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Symbolic Sequence Effects on Consumers' Judgments of Truth for Brand Claims

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We introduce symbolic sequence effects—the consequences of whether the sequence of the initial letters of a pair of words (e.g., a word representing a putative cause and another word representing a putative effect) conforms to the structure of symbolic sequences that are stored in the mind as overlearned natural language traces ("natural sequence"). We synthesize insights from psychophysics as well as numerical and natural language symbolic representations to demonstrate that consumers are able to unconsciously perceive the mere sequence of symbols contained in a brand claim, and that this sequence information influences judgments of truth. Across three experiments, we showed that when a brand claim is structured in a way that is consistent with the natural sequence of symbols ("A causes B" rather than "B causes A"), people experience feelings of sequential fluency, which in turn influences judgments of truth. This occurs despite the inability of participants to attribute the true source of the feelings. Our results suggest that carefully designed brand claims are likely to benefit from this natural sequencing. These findings provide important contributions to the literatures on processing fluency, branding, and advertising. These findings also have sobering societal implications and warn that fake news might be more persuasive if the perpetrators understand symbolic sequencing techniques.

Keywords Judgments of truth; Causality; Processing fluency; Brand claims; Fake news

Many statements that consumers encounter in life, whether they are brand claims, government warnings, "fake news," or legitimate newspaper headlines about consumer products, come in the form "A causes B." Examples of these statements are "Advil kills pain," "Coffee prevents depression," or "Hillary eradicates Muslims." Oftentimes, consumers make a judgment of whether the statement is true or not without spending the time or effort to read the supporting arguments or search for additional information, because people are cognitive misers (Fiske & Taylor, 1984). Although these statements are sometimes true, there are many cases in which they are not. In the present research, we propose a novel variable that influences judgments of truth: the astute sequencing of letters in brand claims.

Conceptual Development

Judgments of Truth

Earlier work has demonstrated that some incidental factors can influence the perceived truthfulness of a statement, such as its repetition, in which statements that were repeated will be judged as more truthful than statements that were shown for the first time (Schwartz, 1982). Another factor is the perceptual fluency of the physical stimulus that is being processed, such as the visual clarity or optical contrast resolution of the printed font, or the readability of the font style in the visual stimulus (Reber & Schwarz, 1999; Reber & Unkelbach, 2010). A unifying theme is that processing fluency, no matter how it is achieved, can influence judgments of truth and marketing outcomes (King & Janiszewski, 2011).

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In a separate literature on psychophysics, one factor that has been found to contribute to perceptions of causation is the sequence by which physical events occur (Alloy & Tabachnik, 1984). People infer that a particular physical stimulus has caused an effect on another target stimulus if the perceived physical or mechanical interaction occurs prior to the effect (Einhorn & Hogarth, 1986). For instance, when people push an object, and the object moves forward, people infer that their movement of pushing has caused the effect of the object moving forward. In other words, the strength of perceived veridicality of a putative causal relationship is a function of whether the temporal sequence of the putative causal event and the putative effect event conforms to what is perceived to be a natural sequence of physical events (i.e., the effect stimulus follows the cause stimulus).

In the symbolic and numeric cognition literature, one striking feature by which people's minds organize information is that there is a systematic sequence by which we temporally and spatially represent symbols and other stimuli in "natural language" (Lyons, 1991). For example, ascending Arabic numerals are overlearned and represented cognitively as natural numbers on a mental number line from the left side to the right side, with smaller numbers on the left side and higher numbers on the right side of this line (Dehaene, 2011; Dehaene, Bossini, & Giraux, 1993; Meck & Church, 1983). Letters are also overlearned and represented cognitively on a mental alphabet line from left to right, with letters A and B arbitrarily placed on the left side of the mental line and alphabetically subsequent letters appearing on the right side of the mental line (Zorzi, Priftis, Meneghello, Marenzi, & Umilta, 2006). The separate literatures on psychophysics and those on numerical and symbolic representation both independently posit that temporal and spatial sequences are fundamental to mental representation, and we propose that their overlearned arbitrary sequencing should underpin the generation of judgments of truth.

The Current Research

Synthesizing insights from these two lines of literature, we propose a novel factor that could influence the perceived truthfulness of a statement: the presence and type of symbolic sequences that are currently activated in human memory. We propose that consumers can unconsciously "see" sequence information in brand claims, even if they are unaware of it. The type of symbolic sequence that is unconsciously perceived can be either a "natural sequence" or a "reverse sequence." We define *natural sequence* as a sequence that conforms to previously encoded symbolic sequences in natural language (e.g., A, B, C, . . . 1, 2, 3. . .). In contrast, we define *reverse sequence* as a sequence that conforms to the opposite of previously encoded symbolic sequences in natural language (e.g., Z, Y, X, . . . 9, 8, 7).

We propose the consumer phenomenon of *symbolic sequence effects*, such that brand claims, or statements in general, containing initial letters that conform to the arbitrary "abcde" sequence (e.g., Andrenogel increases Testosterone) might be perceived as more truthful, compared with a causality statement that does not conform to such sequence (e.g., Undrenogel increases Testosterone). Symbolic sequence effects occur because our mind stores the overlearned natural symbolic sequence of A, B, C, . . . (Zorzi et al., 2006) and scans the environment for possible matches. As a result, mentally processing "Andrenogel increases Testosterone" would unconsciously map onto the causal template ("Cause precedes the Effect"), which generates a feeling of sequential fluency. This feeling of sequential fluency arising from the causality statement could be misattributed for truthfulness. Here, we define sequential fluency as a feeling of ease that emerges when a person encounters a statement that is arranged in an orderly fashion, even when the person is consciously unaware of the sequential arrangement.

Experiment 1

Our objective was to demonstrate the effect of natural language-based alphabetical ordering of the first letters of words in a sentence ("symbolic sequence effect"), such that naturally sequenced statements will be judged as more truthful compared with reverse sequenced statements.

Method

We recruited 172 adults (82 women, M_{age} = 40.96 years) living in the United States from Amazon Mechanical Turk (MTurk) and compensated them $0.45 each. Using G*Power 3 (Faul, Erdfelder, Lang, & Buchner, 2007), this sample size has a 90% power to detect a medium effect size; Cohen's d = .50 (please see Methodological Detail Appendix: MDA 1).

The experiment was a between-subjects design where participants were randomly assigned to evaluate the truthfulness of two brand statement types. To manipulate the sequence of the two versions of statements, we created fictitious brand claims and then varied the first letter of the brand names. In the naturally sequenced statements condition ($n = 88$), participants evaluated 10 brand claims conforming to a naturally stored sequence (e.g., Andrenogel increases Testosterone). In the reverse sequenced statements condition ($n = 84$), participants evaluated 10 brand claims that did not conform to a naturally stored sequence (e.g., Undrenogel increases Testosterone; see Appendix A). We controlled for the brand name's familiarity, ease of pronunciation, and liking (Begg, Anas, & Farinacci, 1992; Laham, Koval, & Alter, 2012; Song & Schwarz, 2009; see MDA2).

Following each statement, participants rated its truthfulness: "Indicate the extent to which the statement is likely to be true." (1 = *very unlikely*, 7 = *very likely*). Responses were averaged to form a truth rating index ($\alpha = .79$).

Results and Discussion

Supporting our prediction, an independent samples *t* test on the truth rating index was significant ($t(170) = 3.26$, $p = .001$, $d = .50$), such that the truth ratings were significantly higher in the naturally sequenced statements condition ($M = 4.38$, $SD = 0.86$) compared with those in the reverse sequenced statements condition ($M = 3.95$, $SD = 0.87$).

Thus, results of Experiment 1 supported our prediction that statements conforming to naturally encoded sequences are perceived to be more truthful, compared with statements that do not conform to such sequences. In the next experiment, we sought to provide evidence regarding the process underpinning sequence effects in judgments of truth.

Experiment 2

Building on Experiment 1, we measured feelings of sequential fluency after participants provided their truth ratings. We predicted that participants would feel a higher level of sequential fluency and hence provide higher truth ratings to naturally (vs. reverse) sequenced statements due to the higher resting activation levels of naturally stored sequences in memory. In addition to the no-prime control condition, we added another two conditions where we altered the activation levels of participants' natural (vs. reverse) stored sequences (not the brand name or brand claim) before participants evaluated brand claims. We predicted that participants primed with a sequence conforming to naturally stored sequences would feel a higher level of sequential fluency and hence provide higher truth ratings to naturally (vs. reverse) sequenced statements. In contrast, priming participants with the reverse sequence should lower truth ratings for naturally sequenced brand claims, because raising activation levels for the *reverse* of natural sequences would create response competition during the process of generating a judgment of truth. Thus, we predicted that participants primed with a sequence conforming to the *reverse* of a stored sequence would temporarily feel a higher level of sequential fluency toward reverse sequences and hence give higher truth ratings to reverse (vs. naturally) sequenced statements. This would represent a reversal of the pattern of results and provide some insight into the mechanism underpinning the sequence effects.

Method

We recruited 256 undergraduate students enrolled in the international program (156 women, $M_{age} = 21.64$ years) to participate in a study in exchange for class credit. This sample size has a 98% power to detect a medium-sized effect; Cohen's $f = .25$. The experiment has a 3 (priming condition: natural sequence prime; $n = 85$ vs. reverse sequence prime; $n = 85$ vs. no-prime control condition; $n = 86$) $\times$ 2 (statement type: naturally sequenced statements; $n = 128$ vs. reverse sequenced statements; $n = 128$) between-subjects design with both factors experimentally manipulated.

Participants were told that they would complete two ostensibly unrelated tasks: a video evaluation task and a brand slogan evaluation task. In the first task, we manipulated priming condition where participants were randomly assigned to watch a short video clip of either an alphabet song that was sung normally (natural sequence prime) or an alphabet song that was sung with a reverse-alphabetical sequence (reverse sequence prime) on the computer screen (see MDA 3). Thus, the video arbitrarily primes sequence information about which letters should go first before others (note that the video does not prime the brand name or the brand claim).

In the brand slogan evaluation task, we manipulated sequence type where participants in each priming condition were randomly assigned to evaluate 10 brand claims that were either naturally sequenced statements or reverse sequenced statements. One design enhancement for Experiment 2 was that we controlled for the alphabetical position in the sequence where brand names in both conditions equally began with early or late letters in the alphabets, and we controlled for the number of intervening letters in the sequence (e.g., Balena removes Cellulite vs. Dalena removes Cellulite; see Appendix B). Again, these brands were pretested to rule out potential confounding variables (see MDA 2).

Following each statement, participants indicated the extent to which the statements were likely to be true on a 7-point scale, and responses were averaged ($\alpha = .67$). After participants provided truth ratings for all of the statements, they completed items measuring feelings of sequential fluency: "How sequential did the statement feel to you?" (1 = *not at all sequential*, 7 = *very sequential*) and "How well-arranged did the statement feel to you? (1 = *not well-arranged at all*, 7 = *very well-arranged*). Participants' responses were averaged ($r = .75$).

Results and Discussion

As predicted, a two-way ANOVA on the truth rating index revealed a significant interaction ($F(2, 250) = 20.76$, $p < .001$, $f = .41$; see Figure 1). Further planned contrasts revealed that, under a natural sequence prime, the truth ratings were significantly higher for naturally sequenced statements ($M = 4.52$, $SD = 0.69$) compared with reverse sequenced statements ($M = 3.95$, $SD = 0.60$, $F(1, 250) = 15.66$, $p < .001$). Similarly, under no-prime control condition, the truth ratings were significantly higher for naturally sequenced statements ($M = 4.62$, $SD = 0.71$) compared with reverse sequenced statements ($M = 3.87$, $SD = 0.65$, $F(1, 250) = 26.71$, $p < .001$). In contrast, under a reverse sequence prime condition, the truth ratings were significantly higher for reverse sequenced statements ($M = 4.32$, $SD = 0.59$) compared with naturally sequenced statements ($M = 3.85$, $SD = 0.75$, $F(1, 250) = 10.67$, $p = .001$).

A two-way ANOVA on feelings of sequential fluency revealed a significant interaction ($F(2, 250) = 12.49$, $p < .001$, $f = .32$). Further planned contrasts supported our predictions and the pattern of results mirrored that of truth ratings (see MDA 4). Next, we conducted a bootstrapping analysis for moderated mediation (model 8, Hayes, 2013). The analysis revealed that the two-way interaction between priming condition (natural sequence prime;

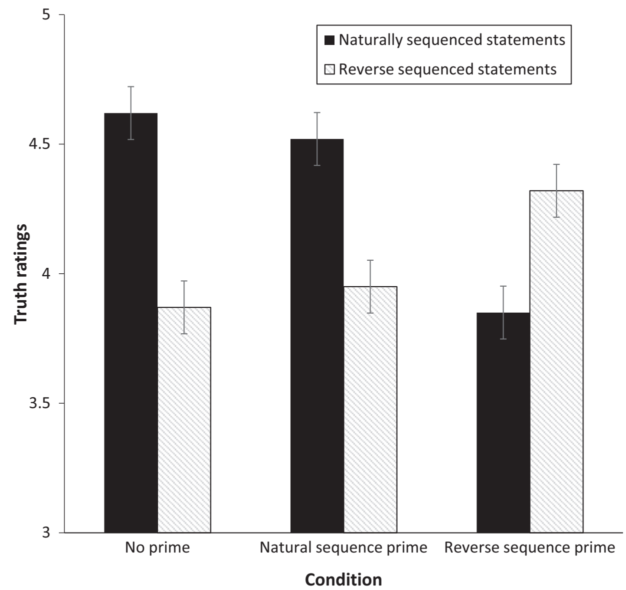

Figure 1. Interaction between priming condition and statement type on truth ratings in Experiment 2.

coded 0 vs. reverse sequence prime; coded 1) and statement type (naturally sequenced statements; coded 0 vs. reverse sequenced statements; coded 1) was significantly mediated by feelings of sequential fluency because the 95% confidence interval (CI) for the moderated mediation did not include zero (95% CI = [0.1547, 0.4661], see Table 1 for regression coefficients). We further examined the indirect effects by priming condition to test for moderated mediation. In the natural sequence priming condition, mediation through feelings of sequential fluency was significant (95% CI = [−0.2809, −0.0664]). In the reverse priming condition, mediation through feelings of sequential fluency was also significant (95% CI = [0.0553, 0.2372]). We also performed a similar moderated mediation analysis comparing the no-prime control condition and reverse sequence prime conditions (see MDA 5). Results were consistent with our prediction: Participants in the no-prime control condition reported a high level of sequential fluency toward naturally sequenced statements and hence increased their truth ratings for them. This pattern of results for no-prime condition mirrored those of participants in the natural sequence prime condition, providing empirical support for the idea that naturally sequenced brand claims elicit higher truth ratings in the marketing ecology ("the real world"), even in the absence of experimental priming (see MDA 6 and 7).

Thus, results of Experiment 2 provided insight into the role of feelings of sequential fluency in underpinning the truth effect. This supports our account that the mind stores natural language sequences, and that judgments of truth are a function of whether an incoming stimulus matches these natural sequences. In addition, our results demonstrate that altering the activation levels of a participant's naturally stored sequence affects perceptions of truthfulness. In the next experiment, we sought to provide further support to our process by measuring reaction times (RTs), because prior research has shown that participants respond to fluent statements more quickly (Whittlesea & Williams, 1998). In addition, we use subliminal presentations to rule out demand effects.

Experiment 3

In this experiment, we made two substantial changes to increase internal validity. First, we used subliminal manipulations to influence participants before the rating task and measured their response times (RTs) toward each brand claim. Subliminal manipulations prevent demand effects from influencing truth ratings, because participants would not be able to consciously alter their truth ratings based on briefly exposed sequence information that they are not consciously aware of. Second, we employed a within-subjects design where participants provided truth ratings to both types of statements. We predicted that participants exposed to a subliminal priming of a natural sequence would respond faster to and indicate higher ratings for, naturally sequenced statements as opposed to participants exposed to reverse sequenced statements. In contrast, we predicted the opposite pattern of results (a reversal) in the case of subliminal priming of a reverse sequence.

Table 1
Results of Bootstrapping Moderated Mediation Analysis Between Natural Sequence Prime and Reverse Sequence Prime Conditions in Experiment 2

	Feelings of sequential fluency (MED)		Truth ratings (DV)	
Variables	*B*	*SE*	*B*	*SE*
Feelings of sequential fluency (MED)			.59***	.06
Priming condition (IV)	−.27***	.08	−.18**	.06
Statement type (MOD)	−.69***	.15	−.17	.12
Interaction (IV × MOD)	.50***	.11	.23**	.08
Index of moderated mediation: IE = 0.29, *SE* = .08, 95% CI **[0.1547, 0.4661]**				
Conditional indirect effect of IV on DV via MED at each level of MOD				
Naturally sequenced statement: IE = −0.16, *SE* = .05, 95% CI **[−0.2809, −0.0664]**				
Reverse sequenced statement: IE = 0.14, *SE* = .05, 95% CI **[0.0553, 0.2372]**				

Note. We conducted a bootstrapping analysis for moderated mediation (model 8, Hayes, 2013) with priming condition (natural sequence prime; coded 0 vs. reverse sequence prime; coded 1) as the independent variable (IV), statement type (naturally sequenced statements; coded 0 vs. reverse sequenced statements; coded 1) as the moderator (MOD), feelings of sequential fluency as the mediator (MED), and truth ratings as the dependent variable (DV). Bold indicates reliable indirect effect where bias-corrected confidence interval (CI) does not include zero at 95%.
$^{**}p < .05$, $^{***}p < .001$.

Method

We recruited 85 undergraduate students enrolled in the international program (53 women, M_{age} = 20.47 years) to participate in the study in exchange for class credit. This sample size has a 99% power to detect a medium to large effect size; Cohen's f = .365. All participants had normal or corrected-to-normal vision and were naïve regarding the purpose of the experiment. The experiment had a 2 (subliminal priming condition: natural sequence; n = 43 vs. reverse sequence; n = 42) × 2 (statement type: naturally sequenced statements vs. reverse sequenced statements) mixed design, where the first factor was between subjects and the second factor was within subjects.

In order to precisely control the timing and stimulus presentation of subliminal stimuli, the experiment was programmed using (EventIDE Software, Okazolab Ltd., London, UK). The software was used for the presentation of stimuli and for the measurement of the RTs. Participants viewed the computer display (60 Hz refresh rate) from a distance of about 50 cm. All stimuli were presented on the computer display (48 cm diagonal screen size) as black digits on a white rectangular background. We created two sets of primes for each subliminal priming condition (see Appendix C). The subliminal primes were presentations of nonspecific sequence information ("mere sequence"), *not* the brand name or brand claim.

Upon arrival at the laboratory, participants were told to complete a visual detection task where they had to look at the set of words flashing on the computer screen. They then had to rate the statements as quickly as possible in a second, ostensibly unrelated task. Participants started the task by first reading the instructions and then completed five practice trials. After the practice round, participants completed 20 measurement trials where each trial consisted of four events (see Figure 2). Following the recommendations of Gollan, Forster, and Frost (1997), the first event was a forward-masking stimulus that was presented for 500 ms (#########). The next event was a subliminal prime stimulus that was presented for 50 ms (RSTUVWXYZ). Immediately following the prime, a backward-masking stimulus was presented for 500 ms (#########). The last event was a target where participants answered the question: "Indicate the extent to which the statement is likely to be true." Participants were instructed to click on a number on a 7-point scale (1 = *very unlikely*, 7 = *very likely*) for each statement. We randomized the presentation of trials as well as the presentation of naturally sequenced statements and reverse sequenced statements within each trial. Just like we did in previous experiments, we pretested the brands used in this experiment to rule out potential confounding variables (see MDA 2).

At the completion of the last measurement trial, the screen presented instructions asking participants to complete a questionnaire placed on the computer table, where they answered questions on subliminal awareness (see MDA 8). None of the participants were able to recognize the subliminal presentations, thus ruling out the possibility of demand effects.

Results and Discussion

Participants' responses were averaged to form an index of truth rating for naturally sequenced statements index ($\alpha = .82$) and an index of truth rating for reverse sequenced statements ($\alpha = .82$). A repeated-measures ANOVA yielded a significant interaction between the condition and truth index by statement type ($F(1, 83) = 23.30$, $p < .001$, $f = .53$, see Table 2). Further planned contrasts revealed that, under subliminal priming of a natural sequence condition, truth ratings were significantly higher for naturally sequenced statements ($M = 4.35$, $SD = 0.83$) compared with reverse sequenced statements ($M = 3.64$, $SD = 0.86$, $F(1, 83) = 20.27$, $p < .001$). In contrast, under subliminal priming of a reverse sequence condition, truth ratings were significantly higher for reverse sequenced statements ($M = 4.22$, $SD = 0.78$) compared with naturally sequenced statements ($M = 3.84$, $SD = 0.85$, $F(1, 83) = 5.46$, $p = .022$).

We calculated RTs for naturally sequenced statements and RTs for reverse sequenced statements for participants in each experimental condition. A repeated-measures ANOVA yielded a significant interaction between subliminal priming condition and RTs by statement type ($F(2, 83) = 13.00$, $p < .001$, $f = .40$, see Table 2). Further planned contrasts demonstrated that, under subliminal priming of a natural sequence prime, RTs were significantly faster for naturally sequenced statements ($M = 2{,}111.82$, $SD = 1{,}168.42$) compared with

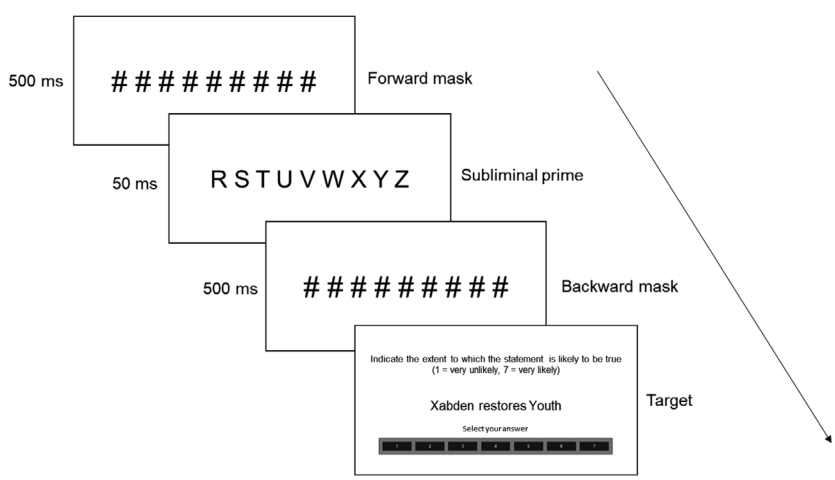

Figure 2. Sequence and durations of events on subliminal priming trials in Experiment 3. The prime stimulus represents subliminal priming of natural sequence condition. The target shown here represents a naturally sequenced statement (brand claim). Note that the subliminal presentation is a priming of mere sequence information only (it does not prime the brand name or brand claim). The brand claim is thus presented for the very first time to the participant at the point of evaluation (the participant has no previous exposure to the brand claim).

Table 2
Results Showing the Effect of Subliminal Priming on Truth Ratings and Response Times in Experiment 3

	Condition			
	Subliminal priming of natural sequence		Subliminal priming of reverse sequence	
Variables	*M*	*SD*	*M*	*SD*
Truth ratings				
Naturally sequenced statements	4.35***	0.83	3.84**	0.85
Reverse sequenced statements	3.64	0.86	4.22	0.78
Response times				
Naturally sequenced statements	2,111.82**	1,168.42	2,639.94**	1,999.87
Reverse sequenced statements	2,420.29	1,769.37	2,158.76	1,092.70

Note. The table shows the mean and standard deviations for truth ratings (1 = *very unlikely*, 7 = *very likely)* and response times in milliseconds in Experiment 3. Planned contrasts compared means between naturally sequenced statements and reverse sequenced statements within each condition.
$^{**}p < .05$. $^{***}p < .001$.

reverse sequenced statements (M = 2,420.29, SD = 1,769.37, $F(1, 83) = 4.02$, $p = .048$). In contrast, under subliminal priming of a reverse sequence prime, RTs were significantly faster for reverse sequenced statements (M = 2,158.76, SD = 1,092.70) compared with naturally sequenced statements (M = 2,639.94, SD = 1,999.87, $F(1, 83) = 9.54$, $p = .003$).

General Discussion

Our findings are distinct to the classic mere exposure phenomenon (Bornstein, 1989; Zajonc, 1968) or illusory truth effects (Hasher, Goldstein, & Toppino, 1977; Unkelbach, 2007) in that stimulus repetition is not needed to increase the perceptions of truth toward a statement (i.e., a brand manager does not need to repeat the claim several times and incur additional marketing costs). Instead, the key to eliciting higher ratings of perceptions of truthfulness is in understanding the natural sequences of symbols that are already cognitively intrinsic to each particular consumer segment (e.g., English versus Chinese speakers versus Iranian speakers, with some consumer segments having left-to-right sequences and others having right-to-left sequences) and structurally engineer the brand claims that conform better to the intrinsic sequences in the consumer segment's mental representations (by country).

Similarly, our effects are also distinct from perceptual fluency effects (Reber & Schwarz, 1999), because it is not the fluency by which the visual system processes the stimulus, but the fluency by which the inference system processes the symbolic sequences in the cause and effect stimuli that drives judgments of truth. Additionally, because our brand claims were always "never shown before," we demonstrated that brand claims that are low in conceptual fluency can be high in sequential fluency. Moreover, because font choice is almost always optimized to be visually clear in the ecology (i.e., few marketers will deliberately print their brand claims in a hard-to-read font), sequence effects appear to have more practical and actionable significance for marketers because there is usually room for improvement with regards to optimizing sequences in brand claims and slogans, and engineering the sentences in a more astute way is within the control of the marketer or government agency (e.g., anti-drug agency).

Future research could test whether patterns of sequence effects can experience reversals as a function of different stimuli designed by practitioners in different departments or advertising agencies. For example, it is possible that altering the advertising copy in a second version, such as "Pain? Asnex!," might cause a significant weakening of the sequence effect in judgments of truth. This is because the consumer might experience response competition between the advertising copy "Pain? Asnex!" and the implicit brand claim that was first encoded in memory: "Asnex Fights Pain." If future studies find such a reversal or attenuation, it might mean that marketers need to astutely coordinate the sequencing of their statements in advertising copy, packaging copy, and various rounds of social media campaigns in order to ensure that judgments of truth remain consistently high for their brand.

Another important question for future research is whether sequence effects generalize to (a) serial exposure to stimuli in general (ad copies that appear serially in Television advertising), or (b) situations in which a person constructs the causal statement mentally (D'Argembeau & Mathy, 2011). This would broaden the effects of sequence fluency to many situations of consumer, social, and moral judgment. Consider a jury that is trying to determine whether a particular murder suspect killed a victim. "Did suspect M kill victim N?" is essentially in the form of "M ___ N?" If we assume that jury members, by default, have symbolic structures in their memory that follow the same natural language sequences as subjects in extant symbolic and numerical cognition literature (Meck & Church, 1983; Zorzi et al., 2006), then we can expect symbolic sequences in the initials of the alleged suspect and the victim to influence the likelihood that the former will be charged or not. Astute but cunning prosecutors can pose the question "Did A kill B?" to influence the jury's judgment and decision making without the latter's awareness. Unlike more obvious phonological fluency effects such as "If the gloves don't fit, you must acquit" used in the OJ Simpson trial, sequence fluency effects are nearly invisible and evade awareness. Paradoxically, fluency effects that evade awareness can have stronger effect sizes, precisely because the lack of awareness means that people cannot adjust against its influence (Bornstein, 1989). Just as a double-edged sword can be used for good (legitimate health claims) or bad (fake news), an invisible sword swung in a dark alley is more likely to cut deeply.

Conflict of Interest

The authors declare no conflict of interest in preparing this manuscript.

Appendix A
Statements Used in Experiment 1

No.	Condition: Naturally sequenced statements	Reverse sequenced statements
1	A-100 burns Clean	E-100 burns Clean
2	B-50 is Efficient	I-50 is Efficient
3	Andrenogel increases Testosterone	Undrenogel increases Testosterone
4	Darapim prevents Malaria	Parapim prevents Malaria
5	Bicanyl treats Fever	Picanyl treats Fever
6	Bufferil eases Pain	Vufferil eases Pain
7	Accuprin strengthens Heart	Uccuprin strengthens Heart
8	Bev cures Depression	Mev cures Depression
9	Aspen moisturizes Skin	Vaspen moisturizes Skin
10	Decontrin cures Headaches	Recontrin cures Headaches

Appendix B
Statements Used in Experiment 2

No.	Condition: Naturally sequenced statements	Reverse sequenced statements
1	Clistin delights Eyes	Glistin delights Eyes
2	Balena removes Cellulite	Dalena removes Cellulite
3	Ecuvite improves Health	Ocuvite improves Health
4	Axeron burns Clean	Exeron burns Clean
5	Flumax kills Germs	Hlumax kills Germs
6	Raspen moisturizes Skin	Vaspen moisturizes Skin
7	Tudafed prevents Vomiting	Wudafed prevents Vomiting
8	Vabden restores Youth	Zabden restores Youth
9	Unimax kills Virus	Yunimax kills Virus
10	Vamas helps You	Zamas helps You

Appendix C
Stimuli and Statements Used in Experiment 3

No.	Subliminal priming (IV): Natural sequence	Reverse sequence	Statement type (DV): Naturally sequenced statements	Reverse sequenced statements
1	CDEFGHIJK	IHGFEDCBA	Clistin delights Eyes	Glistin delights Eyes
2	BCDEFGHIJ	JIHGFEDCB	Balena removes Cellulite	Dalena removes Cellulite
3	ABCDEFGHI	IHGFEDCBA	Adevan removes Cold	Edevan removes Cold
4	CDEFGHIJK	IHGFEDCBA	Ciluten moisturizes Eyes	Hiluten moisturizes Eyes

Appendix C *Continued*

	Subliminal priming (IV)		Statement type (DV)	
No.	Natural sequence	Reverse sequence	Naturally sequenced statements	Reverse sequenced statements
5	EFGHIJKLM	ONMLKJIHG	Ecuvite improves Health	Ocuvite improves Health
6	DEFGHIJKL	IHGFEDCBA	Dibaxin regulates Digestion	Fibaxin regulates Digestion
7	EFGHIJKLM	KJIHGFEDC	Excedrin cures Headaches	Kexcedrin cures Headaches
8	ABCDEFGHI	IHGFEDCBA	Alussin prevents Cough	Dalussin prevents Cough
9	DEFGHIJKL	JIHGFEDCB	Dizani restores Hair	Jizani restores Hair
10	FGHIJKLMN	IHGFEDCBA	Flumax kills Germs	Hlumax kills Germs
11	KLMNOPQRS	RQPONMLKJ	Lodein kills Pain	Rodein kills Pain
12	MNOPQRSTU	TSRQPONML	Miderma kills Pimples	Riderma kills Pimples
13	MNOPQRSTU	PONMLKJIH	Novasyn removes Odors	Povasyn removes Odors
14	RSTUVWXYZ	VUTSRQPON	Raspen moisturizes Skin	Vaspen moisturizes Skin
15	RSTUVWXYZ	VUTSRQPON	Renogel increases Testosterone	Venogel increases Testosterone
16	QRSTUVWXY	XWVUTSRQP	Salena reduces Weight	Xalena reduces Weight
17	QRSTUVWXY	WVUTSRQPO	Tudafed prevents Vomiting	Wudafed prevents Vomiting
18	QRSTUVWXY	ZYXWVUTSR	Vamas reduces Wrinkles	Zamas reduces Wrinkles
19	RSTUVWXYZ	UTSRQPONM	Xabden restores Youth	Zabden restores Youth
20	QRSTUVWXY	YXWVUTSRQ	Unimax kills Virus	Yunimax kills Virus

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Supporting Information

Additional supporting information may be found in the online version of this article at the publisher's website:

Appendix S1. Methodological Detail