Labov 1978), with vagueness constituting an important pillar of third wave variationism (Eckert 2012; 2016; Moore 2021), in which variation is seen as inherently socially meaningful.

   In an idealized description of constructional forms and their corresponding meaning, use, and/or language-external indexicality, one can suppose distinctions. For example, the dative alternation, as in (7) and (8), is traditionally explained by two different conceptualizations: a change of state construal (possession) favours the ditransitive, and a change of place construal (movement towards a goal) favours the prepositional variant (Gropen et al. 1989). However, this distinction only emerges from an empirical paradigm based on a grammarian's intuition or solicited grammaticality judgments. When tested against actual usage, this idealized explanatory factor has weak predictive power. Simply put, any semantic or functional difference between the ditransitive (7) and the prepositional (8) dative construction is neutralized in natural discourse. The traditional account (change of state or change of place) does not predict the choice as well as contextual constraints, such as pronominality of theme and recipient, definiteness of theme and recipient, length of theme and recipient, animacy of recipient, concreteness of theme, persistence etc. (Bresnan et al. 2007; Szmrecsanyi et al. 2017; Szmrecsanyi & Grafmiller 2023), indicating that a probabilistic account that involves constraints explains actual linguistic behaviour more accurately.

(7) Ditransitive dative: I gave give [him]$_{recipient}$ [some pizza.]$_{theme}$

(8) Prepositional dative: I gave [some pizza]_{theme} to [him.]_{recipient}
(Szmrecsanyi et al. 2017)

Optionality is intrinsically sub-optimal for a theory of grammar that expects aesthetic or ontological parsimony/symmetry (Gunitsky 2019). Optionality inevitably triggers a certain type of complexity (Ma, Van Hoey & Szmrecsanyi 2025; Szmrecsanyi et al., in print; Van Hoey et al., accepted). If language A has multiple ways for expressing the same meaning and language B has only a single, isomorphic way, then language A is more complex than language B, i.e., language A's grammar requires a longer description to include all options. This is known as absolute complexity in the language complexity literature (see Miestamo 2008 for discussion). Complexity, however, can also be understood in a relative sense as the cost and difficulty for language users (again, see Miestamo 2008; see also Kusters 2003). For example, by definition, having two dative structures makes the English language more complex absolutely (i.e., there are more structure types to acquire). Implementing the probabilistic constraints that govern variant choice between dative options logically must also have additional cognitive costs for speakers of English relative to invariant structures.

Consider the *want to / wanna* alternation (*I want to go* vs. *I wanna go*), recently modelled and related to communicative efficiency by Levshina & Lorenz (2022). It is shown that these two variants are often not perceived as mutually exclusive alternatives targeting the formal-informal dichotomy. The distinction between them is regularly neutralized, and the variants are used interchangeably. Variant selection is subject to immediate contextual (not situational) constraints. That being said, upon reflection speaker may mentally classify the variants as formal/informal alternatives and then, according to Levshina and Lorenz, the Principle of No Synonymy will pull the variants apart functionally, creating a functional paradigm such that only one variant is grammatically licit in formal contexts while only the other is only grammatically licit in informal contexts. Even if full functional partitioning does not develop (i.e., heterogeneity persists), a variational probabilistic view of grammar in which social, contextual, language-internal, or any other influencing factor nudges speakers toward certain ways of speaking does suggest a certain validity to the Principle of No Synonymy, but as a pressure on a linguistic system rather than a as feature of it. Yet the theoretical ontological parsimony underlying the Principle of No

Synonymy itself is not evidenced. Diachronic trends towards isomorphism are still not proof of essential isomorphism.

Efficiency, in a broad sense, also relates to the relationship between absolute and relative complexity There is a widespread suspicion that absolute language complexity is positively correlated with relative complexity (Miestamo 2008; 2017). Miestamo further relates this predicted positive correlation between relative and absolute complexity to typological frequency and rarity:

> [I]f we take an inductive approach and look at what is actually found in the world's languages, and then try to evaluate the absolute complexity of those structures, it is highly likely that there will be some correlation between absolute complexity and cross-linguistic rarity. Perhaps (absolute) simplicity does not always mean ease of processing, but surely (absolute) complexity does in many cases add to processing difficulty. (Miestamo 2008: 38).

Miestamo (2008) predicts that longer absolute grammars will be more difficult to use and by extrapolation harder to acquire. Yet, this predicted positive correlation may be empirically elusive. Measures of absolute and relative complexity often do not capture it or, if they do, they overlook alternative explanations such as contextual specificity requirements (Hawkins 2019), register effects (Levshina & Lorenz 2022), or online processing and inference (Blumenthal-Dramé 2021), see overview by Ehret et al. (2021: 11–12). In summary, whether there is a positive correlation between absolute complexity and relative complexity remains an open empirical question, but the hypothesis is that the extra cognitive work required to handle absolutely complex grammar, regardless of how automatic and entrenched it is, results in increased cognitive load. This is on top of any other social, stylistic, or other considerations speakers are faced with when choosing one variant over another.

Against this backdrop, this paper investigates the extent to which grammatical optionality triggers production difficulty in a large corpus of naturalistic speech. The Principle of No Synonymy (and similar principles) predict such a triggering effect: if language(s) disfavour synonymy and optionality, then synonymy and optionality should be measurably sub-optimal in production. Likewise, optionality increases absolute complexity, and customary thinking about language complexity predicts that those increases in absolute complexity are paralleled by proportional increases in relative complexity (i.e. cost and difficulty). Whether all of this is empirically true is the question we address in this paper.

We thus examine 22 different grammatical variable contexts attested across varieties of spoken American English using the SWITCHBOARD corpus (Godfrey, Holliman & McDaniel 1992). Production difficulty (i.e. relative complexity) is assessed by locating and quantifying two different dysfluency types: (a) filled pauses, or delay markers; (b) unfilled pauses, or speech planning time (Ferreira 1991; Shriberg 1994; Berthold 1998; Clark & Wasow 1998; Berthold & Jameson 1999; Oomen & Postma 2001; Abel 2015; Lickley 2015; Le Grézause 2017). Hesitation phenomena, like speech planning time, have been used previously as metrics of relative cognitive effort (summarized by Berthold 1998; Berthold & Jameson 1999) and have been attested as more frequent in contexts independently judged to be more difficult, such as when utterances are longer or more syntactically complex (Grosjean, Grosjean & Lane 1979; Cooper & Paccia-Cooper 1980; Ferreira 1991; Shriberg 1994; Oviatt 1995; Clark & Wasow 1998; Lickley 2015; Christodoulides 2016), when the topic of conversation is unfamiliar (Smith & Clark 1993; Merlo & Mansur 2004), when the discursive task is more challenging (Oomen & Postma 2001; Abel 2015; Freeman 2015; Le Grézause 2017), or when lexical items are low frequency and/or have low contextual probability (Lieberman 1963; Tannenbaum & Williams 1968; see also Tily et al. 2009).

We replicate here the study by Gardner et al. (2021), who report, for a subset of the SWITCHBOARD corpus, that there is no significant (positive) relation between variation/optionality and dysfluency. In the current study, we expand upon Gardner et al. (2021) by extending the scope of the data to the full SWITCHBOARD corpus and by additionally classifying types of variation contexts/alternations following De Troij (2022).

This paper is structured as follows. We first present the methods (materials in Section 2.1; operationalization of variation contexts in Section 2.2; analytical framework in Section 2.3), followed by the results in Section 3.1; influence of alternation typology in Section 3.2, and finally a discussion and conclusion (Section 4).

2. Methods

The methodology of this study consists of four steps:

1. Tap into the SWITCHBOARD Corpus of spoken American English. As data points we consider each conversation. These materials are presented in Section 2.1.

2. Identify and quantify filled and unfilled pauses, the proxies for relative complexity (Section 2.1).

3. Identify and quantify variable contexts, i.e., sites where speakers have the choice between different grammatical ways of expressing the same meaning. In Section 2.2, we present the list of 22 commonly studied alternations, and present summary statistics.

4. Check if the there is a statistical correlation (Section 2.3).

2.1. Materials and (un)filled pauses

This paper analyses the full SWITCHBOARD corpus of spoken American English (Godfrey, Holliman & McDaniel 1992), an influential spoken corpus that consists of 2,438 spontaneous telephone conversations between 542 American English speakers who, in principle, are strangers to each other. The data were recorded by Texas Instruments in 1989–1990. Most recordings last 5 minutes, totalling to 240 hours for the whole SWITCHBOARD corpus. Demographic information about participants' age (15-69 years old), dialectal region, sex, and education level is available (Table 1), in addition to timestamps, previous places of residence etc. (Godfrey, Holliman & McDaniel 1992). While the connection between variation, dysfluency, and socio-demographic differences warrants investigation, we leave this topic to future publications.

Dialect group	Age range	Sex	Education level
South Midland (156)	15-19 (23)	Male (280)	Some (468)
Western (82)	20-29 (185)	Female (240)	None (52)
North Midland (75)	30-39 (146)		
Northern (73)	40-49 (108)		
Southern (55)	50-59 (54)		
New York City (31)	60+ (4)		
Mixed / Unknown (27)			
New England (21)			

Table 1: Demographics of the SWITCHBOARD corpus. Numbers in parentheses indicate number of individual speakers. Education level collapsed to some vs. no post-secondary education.

The public distribution of SWITCHBOARD includes time-aligned transcripts for the entire corpus. Additionally, previous work has already examined overt dysfluencies in portions of the corpus (e.g., Shriberg 1996; Clark & Fox Tree 2002; Wieling et al.

2016; Le Grézause 2017). Following Gardner et al. (2021), we consider all turn-internal uses of *um* and *uh* as overt hesitation markers, or FILLED PAUSES. This does not include other similar sounding terms like *um-hmm* or *uh-oh* or *um* and *uh* used as backchannels or turn initiators/enders, nor filled pauses at the start or end of a turn, because such filled pauses are most likely to be used to hold the floor. Further, we assume all remaining instances of *um* and *uh* are hesitation markers. This contrasts with analyses that treat them as tools for discourse organization (Clark & Fox Tree 2002) or dramatic performance. We recognize that this may be a limitation of our analysis; however, we point to the prolific literature showing higher rates of non-backchannel *um* and *uh* (regardless of function) when a speaker is objectively experiencing extra cognitive load (see Section 1). While Gardner et al. (2021) restrict their sample to a subset of young (20-29 years old) women who belong to the South Midland dialect region (285 conversations, 34 speakers, 7,161 turns), here we report on the full SWITCHBOARD corpus, in which after exclusions we find 58,032 filled pauses (*uh* and *um*) across the 2,438 conversations.

In addition to filled pauses, we measure speech planning time, or UNFILLED PAUSES. Maclay and Osgood's (1959) classic study identifies unfilled pauses as one of four major hesitation types (along with filled pauses, repeats, and false starts).[1] These hesitation types have been linked to production difficulties such as content planning, word retrieval, and the formulation of phrasal structure (Fox Tree & Clark 1997). Maclay & Osgood (1959) subjectively distinguish between short rhetorical pauses and unfilled pauses, which "were marked when there was judged to be an abnormal hesitation in speech [...]" (Maclay & Osgood 1959: 24). We, on the other hand, follow Hieke et al. (1983), who identify 130 ms as the threshold beyond which pausing becomes psychologically rather than articulatorily motivated. We automatically identify unfilled pauses using the in-built script in the phonetics software program Praat (Boersma & Weenink 2023), called "Sound: To TextGrid (silences)". The main function of this script is to detect silence intervals in audio streams. We specify that silence is any part of the audio stream below -50 dB and longer than 130 ms. We also only consider turn-internal pausing and exclude pausing before or after speaking, or

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[1] We are currently conducting a follow-up study of the SWITCHBOARD corpus that annotates false starts, repeats, and discourse markers in detail as well. As of December 2025, about the 50% of the audio files have additionally annotated. Preliminary analyses (some reported by Gardner & Szmrecsanyi 2022), find no positive correlation between choice points and restarts or repairs, and a very weak positive correlations for some discourse markers, like *you know*.

while an interlocutor is speaking. The total amount of turn-internal unfilled pause time is just over 61 hours within the 200 + hours of speech recording.

Both filled and unfilled pauses were standardized following the procedure laid out in Gardner et al. (2021). That is, relative frequencies were obtained by calculating the proportion of (un)filled pauses per 100 words, a standard procedure used when comparing speech samples that differ in length (as each conversation within SWITCHBOARD does).

2.2. *Grammatical variation sites*

The 22 grammatical alternations (i.e., variables) are the "usual suspects" in the literature on grammatical variation in American English (and beyond). When selecting the alternations we aimed to strike a balance between diachronic longevity (older and stable vs. newer), formality (no register association vs. prescriptive vs. informal speech), and grammaticalization status (wholly grammaticalized alternations vs. those involving a moderate degree of lexical material). The alternations subject to study can be categorized as involving (a) permutation, as in Table 2, (b) insertion / deletion, as in Table 3, or (c) substitution, as in Table 4 (De Troij 2022; Szmrecsanyi & Grafmiller 2023: 18–19). Permutation alternations exhibit a difference in the relative order of the items involved, e.g., *The man cut off his beard* vs *The man cut his beard off*. Insertion / deletion alternations are those in which a variant has one or more extra elements compared to the other one(s), e.g., *She know's* (that) *I'm coming on Friday*. Substitution are those cases in which variants differ with regard to the lexicalization of a single functional category, e.g., *A girl* has to / *must eat*. This typology is a refinement of Gries's (2017) overview article, in which he recognizes "word/constituent alternations" (permutation here), and "realization alternations" (insertion / deletion here). Yet, as the examples in Table 2-Table 4 show, most alternations studied by Gardner et al. (2021) originally, and in this current expanded replication, belong to the substitution type (N = 17), while the number of permutation (N = 3) and insertion / deletion (N = 2) type alternations is much smaller. We refer the reader to Gardner et al. (2021) for detailed descriptions and references to other studies of these 22 alternations.

In total, we identified 81,493 grammatical variable contexts in the SWITCHBOARD materials. These contexts were manually identified and carefully screened such that, in line with the variationist methodology (e.g., Tagliamonte 2012), substitution of an alternate variant would result in zero semantic/functional change in the specific

utterance that it occurred. To exemplify, an *s*-genitive variable context such as *my brother's sister* was licit because an *of*-genitive (*the sister of my brother*) would be semantically and functionally equivalent. Conversely, the *of*-genitive *three glasses of wine* was not licit as the corresponding *s*-genitive (**wine's three glasses*) would not be semantically or functionally equivalent. Additionally, invariant proper names like *Macy's* or *the United States of America* were excluded. Our specific criteria for inclusion/exclusion were based on the relevant variationist literature for each variable (again, see Gardner et al. 2021).

Permutation Alternation	Example	Instances
Particle placement	*He picked <u>up</u> the book.* *He picked the book <u>up</u>.*	3,272
Dative alternation	*The mother gave <u>the baby</u> the toy.* *The mother gave the toy <u>to the baby</u>.*	873
Genitive alternation	<u>*the officer's*</u> *uniform* *the uniform <u>of the officer</u>*	1,675
	TOTAL	5,820

Table 2: Examples of alternations that consist of permutations (N = 3).

Insertion /Deletion Alternation	Example	Instances
Complementizer	*I think <u>that</u> I know him.* *I think ∅ I know him.*	19,111
Relativization (restricted)	*The results <u>that</u> I obtained* *The results ∅ I obtained* *The results <u>which</u> I obtained*	944
	TOTAL	20,055

Table 3: Examples of alternations that consist of insertion and deletion (N = 2).

Substitution Alternation	Example	Instances
Comparatives (analytic vs. synthetic)	*Blood is <u>thicker</u> than water.* *Blood is <u>more thick</u> than water.*	766
Complementation (infinitive vs. gerund)	*I start <u>to sing</u>.* *I start <u>singing</u>.*	205
Complementation (*that* vs. gerund)	*I don't regret <u>helping her</u>.* *I don't regret <u>that I helped her</u>.*	307

Substitution Alternation	Example	Instances
Future marker	*I <u>will</u> leave tomorrow.* *I <u>shall</u> leave tomorrow.* *I <u>am going to</u> leave tomorrow* (etc.)	13,110
Deontic modality	*I <u>must</u> leave.* *I <u>have to</u> leave.* *I (<u>have</u>) <u>got to</u> leave.* *I <u>need to</u> leave.* (etc.)	7,998
Stative possession	*I <u>have</u> a headache.* *I (<u>have</u>) <u>got</u> a headache.*	5,576
Negation	*I do <u>not</u> want <u>any</u>.* *I do <u>not</u> want <u>none</u>.* *I want <u>none</u>.*	3,876
Not / auxiliary contraction	*She<u>'s</u> not a student.* *She is<u>n't</u> a student.*	10,123
Indefinite pronouns	*Any<u>body</u> home?* *Any<u>one</u> home?*	5559
Coordinate pronouns	*<u>He and I</u> are going to the store.* *<u>Him and me</u> are going to the store.* *<u>I and him</u> are going to the store.* (etc.)	589
Quotatives	*And I <u>went</u> "Whoa!"* *And I <u>was like</u> "Whoa!"* *And I <u>said,</u> "Whoa!"* (etc.)	647
Try and/to/-ing	*I try <u>to exercise</u> daily.* *I try <u>and exercise</u> daily.* *I try <u>exercising</u> daily.*	1,124
Tried to/-ing	*I tried <u>to exercise</u> daily.* *I tried <u>exercising</u> daily.*	262
Without (*any*) / *with no*	*I ate salad <u>without dressing.</u>* *I ate salad <u>with no dressing.</u>*	82
Relativization (unrestricted)	*The shop <u>that</u> is new is great.* *The shop <u>which</u> is new is great.* (etc.)	763
There is/are plurals	*There <u>are</u> some erasers here.* *There <u>is</u> some erasers here.*	209
Verba dicendi *about/of*	*I think <u>about</u> the good old days.* *I think <u>of</u> the good old days.*	4,422
	TOTAL	55,618

Table 4: Examples of alternations that consist of substitutions (N = 17).

2.3. Quantitative analysis

After identifying and quantifying the two dependent variables – filled pauses (*uh/um*) and unfilled pauses (speech planning time) – and the predictor (relative frequency of variable contexts), we investigated the relation between each dependent variable and the predictor for both speakers in each conversation. Gardner et al. (2021) already determined that, for young Midland female speakers in SWITCHBOARD, there is no statistically significant positive relationship between dysfluency and variable contexts. This was true for both filled and unfilled pauses. Gardner et al. (2021) found that only their control variables of turn duration, mean word length, and speech rate were significant predictors of dysfluency.

Gardner et al. (2021) investigated the possible effect of individual grammatical alternations on dysfluency at the level of the conversational turn in a highly circumscribed group of SWITCHBOARD participants; in this paper we examine broad categories of alternations across the entire SWITCHBOARD data set. We take as our unit of analysis each dyadic conversation and ask the following: are conversations that are comparatively rich in variable contexts also more dysfluent compared to conversations that (for whatever reason) are less rich in variable contexts? The Principle of No Synonymy and other such doctrines of form-function symmetry, as Poplack & Dion 2009 describe them, predict that this should indeed be the case. To answer this question, we employ repeated measures correlation tests. Standard correlation tests (e.g., Pearson's correlation) assume that each data point is independent of all others. Most speakers in the SWITCHBOARD corpus took part in multiple conversations, so our per-speaker per-conversation data points are not fully independent. Therefore, we employ a statistical technique that accounts for any bias introduced by having multiple measures from the same participant (Bland & Altman 1995; Bakdash & Marusich 2017). Repeated measures correlations are calculated with the package *rmcorr* (Bakdash & Marusich 2022) in R (R Core Team 2023). The materials and analysis can be found in our accompanying Open Data Science (OSF) repository (see Data Availability Statement below).

3. Results

3.1. Do grammatical variable contexts in general predict dysfluencies?

In the 2,433 conversation transcripts from SWITCHBOARD there was an average of 33.48 variable contexts per conversation ($SD = 19.85$, $min = 1$, $max = 137$, $N_{total} = 81,493$).

In total, we identified 58,032 *um*'s and *uh*'s (filled pauses), and about 3,788 minutes of turn-internal speech planning time (unfilled pauses). The number of filled pauses and unfilled pauses were converted into relative frequencies per hundred words to control for the differing lengths of conversations in SWITCHBOARD. Individual measures were recorded for both speakers in a conversation based only on their own speech. Next, we conducted two repeated measures correlations: first between filled pauses and variable contexts (Figure 1), then between unfilled pauses and variable contexts (Figure 2). Varying intercepts were calculated per speaker and are plotted in Figures 1 and 2.

Figure 1 shows the correlation between filled pauses (overt dysfluencies) and variable contexts per 100 words, while Figure 2 shows the correlation between unfilled pauses (speech planning time) and variable contexts per 100 words. Blue dots represent values for each speaker in individual conversations; thin blue lines represent regression lines for individual speakers across their multiple conversations. The black line represents the overall regression line.
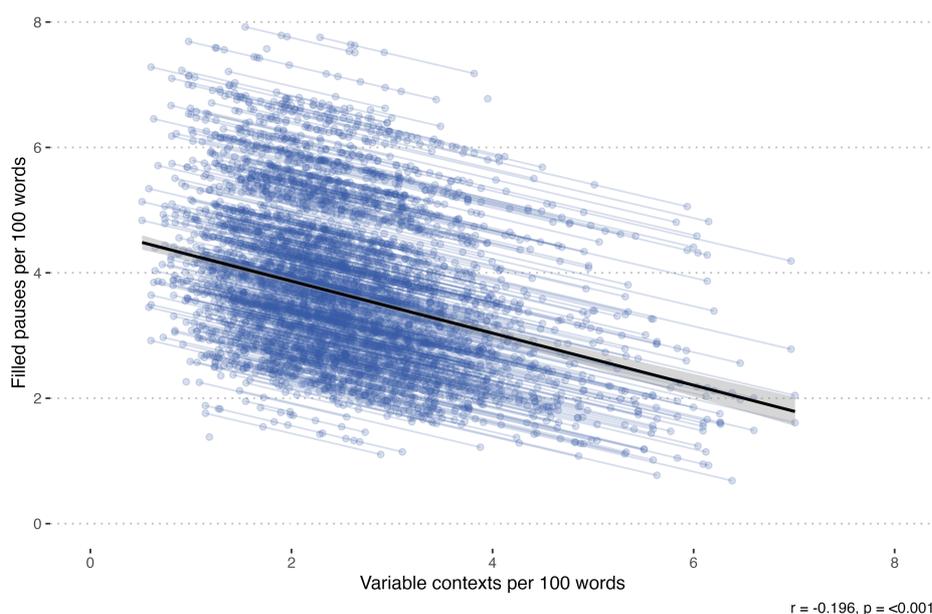

Figure 1: Repeated measures correlation between variable contexts and **filled** pauses ($N_{conversation}$ = 2,392, $N_{speaker}$ = 4,784). In this varying-intercept model, dots represent individual measurements per transcript. Thin lines represent regression lines per speaker. The black solid line represents the overall regression line. The slope (*r* = -0.20) indicates a weak negative correlation.
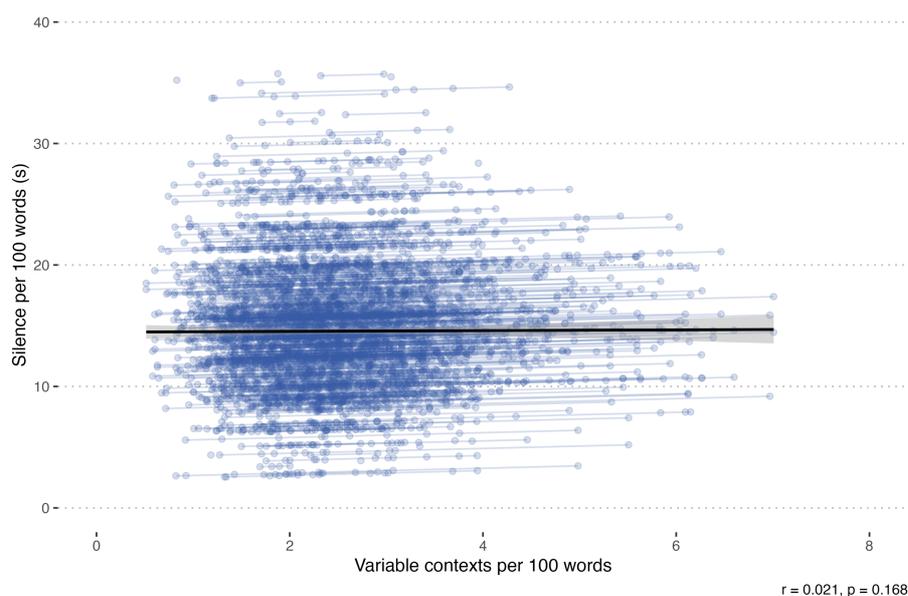
Figure 2: Repeated measures correlation between variable contexts and **unfilled** pauses ($N_{conversation}$ = 2392, $N_{speaker}$ = 4784). In this varying-intercept model, dots represent individual measurements per transcript. Thin lines represent regression lines per speaker. The black solid line represents the overall regression line. The slope (r = 0.02) indicates a very weak positive/no correlation.

As Figure 1 shows, the correlation between filled pauses and variable contexts is negative and significant, though weak (r = -0.20, p < 0.001). Correlation r values range from –1 (perfect negative correlation, or an increase in the x-axis independent variable predicts an equivalent decrease in the y-axis dependent variable) to +1 (perfect positive correlation, or an increase in the x-axis independent variable predicts an equivalent increase in the y-axis dependent variable); an r value of zero (flat regression line) indicates no relationship whatsoever (a change in the x axis variable does not predict any change in the y-axis variable). The correlation between unfilled pauses and variable contexts in Figure 2 is positive but extremely weak (r = +0.02); the relationship is not statistically significantly different from zero relationship (p = 0.17).

We note in this context that previous research (Le Grézause 2017) has suggested that there is a dyadic gender difference in the rates of filled pauses (mixed-gender dyads have more *ums* than same-gender dyads; same-gender dyads have more *uhs* than mixed-gender dyads). Investigating demographic meta-information, we can report that this is not borne out by our data (see the supplementary materials in the OSF repository).

In summary, we replicate the results reported in Gardner et al. (2021), using a much larger data set and by taking conversation (rather than turn) as the unit of interest. Overall, dysfluencies in the SWITCHBOARD simply do not correlate with grammatical optionality. However, the foregoing analysis does not distinguish between different types of alternations. This is the line of inquiry that we turn to next.

3.2. Does alternation type make a difference?

Not all variables involve the same sort of grammatical alternation. For example, insertion/deletion variables may facilitate Uniform Information Density (UID) optimization through reduction (Meister et al. 2021). Permutation variables are intimately linked with Easy First optimization (MacDonald 2013). Substitution variables often involve constraints that have to do with phonological or rhythmic well-formedness (Shih et al. 2015), and so on. It does make sense to conduct an additional series of repeated measures correlations (Figures 3–4) in which we split the data based on the nature of the alternation (see Tables 2–4).
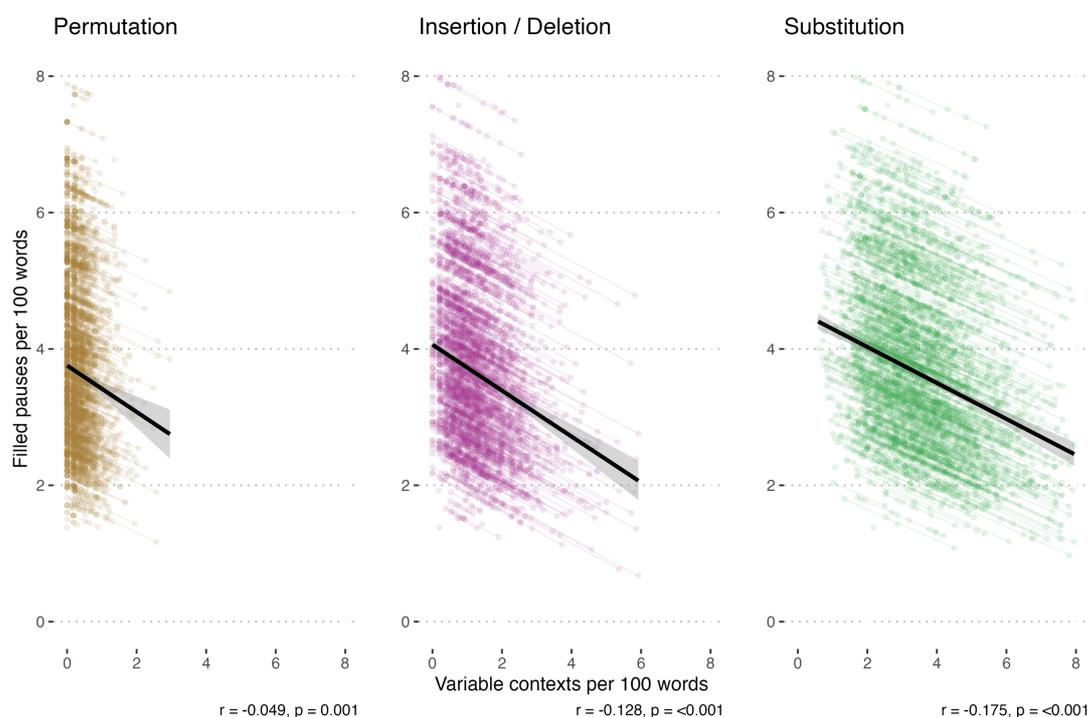

Figure 3: Repeated measures correlation for filled pauses, divided by subsets based on the three types of alternation ($N_{conversation}$ = 2392, $N_{speaker}$ = 4784). In this varying-intercept model, represent individual measurements per transcript. Thin lines represent regression lines per speaker. The black solid line represents the overall regression line.
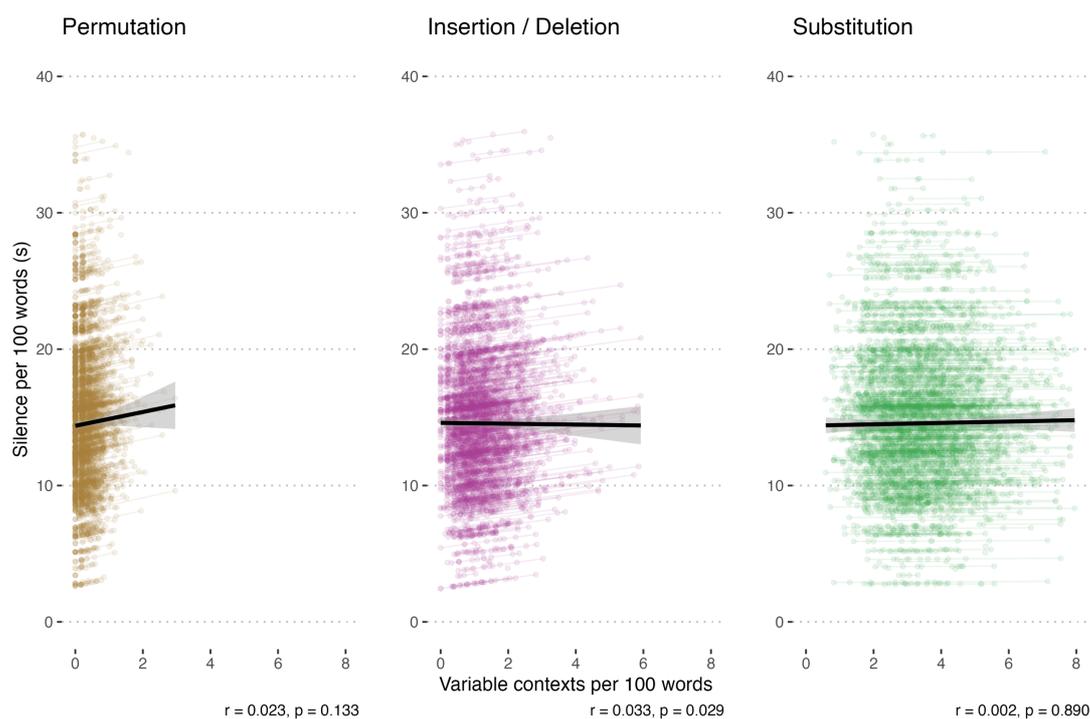
Figure 4: Repeated measures correlation for unfilled pauses, divided by subsets based on the three types of alternation ($N_{conversation}$ = 2392, $N_{speaker}$ = 4784). In this varying-intercept model, dots represent individual measurements per transcript. Thin lines represent regression lines per speaker. The black solid line represents the overall regression line.

Figure 3 shows that all correlations for filled pauses are negative and statistically significant ($p < 0.001$), meaning that each of the three categories of alternations repel dysfluency. The strongest of these negative correlation effects is for substitution alternations ($r = -0.18$), followed by insertion/deletion ($r = -0.13$) and permutation alternations ($r = -0.05$). Note that r values below –0.25 are considered weak, while those less than 0.10 are considered very weak. For unfilled pauses (Figure 4), only permutation alternations show a significant relationship between pausing and number of variable contexts ($r = 0.04, p = 0.007$). Both insertion/deletion and permutation alternations show a relationship that is not statistically significantly different from nil. This is congruous with our earlier finding that the number variable contexts per 100 words does not predict seconds of silence per 100 words (as in Figure 2).

As an interim summary, we note that distinguishing between different alternation types does not change the general observation that increased variable contexts does not positively predict either an increased number of dysfluencies or additional speech

planning time. In fact, for the most part, more grammatical optionality correlates (albeit weakly) with fewer dysfluencies and less speech planning time – otherwise the relationship cannot be statistically verified as beyond chance variation. Along with the results of Gardner et al. (2021), our findings provide strong evidence that variation and optionality do not result in additional production difficulty. That is, increased absolute complexity does not result in increased relative complexity. We discuss the implications of this finding in Section 4.

4. Discussion and conclusion

As we have shown, the often-presupposed positive correlation between relative complexity and absolute complexity is not borne out in our large corpus of spoken English. Absolute complexity was operationalized by identifying grammatical variable contexts, i.e., sites where speakers had to make an online choice between alternative forms. These contexts belong to 22 grammatical alternations that are well-studied in the variationist literature, which shows that the choice of alternates is based on non-trivial contextually sensitive probabilistic conditioning. Relative complexity was operationalized in two manners: filled pauses or delay markers, e.g., *uh* and *um*; and unfilled pauses or speech planning time. It is evident from the repeated measures correlations that speakers facing more sites of grammatical choice making are not disadvantaged cognitively by having to make those choices.

Further, grouping variables by typological similarity reproduces similar results. It is not the case, then, that insertion/deletion choices involve more cognitive challenge than permutation or substitution type choices. This is particularly noteworthy given that other characteristics of syntactic constructions or lexical items (especially their frequency) *do* affect a speaker's fluency in production. For example, in SWITCHBOARD, dysfluencies are more likely prior to unexpected lexical items (i.e., with high surprisal) or in contexts of more or longer syntactic dependencies (Dammalapati, Rajkumar & Agarwal 2019). Speakers have also been shown to actively manage the complexity of the utterances they produce (see, e.g., Rezaii et al. 2022). Given this, it may be the case that choice making sites only surface in utterances that are, all things being equal, easier to produce (e.g., with fewer content words and common syntactic structures). Optionality does not add relative complexity, but rather only surfaces in contexts that are already relatively simple. This is particularly the

case for permutation contexts. The corollary of this observation is that while absolute complexity does not add to relative complexity, the full suite of grammatical rules (including optional constructions) constituent of absolute complexity surface most robustly in utterances that are otherwise the least relatively complex.

We started out by contrasting the variationist view of linguistic variation — that it is endemic and normal — with a view underlying much theorizing in typology, functional linguistics, cognitive linguistics, and construction grammar: variation is sub-optimal and anomalous. This latter view is inseparable from the continued proposal that syntactic synonymy simply does not, cannot, or should not exist, viz. the Principle of Isomorphism (Haiman 1980), Principle of No Synonymy (Goldberg 1995), and Principle of No Equivalence (Leclercq & Morin 2023). The existence of near-synonymy at different linguistic levels is rarely denied outright, however, there is an assumption that such form-function or form-meaning overlap is necessarily short-lived and largely accidental (see De Smet et al. 2018; De Smet 2019 for critical discussion). Conversely, a foundational observation of variationist linguistics is that there exist instances in which forms and functions/meanings of different constructions overlap considerably, if not entirely, often because of language-external forces (Labov 1978). Variationists, however, do take great pains to identify the limits of variation, i.e., carefully circumscribing variable contexts. For example, there are scenarios in which variation could occur, but does not (e.g., *-ing* varies between [-ɪn] and [-ɪŋ], but never for one-syllable words like *king*), and scenarios where diachronic variation resolves to functional partitioning or loss (e.g., the functional partitioning of the *go* quotative for non-lexical sounds or gestures in Australian Aboriginal English, Rodríguez Louro et al. 2023). In modeling the probabilistic nature of three alternations (genitive, dative, particle placement) in different World Englishes, Szmrecsanyi & Grafmiller (2023) spend roughly 10 pages describing cases that do not participate in the variable context, i.e., where an isomorphic form-functional niche has been found.

Most typologists, functionalist/cognitive linguists, and construction grammarians tend to focus on the ways in which variants differ. If variants do have semantic/functional overlap, then this overlap is viewed as sub-optimal. They expect that the linguistic system will rebalance itself by finding different functional niches

over time, thereby repairing accidental form-function asymmetries (see Figure 5 for a visual depiction).
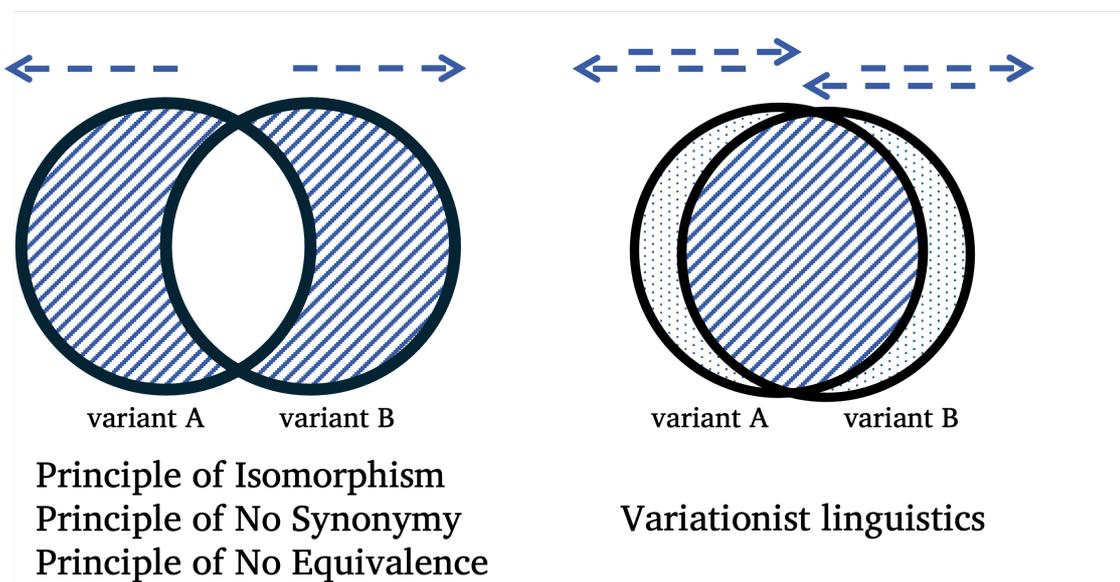

Figure 5. Diagrammatic representation of the Principle of Isomorphism / No Synonymy / No Equivalence (left) vs. Variationist Linguistics (right), their respective focus of attention (stripes), and view on diachronic change (arrows).

Poplack and Dion (2009: 557) call this way of thinking about optionality "the doctrine of form-function symmetry". Variationist linguists, by contrast, recognize that constructions can certainly have niche isomorphic functions or meanings, but their focus is on those instances where the boundaries between different forms and their linked meanings are indeed blurred. Consequently, the modeling of speakers' grammars will then necessarily involve the modeling of probabilistic grammars, which in essence are not unstable in nature but are dynamic, across time and situation (indicated by arrows in Figure 5). In this regard, grammatical optionality is not fundamentally problematic, but in fact a feature of language. Thus, whether variation is a blemish on the linguistic system or a fundamental part of it depends on which analytic glasses you wear (either the left or right side of Figure 5). Our findings, however, only evidence one of these views: variation is not a problem.

Indeed, there may even be cognitive benefits to having multiple variants available, as already argued in Gardner et al. (2021). For example, speakers can adjust their explicitness depending on the complexity of the environment (Rohdenburg 1996), manage information density (Levy & Jaeger 2007; Meister et al. 2021), be biased to produce easy constituents first or heavy constituents last ("Easy First" in MacDonald

2013; "End Weight" in Eitelmann 2016), or produce a more eurhythmic utterance (Shih et al. 2015). So perhaps having multiple grammatical ways of saying the same thing is a blessing rather than a blight, an issue that warrants further exploration by including other forms of dysfluencies, such as discourse markers, restarts and repairs.

This is the first study of a large representational corpus of a major variety of spoken English in which the notion of complexity was interpreted as absolute (operationalized as 22 major types of grammatical alternations) vs. relative (filled and unfilled pauses). The methodology should be applied to other spoken corpora. In particular, attention should be devoted to the investigation of other kinds of alternations, e.g., phonological or lexical, next to grammatical alternations (see examples 3-5 in the introduction). One may also wonder whether these findings are restricted to English data (unlikely) or also appear in other languages. To that end, we are currently investigating spoken data from Mandarin Chinese. While our study is corpus-based, additional psycholinguistic classification tasks provide potential points of comparison to cross-validate our results. And finally, there may be a difference in the difficulty of choices that need to be made. Some turns may contain contexts that are constrained (easier choices), other may be more restricted (harder choices). It is not unthinkable that hard choices would elicit more hesitation markers, i.e., come with a higher relative cost. We have modeled this aspect on the same dataset (Szmrecsanyi et al., in print; Van Hoey et al., accepted), with similar results as the current contribution. For now, however, it is clear that the predicted theoretical positive relation between relative and absolute complexity was not found in our data. Absolute complexity does not necessarily trigger relative complexity after all.

Data availability statement

Data and code can be found on the accompanying OSF repository.
https://osf.io/at5mn/

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