Do Languages Generate Future-Oriented Economic Behavior?

Experimental Evidence for Causal Effects

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Do languages affect or merely reflect the attitudes, preferences and behaviors of the people who speak them?

Studies have documented correlations between linguistic features and grammatical structures of languages and between the attitudes, preferences and behaviors of the people who speak them. Thus for example, it was shown that speakers of languages with different structures and features vary in their processing of colors, future oriented economic behaviors and gendered attitudes (Chen 2013, Davis and Reynolds 2018, Gay et al. 2013, Jakiela and Ozier 2018, Mavisakalyan 2015, Prewitt-Freilino et al. 2012). Yet, evidence for the causal effects of the features and structure of languages on attitudes, preferences and behaviors are harder to provide. It is challenging to empirically disentangle the effects of languages from the effects of the cultures in which they are embedded and to show that languages shape the way we perceive the world (Whorf 1956). We contribute to this longstanding debate by providing evidence for the causal impact of the encoding of time in the language spoken on the intertemporal economic choices people make. Our findings suggest that perceptions of time are differently embedded in languages and can impact every day human interactions.

Languages vary in the ways in which they encode time. In some languages, like German, the same grammatical tense is used for the present and the future, while in other languages, like English, the marking of the present and the future are distinct. Studies based on survey data have shown that the usage of languages that grammatically associate the future and the present tends to be correlated with more future-oriented behavior: across and within countries, speakers of such languages save more, retire with more wealth, smoke less, practice safer sex, are less obese and care more about the environment (Chen 2013, Mavisakalyan 2016). These correlations between languages and future oriented economic behaviors may occur because speaking about a future event in the present tense makes the future seem more immediate. Thus, speakers of such languages may tend to value future events more than speakers of languages in which the present and the future are marked more distinctly. Another possibility is that cultural differences regarding time preferences across and within countries might be

reflected both in the languages spoken and in the observed differences in people's future economic behaviors.

Although survey data provide an opportunity to observe correlations between the way in which a language encodes time and future-oriented economic behaviors of the people who speak it, it is very difficult to use them to observe a *causal effect* between the language spoken and future-oriented economic behaviors. In other words, it is nearly impossible to hold constant the unmeasured cultural differences across and within countries that might be reflected both in the languages spoken and in the observed differences in people's future economic behaviors. Indeed, following Chen's (2013) study, some researchers have argued that the study merely shows that the languages we speak reflect the societies and cultures in which we live, but it does not show that the languages we speak affect our thinking (Roberts et al. 2015).

In an attempt to weigh in on the debate, Sutter and colleagues (2018) study differences in intertemporal choices of children who live in a bilingual city where about half of the inhabitants speak German (a weak FTR language) and the other speak Italian (a strong FTR language). They find that German-speaking primary school children are more likely than Italian-speaking children to delay gratification in an intertemporal choice experiment. However, like Chen's study, their study cannot rule out the possibility that the differences in behavior observed were generated by the cultural differences between the two groups.

The purpose of the current study is to go beyond correlation and to identify the *causal effect* of language on future-oriented behavior which has not been identified yet. We wish to show that the encoding of time in a language not only reflects but also generates differences in future-oriented economic behaviors; thus, when people are addressed in a language that grammatically differentiates the present and the future – i.e., it has a strong FTR – scripts about the future being more distant are activated. This, in turn, encourages less future-oriented behavior, such as spending more today. When people are addressed in a language that grammatically does not differentiate the present and the future – i.e., it has a weak FTR – scripts about the future being less distant are activated. This, in turn, encourages more future-oriented behavior, such as saving.

To do so, we take a randomized between-subject experimental approach. We let bilingual people who are fluent in two languages that vary in the way in which they encode time make a future-oriented economic decision: specifically, we ask participants in one of the two languages in which they are fluent to make a set of binary choices about whether they wish to be paid a certain amount of money earlier (today), or a larger amount of money later (in the following week). We then test whether the people who are randomly assigned to be asked in a strong FTR language require more future compensation than those asked in a weak FTR language.

Following Chen (2013), we separate the languages we explore into two broad categories: weak and strong-FTR (see also Dahl 2000). Strong FTR languages are those that require future events to be grammatically marked when making predictions. Weak FTR languages do not require such grammatical marking. Altogether we use 12 language pairs in which one language uses the same grammatical tense for the present and the future – i.e., it has a weak future time reference (weak FTR) – and the other has a strong future time reference (strong FTR).

We find, as predicted by Chen's theory, that being addressed in the strong-FTR language generates a higher time discount rate compared to being addressed in the weak-FTR language. In other words, participants who are addressed in languages in which the present and the future are marked more distinctly tend to value future events less than participants who are addressed in languages in which the present and the future are similarly marked.

Experimental Design

The experiment involves bilingual participants who are proficient in one weak-FTR language (German, Dutch, Mandarin) and in one strong-FTR language (English, French, Spanish, Hindi). We conducted the experiment in the Spring and Summer of 2019. Participants were recruited via MTurk, a crowdsourcing marketplace for Human Intelligence Tasks (HIT) and were randomly assigned to either the weak or the strong-

FTR experimental condition. They were first asked (in either the randomly-assigned weak or in the strong FTR language) to make a set of binary choices about whether they wish to be paid a certain amount of money earlier ($3 today), or a larger amount of money later (in the following week). We let participants choose between eleven such binary decision problems, varying the value of the future compensation they will receive in a week from $3.05 to $7. This procedure builds upon previous studies in which similar multiple price list procedures were used to elicit participants' discount rates (i.e., the amount for which participants are willing to receive a delayed payment, Benjamin et al 2010, Shane et al 2002). After choosing their preferred payment methods, participants were asked about their level of comfort in both languages and their country of residence. They were then asked to take language proficiency tests in the two languages in which they said they were proficient. Each language proficiency test consisted of 9 questions. The order of the two proficiency tests was randomized. (See the appendix for the payment options and proficiency tests). After completing the two proficiency tests, participants were asked a set of demographic questions. The geolocation of participants was also coded. Participants were then instructed on how to receive payment. Participants who were not proficient in both tested languages were excluded from the study.

The experiment therefore consisted of 12 sub-experiments (4 Strong-FTR languages x 3 Weak-FTR languages) X 2 experimental conditions (Compensation Question in Strong-FTR or Weak-FTR language). Over the course of eight months starting in November 2018, we published 12 different HITs on MTurk, asking bilingual participants to participate in our study only if they were fluent in the two languages.

Altogether 6,189 participants declared they were bilingual and fluent in the two languages but only 3,804 finished the experiment. Only 717 of the participants passed the two language proficiency tests assigned to them (received a score of at least 6 our of 9 on each of the proficiency tests). We also removed participants who displayed inconsistent time preferences, and those who participated from the same IP address as other participants. The final sample we use in the analysis consists of 565 participants (see Table 1).

(Table 1 about here)

Out of the 565 participants 289 were assigned to the weak-FTR condition and 276 to the strong-FTR condition. Table 2 presents the sample characteristics by the experimental condition.

(Table 2 about here)

Results

In Table 3 we present the results of OLS regression models predicting participates' lowest accepted delayed payment value. For each participant we capture the lowest amount for which she prefers to be paid in a week from now compared to being paid $3 today. Participants who provided inconsistent time preferences are excluded from the analysis.

Because these are linear regression models, we exclude from the sample for these analyses the participants for whom it was impossible for us to determine their precise preferences (those who denied all delayed payment offers (31.2% of participants) and those who accepted all delayed payment offers (7.4%)). Robust standard errors are reported in parentheses.

(Table 3 about here)

In model 1, we estimate the effect of the experimental condition with no controls. In model 2, we include participants' proficiency in the language in which they were asked the payment questions as a control. In model 3 we add the gap in participants' proficiency in the strong compared to the weak FTR language. The gap is intended to reflect participants relative emersion in the strong compared to the weak FTR language and culture and to capture the correlations observed by Chen (2013). Model 4 includes an additional interaction between the gap in proficiency and the experimental conditions. Model 5 additionally includes the demographic characteristics of participants and the language pair in which the participants were bilingual. Finally, following Roberts et al. (2015) model 6 controls for the origins of the languages in which participants are fluent (and thus does not include the specific language pair).

As predicted, being addressed in the strong-FTR language generated a higher time discount rate compared to being addressed in the weak-FTR language. In models 2,3,5 and 6, participants' lowest accepted delayed payment was at least 29 cents higher than the lowest accepted delayed payment of participants who were addressed in the weak FTR ($p<0.001$). Note that in model 1 where no controls are included, the effects of being addressed in the strong-FTR language are statistically significant only when a one tailed test is used. Because our hypothesis is one tailed and builds on Chen's (2013) findings we interpret the results in model 1 as supporting our hypothesis. The effects of being addressed in the strong-FTR language in all the other models are statistically significant when one or two sided tests are used. Participants' proficiency in the language in which the payment questions were asked also affected their preferences. More proficient participants had lower time discount rates compared to less proficient participants. This may be because more proficient participants understood the payment questions better or because more fluent participants are also more willing to delay immediate rewards compared to less proficient participants (scores in the two proficiency tests were positively correlated).

The strong-weak gap variable captures participants' relative proficiency in the strong compared to the weak FTR language. The significant and positive interaction in model 4 (asked in the strong-FTR * strong-weak gap, $p<0.001$) suggests that the effects of being asked the payment questions in the strong-FTR language are significantly strong for participants who are more fluent in the strong compared to the weak FTR language.

In the appendix, we present the results of ordered logistic regression models replicating the analyses presented in Table 3 but on the full sample (including the participants who denied all delayed payment offers and those who accepted all delayed payment offers). The results of the models are similar to the results presented in Table 3, suggesting that our findings are robust to the inclusion of participants who denied all delayed payment offers and those who accepted all delayed payment offers (See Table A1).

Attrition and Selection Bias

Only 61% of the participants who started the experiment completed it (see Table 1). Our concern is that participants who were asked the payment questions in a language in which they were less proficient left the study disproportionally so that people who were more fluent in the weak-FTR language (and were asked the payment questions in the strong-FTR language) left the experiment more than the people who were more fluent in the strong-FTR language (and were asked the payment questions in the weak-FTR language). If this were the case, the sample would generate a biased sample in which people who are asked in the strong FTR-language are also more proficient in the strong-FTR language compared to the people who are asked in the weak FTR language. If the sample were indeed biased, it would be impossible to disentangle the effects of the experimental condition (being asked in the strong FTR language) form the effect of one's proficiency in the strong-FTR language.

In Table 4, we present the results of balancing tests comparing the characteristics of participants by experimental condition.

(Table 4 about here)

We see that participants who were asked the payment questions in the strong-FTR language are not significantly more fluent in the strong-FTR language compared to the participants who were addressed in the weak-FTR language. Yet, the findings suggest that participants who were fluent in French (a strong-FTR language) were disproportionately represented in the strong-FTR experimental condition. To eliminate the concern that this imbalance generated the results we observe, we estimate the same OLS regression models predicting participants' lowest accepted delayed payment after excluding all the French speaking participants from the sample. The results we obtain are very similar to the results obtained with the full sample (see Table A2 in the Appendix). This suggests that it was not the attrition form the experiment that generated the results we report. Finally, the results of the balancing tests presented in Table 5 further suggest that people who were fluent in Hindi (a strong-FTR language) were disproportionately *underrepresented* in the strong-FTR condition. Although this bias should decrease the probability of obtaining the results we report, we also estimate the same OLS regression

models predicting participants' lowest accepted delayed payment after excluding all the Hindi speaking participants from the sample. The results we obtain are not statistically different than the results presented in Table 2 (see Table A2 in the Appendix).

Discussion

The results of our study demonstrate subjects' decisions concerning the future payment depends on whether they are asked question in strong or weak FTR languages.. They suggest that the grammatical structure of the language in which one is addressed activates different perceptions of time and results in different time preferences and behaviors; when a language refers to a future event in the present tense, it makes the future seem more immediate. Thus, conversing in such a language leads to valuing future events more than conversing in languages in which the present and the future are marked more distinctly.

Our results further suggest that the time related schemas embedded in languages are easily and immediately activated; asking the same payment questions in a different language resulted in different time preferences for otherwise similar participants.

Languages both reflect time related attitudes, preferences and behaviors and generate them. The preferences of participants in the experiment were affected both by the encoding of time in the language which they were addressed and by the encoding of time in the language in which they are more proficient. Thus, languages routinely and actively participate in enacting and maintaining schemas about time; whenever a language is spoken, the time preferences embedded in it are further reinforced and behaviors follow.

Bibliography

1. Chen, Keith M. 2013. "The Effect of Language on Economic Behavior: Evidence from Savings Rates, Health Behaviors, and Retirement Assets." American Economic Review, Vol 103, No. 2, pp 690-731.

2. Cronqvist, Henrik and Stephan Siegel. 2015. "The Origins of Savings Behavior." *Journal of Political Economy*, 123:1, pp 123-169
3. Davis, Lewis and Megan Reynolds. 2018. "Gendered language and the educational gender gap." *Economics Letters*, 168, 46-48.
4. Galor, Oded, and Ömer Özak. 2016. "The Agricultural Origins of Time Preference." *American Economic Review*, 106 (10): pp. 3064-3103.
5. Gay, Victor, Estefania Santacreu-Vasut and Amir Shoham. 2013. "The grammatical origins of gender roles." In: *Working papers Berkeley Economic History Laboratory Paper Series*.
6. Jakiela, Pamela and Owen Ozier. 2018. "Gendered Language". Policy Research working paper; no. WPS 8464. Washington, D.C. : World Bank Group. http://documents.worldbank.org/curated/en/405621528167411253/Gendered-language
7. Kricheli-Katz, Tamar and Tali Regev. 2019. "The Effect of Language on Performance: Do Gendered Languages Fail Women in Math?" Working Paper
8. Mavisakalyan, Astghik. 2015. "Gender in language and gender in employment." *Oxford Development Studies*, 43(4), 403–424
9. Mavisakalyan, Astghik, Yashar Tarverdi and Clas Weber. 2018. "Talking in the present, caring for the future: Language and environment." *Journal of Comparative Economics*, 46(4), 1370-1387,
10. McKelvey, Richard D. and Thomas R. Palfrey. 1992. “An Experimental Study of the Centipede Game.” *Econometrica*, 60(4), pp. 803-836
11. Nagel, Rosmarie and Fang Fang Tang. 1998. “Experimental Results on the Centipede Game in Normal Form: An Investigation on Learning.” *Journal of Mathematical Psychology* 42, pp. 356-384.
12. Pavlenko, Aneta. 2014. The Bilingual Mind: And What it Tells Us about Language and Thought. Cambridge: Cambridge University Press. doi:10.1017/CBO9781139021456
13. Prewitt-Freilino, Jennifer L., Andrew T. Caswell and Emmi K. Laakso. 2012. "The gendering of language: A comparison of gender equality in countries with gendered, natural gender, and genderless languages." Sex Roles, 66, 268 –281.

14. Roberts, Sean G, James Winters and Keith Chen. 2015. "Future Tense and Economic Decisions: Controlling for Cultural Evolution." *PLoS ONE* 10(7): e0132145. https://doi.org/10.1371/journal.pone.0132145
15. Sutter, Matthias, Silvia Angerer, Daniela Glätzle-Rützler and Philipp Lergetporer (2018). "Language group differences in time preferences: Evidence from primary school children in a bilingual city." *European Economic Review*, vol. 106, issue C, 21-34.
16. Whorf, Benjamin (1956), Carroll, John B. (ed.), Language, Thought, and Reality: Selected Writings of Benjamin Lee Whorf, MIT Press.

Tables

Table 1: Attrition

	Weak-FTR		Strong-FTR		Difference
	Obs	Proportion	Obs	Proportion	P-Value
Step					
Assignment to Treatment	3033		3156		.118
Answered Payment Questions	1980	.65	2213	.70	.000
Completed Survey	1822	.60	1982	.63	.027
Proficient in Both Languages	364	.12	353	.11	.316
Unique Users	310	.10	295	.09	.247
Consistent Time Preference	289	.10	276	.09	.285

Table 2: Sample Characteristics by Experimental Condition		
	Weak-FTR	Strong-FTR
Language Pairs		
English-Dutch	0.13	0.11
English-German	0.21	0.23
English-Mandarin	0.15	0.17
French-Dutch	0.04	0.05
French-German	0.06	0.10
French-Mandarin	0.04	0.03
Hindi-Dutch	0.05	0.05
Hindi-German	0.08	0.04
Hindi-Mandarin	0.05	0.03
Spanish-Dutch	0.06	0.05
Spanish-German	0.10	0.08
Spanish-Mandarin	0.04	0.05
Payment reservation price		
$3.05	0.33	0.30
$3.25	0.11	0.11
$3.50	0.07	0.08
$3.75	0.06	0.04
$4.00	0.13	0.13
$4.50	0.06	0.08
$5.00	0.10	0.08
$5.50	0.02	0.02
$6.00	0.02	0.04
$7.00	0.03	0.05
None selected	0.06	0.09
Proficiency in the Addressing Language	7.45	8.15
	(1.13)	(1.09)
Strong-Weak Proficiency Gap	0.51	0.54
	(1.15)	(1.20)
Female	0.38	0.37
White/Caucasian	0.41	0.41
African American	0.02	0.02
Hispanic	0.05	0.06
Asian	0.48	0.47
Other Race	0.04	0.04
College	0.78	0.79
Strong Language Genus:		
Germanic	0.48	0.51
Indic	0.18	0.12
Romance	0.33	0.37
Weak Language Genus		
Germanic	0.28	0.28
Indic	0.72	0.72
N	289	276
The table reports group means. Standard errors are in parentheses.		

Table 3: OLS Regression Models Predicting Lowest Accepted Delayed Payment

	(1)	(2)	(3)	(4)	(5)	(6)
Asked in Strong FTR	0.121	0.303	0.298	0.179	0.295	0.293
	(0.092)	(0.091)	(0.091)	(0.094)	(0.095)	(0.092)
Proficiency in the Addressing Language		-0.252	-0.248	-0.343	-0.232	-0.219
		(0.039)	(0.040)	(0.045)	(0.041)	(0.040)
Strong Weak Proficiency Gap			0.056	-0.122	0.054	0.047
			(0.041)	(0.050)	(0.049)	(0.048)
Asked in Strong FTR X Strong Weak Proficiency Gap				0.347		
				(0.088)		
Female					0.159	0.177
					(0.090)	(0.090)
African American					0.514	0.571
					(0.312)	(0.309)
Hispanic					-0.148	-0.154
					(0.194)	(0.188)
Asian					-0.288	-0.334
					(0.118)	(0.115)
Other					0.019	0.007
					(0.302)	(0.301)
College Graduate					-0.175	-0.200
					(0.132)	(0.132)
Language Pairs Dummies					Y	
Strong-FTR Genus Indic						0.109
						(0.153)
Strong-FTR Genus Romance						0.044
						(0.103)
Weak-FTR Genus Indic						-0.092
						(0.110)
Constant	3.848	5.731	5.671	6.478	5.685	5.697
	(0.059)	(0.307)	(0.318)	(0.363)	(0.366)	(0.373)
N	523	523	523	523	509	509
Adjusted R-square	0.001	0.071	0.073	0.100	0.113	0.100

Robust standard errors in parentheses;

Table 4: Balancing Tests

	Asked in Weak FTR	Asked in Strong FTR	t-tes p-valu

	(1)	(2)	(1)-(2
Strong FTR Language: English	0.484	0.507	0.58
	(0.029)	(0.030)	
Strong FTR Language: French	0.131	0.185	0.083
	(0.020)	(0.023)	
Strong FTR Language: Hindi	0.183	0.123	0.047
	(0.023)	(0.020)	
Strong FTR Language: Spanish	0.201	0.185	0.63
	(0.024)	(0.023)	
Weak FTR Language: Dutch	0.270	0.275	0.88
	(0.026)	(0.027)	
Weak FTR Language: German	0.453	0.446	0.85
	(0.029)	(0.030)	
Weak FTR Language: Mandarin	0.277	0.279	0.95
	(0.026)	(0.027)	
Strong FTR proficiency score	8.076	8.152	0.40
	(0.064)	(0.065)	
Weak FTR proficiency score	7.453	7.511	0.54
	(0.067)	(0.068)	
N	289	276	

Robust standard errors in parentheses. * p<0.1 ** p<0.05 ***p<0.01

Table 4: Balancing Tests			
			t-test
	Asked in Weak FTR	Asked in Strong FTR	p-value
	(1)	(2)	(1)-(2)
Strong FTR Language: English	0.484	0.507	0.588
	(0.029)	(0.030)	
Strong FTR Language: French	0.131	0.185	0.083
	(0.020)	(0.023)	
Strong FTR Language: Hindi	0.183	0.123	0.047
	(0.023)	(0.020)	
Strong FTR Language: Spanish	0.201	0.185	0.632
	(0.024)	(0.023)	
Weak FTR Language: Dutch	0.270	0.275	0.884
	(0.026)	(0.027)	
Weak FTR Language: German	0.453	0.446	0.856
	(0.029)	(0.030)	
Weak FTR Language: Mandarin	0.277	0.279	0.954
	(0.026)	(0.027)	
Strong FTR proficiency score	8.076	8.152	0.408
	(0.064)	(0.065)	
Weak FTR proficiency score	7.453	7.511	0.545
	(0.067)	(0.068)	
N	289	276	
Robust standard errors in parentheses.			

Appendix

Tables

Table A1: Ordered Logit Regression Models Predicting Lowest Accepted Delayed Payment

	(1)	(2)	(3)	(4)	(5)	(6)
Asked in Strong FTR	0.198	0.574	0.639	0.391	0.705	0.673
	(0.149)	(0.159)	(0.156)	(0.167)	(0.165)	(0.158)
Proficiency in the Addressing Language		-0.588	-0.596	-0.814	-0.645	-0.616
		(0.074)	(0.070)	(0.087)	(0.077)	(0.078)
Strong Weak Proficiency Gap			0.081	-0.274	0.011	0.001
			(0.062)	(0.083)	(0.075)	(0.073)
Asked in Strong FTR X Strong Weak Proficiency Gap				0.719		
				(0.144)		
Female					0.002	0.019
					(0.163)	(0.161)
African American					0.642	0.713
					(0.414)	(0.392)
Hispanic					0.328	0.369
					(0.359)	(0.366)
Asian					-0.631	-0.661
					(0.236)	(0.223)
Other					1.002	0.901
					(0.516)	(0.504)
College Graduate					-0.322	-0.325
					(0.211)	(0.210)
Language Pairs Dummies					Y	
Strong-FTR Genus Indic						-0.289
						(0.298)
Strong-FTR Genus Romance						-0.232
						(0.181)
Weak-FTR Genus Indic						-0.146
						(0.192)
cut1	-0.699	-5.070	-5.158	-6.999	-6.183	-6.124
	(0.114)	(0.583)	(0.550)	(0.701)	(0.709)	(0.734)
cut2	-0.216	-4.511	-4.620	-6.441	-5.608	-5.556
	(0.109)	(0.574)	(0.542)	(0.689)	(0.700)	(0.724)
cut3	0.084	-4.154	-4.286	-6.095	-5.245	-5.199
	(0.109)	(0.567)	(0.536)	(0.682)	(0.693)	(0.717)
cut4	0.276	-3.919	-4.070	-5.872	-5.014	-4.972
	(0.109)	(0.561)	(0.531)	(0.677)	(0.688)	(0.711)
cut5	0.816	-3.223	-3.459	-5.243	-4.362	-4.333
	(0.113)	(0.545)	(0.518)	(0.661)	(0.677)	(0.698)
cut6	1.161	-2.757	-3.082	-4.858	-3.970	-3.950
	(0.119)	(0.533)	(0.510)	(0.653)	(0.669)	(0.689)
cut7	1.723	-1.908	-2.494	-4.261	-3.340	-3.330
	(0.131)	(0.529)	(0.509)	(0.651)	(0.666)	(0.681)
cut8	1.858	-1.664	-2.355	-4.120	-3.207	-3.198
	(0.135)	(0.528)	(0.508)	(0.650)	(0.666)	(0.681)
cut9	2.123	-1.088	-2.084	-3.846	-2.923	-2.917
	(0.146)	(0.535)	(0.510)	(0.650)	(0.668)	(0.681)
cut10	2.622		-1.575	-3.330	-2.390	-2.388
	(0.175)		(0.525)	(0.658)	(0.677)	(0.691)
N	565	523	565	565	551	551
Pseudo R-square	0.001	0.032	0.033	0.043	0.055	0.049

Robust standard errors in parentheses.

Table A2: OLS Regression Models Predicting Lowest Accepted Delayed Payment		
	Excluding French	Excluding Hindi
	(1)	(2)
Asked in Strong FTR	0.334	0.247
	(0.099)	(0.099)
Proficiency in the Addressing Language	-0.232	-0.239
	(0.044)	(0.045)
Strong Weak Proficiency Gap	0.057	0.038
	(0.045)	(0.044)
Constant	5.524	5.647
	(0.351)	(0.356)
N	443	443
adj. R-sq	0.066	0.060
Robust standard errors in parentheses.		

Experimental Materials

Screenshots of the compensation question treatments and fluency tests for all seven languages can be found in our web appendix at

https://ianayres.yale.edu/sites/default/files/files/Survey%20Question%20Appendix.pdf

Subjects who were randomly assigned to the English treatment saw:

English

You are invited to participate in a research study about languages. You must be at least 18 years of age to participate. Your participation will take less than 30 minutes. There are no risks associated with this study and your identity will be kept confidential.

Participation: If you decide to participate in this project, please understand your participation is voluntary and you may withdraw your consent or discontinue participation at any time without penalty. The alternative is not to participate. You have the right to refuse to answer particular questions. Your individual privacy will be maintained in all published and written data resulting from the study.

Contact Information: If you have any questions, concerns or complaints about this research, its procedures, risks and benefits, contact the Protocol Director, Ian Ayres at ian.ayres@yale.edu.

If you agree to participate in this research, please click to the next screen and complete the questionnaire.

In addition to the payment for taking this HIT, you will receive a bonus if your performance demonstrates sufficient fluency in each language. Please choose one pay schedule from each of the pay schedule tradeoff pairs presented below. Your actual bonus will be determined by a random selection from your choices and will be made through Amazon Mechanical Turk.

We pay $3 today or we will pay $3.05 in 1 week.

- ○ We pay $3 today
- ○ We will pay $3.05 in 1 week

We pay $3 today or we will pay $3.25 in 1 week.

- ○ We pay $3 today
- ○ We will pay $3.25 in 1 week

We pay $3 today or we will pay $3.5 in 1 week.

- ○ We pay $3 today
- ○ We will pay $3.5 in 1 week

We pay $3 today or we will pay $3.75 in 1 week.

- We pay $3 today
- We will pay $3.75 in 1 week

We pay $3 today or we will pay $4 in 1 week.

- We pay $3 today
- We will pay $4 in 1 week

We pay $3 today or we will pay $4.5 in 1 week.

- We pay $3 today
- We will pay $4.5 in 1 week

We pay $3 today or we will pay $5 in 1 week.

- We pay $3 today
- We will pay $5 in 1 week

We pay $3 today or we will pay $5.5 in 1 week.

- We pay $3 today
- We will pay $5.5 in 1 week

We pay $3 today or we will pay $6 in 1 week.

- We pay $3 today
- We will pay $6 in 1 week

We pay $3 today or we will pay $7 in 1 week.

- We pay $3 today
- We will pay $7 in 1 week