This supplementary file contains 8 tables, presenting the best-fitting models for some of our statistical analyses that are not the focus of discussion, including the models for reaction time measures and for awareness effect at the end of learning.

Table S2. *Best fitting models for accuracy in Experiment 1, with consonantal (A), vocalic (B), and tonal (C) minimal pair trials as the reference level, respectively.*

Table S2 (A)

Fixed Effects	Estimate	SD Error	Z	*p*
(Intercept)	-0.101	0.142	-0.710	.478
block	0.093	0.044	2.142	.032 *
langgroupEnglish	-0.080	0.137	-0.589	.556
MPtypeN	0.374	0.162	2.308	.021 *
MPtypeT	0.193	0.171	1.128	.259
MPtypeV	0.308	0.201	1.531	.126
block:langgroupMandarin:MPtypeC	0.153	0.064	2.374	.018 *
block:langgroupEnglish:MPtypeC	0.018	0.047	0.379	.705
block:langgroupMandarin:MPtypeN	0.244	0.069	3.555	<.001 ***
block:langgroupEnglish:MPtypeN	0.071	0.047	1.511	.131
block:langgroupMandarin:MPtypeT	0.018	0.059	0.307	.759
block:langgroupEnglish:MPtypeT	-0.086	0.045	-1.895	.058
block:langgroupMandarin:MPtypeV	0.112	0.056	2.023	.043 *

Number of observations: 8038, Participants: 56, Item, 12. AIC = 10023.5, BIC = 10366.1, log-likelihood = -4962.7.

Table S2 (B)

Fixed Effects	Estimate	SD Error	Z	*p*
(Intercept)	0.208	0.170	1.224	.221
block	0.006	0.039	0.142	.887
langgroupEnglish	-0.078	0.137	-0.569	.570

MPtypeC	-0.313	0.200	-1.563	.118
MPtypeN	0.060	0.186	0.324	.746
MPtypeT	-0.115	0.195	-0.590	.555
block: langgroupMandarin:MPtypeV	0.199	0.060	3.343	<.001 ***
block:langgroupEnglish:MPtypeV	0.086	0.045	1.902	.057
block: langgroupMandarin:MPtypeC	0.241	0.060	4.056	<.001 ***
block:langgroupEnglish:MPtypeC	0.106	0.045	2.376	.018 *
block: langgroupMandarin:MPtypeN	0.333	0.062	5.337	<.001 ***
block:langgroupEnglish:MPtypeN	0.159	0.047	3.356	<.001 ***
block: langgroupMandarin:MPtypeT	0.105	0.044	2.395	.017 *

Number of observations: 8038, Participants: 56, Item, 12. AIC = 10023.6, BIC = 10366.2, log-likelihood = -4962.8.

Table S2 (C)

Fixed Effects	Estimate	SD Error	z	p
(Intercept)	0.097	0.129	0.750	.454
block	0.160	0.045	3.530	<.001 ***
langgroupEnglish	-0.085	0.138	-0.616	.538
MPtypeV	0.113	0.195	0.580	.562
MPtypeC	-0.190	0.171	-1.112	.266
MPtypeN	0.179	0.180	0.992	.321
block: langgroupMandarin:MPtypeT	-0.051	0.060	-0.854	.393
block:langgroupEnglish:MPtypeT	-0.154	0.047	-3.238	.001 **
block: langgroupMandarin:MPtypeV	0.040	0.067	0.595	.552
block:langgroupEnglish:MPtypeV	-0.070	0.047	-1.499	.134

block: langgroupMandarin:MPtypeC	0.080	0.067	1.192	.233
block:langgroupEnglish:MPtypeC	-0.052	0.046	-1.137	.255
block: langgroupMandarin:MPtypeN	0.169	0.059	2.871	.004 **

Number of observations: 8038, Participants: 56, Item, 12. AIC = 10023.7, BIC = 10366.3, log-likelihood = -4962.8.

R syntax: glmer(acc ~ block + langgroup + MPtype + langgroup:MPtype:block + (1 + block + langgroup + MPtype | item) + (1 + block + MPtype | subjectID), family = binomial, data = fulld, glmerControl(optCtrl=list(maxfun=2e5), optimizer = "nloptwrap", calc.derivs = FALSE)).

Table S3. *Best fitting model for accuracy for L1 Mandarin group in Experiment 1, with non-minimal pair (A), consonantal (B), vocalic (C), and tonal (D) minimal pair trials as the reference level, respectively.*

Table S3 (A)

Fixed Effects	Estimate	SD Error	Z	*p*
(Intercept)	0.107	0.161	0.660	.510
block	0.348	0.060	5.790	<.001 ***
MPtypeV	0.072	0.234	0.310	.757
MPtypeT	0.138	0.241	0.573	.566
MPtypeC	-0.470	0.231	-2.034	.042 *
block:MPtypeV	-0.156	0.063	-2.493	.013 *
block:MPtypeT	-0.276	0.061	-4.524	<.001 ***
block:MPtypeC	-0.063	0.062	-1.009	.313

Number of observations: 4013, Participants: 28, Item, 12. AIC = 4828.1, BIC = 5067.4, log-likelihood = -2376.1.

Table S3 (B)

Fixed Effects	Estimate	SD Error	Z	*p*
(Intercept)	-0.362	0.171	-2.110	.035 *
block	0.284	0.056	5.028	<.001 ***
MPtypeN	0.469	0.231	2.034	.041 *
MPtypeV	0.546	0.240	2.277	.023 *
MPtypeT	0.605	0.234	2.590	.010 **
block:MPtypeN	0.065	0.062	1.050	.294
block:MPtypeV	-0.093	0.060	-1.560	.119

block:MPtypeT	-0.211	0.057	-3.680	<.001 ***

Number of observations: 4013, Participants: 28, Item, 12. AIC = 4826.5, BIC = 5065.8, log-likelihood = -2375.2.

Table S3 (C)

Fixed Effects	Estimate	SD Error	t value	p
(Intercept)	0.183	0.173	1.058	.290
block	0.191	0.057	3.351	<.001 ***
MPtypeC	-0.545	0.239	-2.281	.023 *
MPtypeN	-0.075	0.235	-0.321	.748
MPtypeT	0.062	0.257	0.241	.810
block:MPtypeC	0.093	0.060	1.557	.120
block:MPtypeN	0.158	0.063	2.520	.012 *
block:MPtypeT	-0.118	0.058	-2.042	.041 *

Number of observations: 4013, Participants: 28, Item, 12. AIC = 4826.4, BIC = 5065.7, log-likelihood = -2375.2.

Table S3 (D)

Fixed Effects	Estimate	SD Error	Z	p
(Intercept)	0.243	0.176	1.380	.168
block	0.073	0.054	1.344	.179
MPtypeC	-0.604	0.230	-2.624	.009 **
MPtypeN	-0.133	0.243	-0.549	.583
MPtypeV	-0.057	0.254	-0.227	.821
block:MPtypeC	0.211	0.057	3.685	<.001 ***

block:MPtypeN	0.276	0.061	4.520	<.001 ***
block:MPtypeV	0.117	0.058	2.030	.042 *

Number of observations: 4013, Participants: 28, Item, 12. AIC = 4827.1, BIC = 5066.4, log-likelihood = -2375.5.

R syntax: glmer(accuracy ~ block + MPtype + block:MPtype + (1 + block + MPtype | item) + (1 + block + MPtype | subjectID), family = binomial, data = Mandata, glmerControl(optCtrl=list(maxfun=2e5), optimizer = "nloptwrap", calc.derivs = FALSE))

Table S4. *Best fitting model for accuracy for L1 English group in Experiment 1, with non-minimal pair (A), consonantal (B), vocalic (C), and tonal (D) minimal pair trials as the reference level, respectively.*

Table S4 (A)

Fixed Effects	Estimate	SD Error	Z	*p*
(Intercept)	0.555	0.151	3.667	<.001 ***
block	0.100	0.027	3.715	<.001 ***
MPtypeT	-0.859	0.198	-4.333	<.001 ***
MPtypeV	-0.431	0.182	-2.366	.018 *
MPtypeC	-0.590	0.134	-4.406	<.001 ***

Number of observations: 4025, Participants: 28, Item, 12. AIC = 5217.1, BIC = 5437.6, log-likelihood = -2573.6.

Table S4 (B)

Fixed Effects	Estimate	SD Error	Z	*p*
(Intercept)	-0.028	0.129	-0.219	.827
block	0.099	0.026	3.845	<.001 ***
MPtypeN	0.577	0.127	4.555	<.001 ***
MPtypeT	-0.281	0.176	-1.596	.111
MPtypeV	0.158	0.196	0.807	.420

Number of observations: 4025, Participants: 28, Item, 12. AIC = 5217.5, BIC = 5438.0, log-likelihood = -2573.8.

Table S4 (C)

Fixed Effects	Estimate	SD Error	t value	*p*

(Intercept)	0.135	0.186	0.728	.467
block	0.099	0.027	3.711	<.001 ***
MPtypeC	-0.172	0.201	-0.857	.391
MPtypeN	0.406	0.169	2.404	016 *
MPtypeT	-0.440	0.195	-2.260	.024 *

Number of observations: 4025, Participants: 28, Item, 12. AIC = 5216.0, BIC = 5436.5, log-likelihood = -2573.0.

Table S4 (D)

Fixed Effects	Estimate	SD Error	Z	*p*
(Intercept)	-0.304	0.140	-2.171	.030 *
block	0.099	0.027	3.708	<.001 ***
MPtypeC	0.267	0.185	1.443	.149
MPtypeN	0.846	0.196	4.316	<.001 ***
MPtypeV	0.441	0.194	2.269	.023 *

Number of observations: 4025, Participants: 28, Item, 12. AIC = 5216.0, BIC = 5436.5, log-likelihood = -2573.0.

R syntax: glmer(accuracy ~ block + MPtype + (1 + block + MPtype | item) + (1 + block + MPtype | subjectID), family = binomial, data = Engdata,

glmerControl(optCtrl=list(maxfun=2e5), optimizer = "nloptwrap", calc.derivs = FALSE))

Table S5. *Best fitting model for reaction time in Experiment 1, showing fixed effects*

Fixed Effects	Estimate	SD Error	t value	*p*
(Intercept)	7.493	0.118	63.323	<.001 ***
block	-0.168	0.023	-7.160	<.001 ***
langgroupEnglish	-0.456	0.161	-2.839	.005 **

Number of observations: 5042, Participants: 56, Item, 12. AIC = 78096.9, BIC = 78357.9,

log-likelihood = -39008.5.

R syntax: glmer(RT ~ block + langgroup + (1 + block + langgroup + MPtype | item) + (1 +

block + MPtype | subjectID), family = Gamma (link = "log"), data = fulld.correct,

glmerControl(optCtrl=list(maxfun=2e5), optimizer = "nloptwrap", calc.derivs = FALSE))

Table S6. *Best fitting model for accuracy for the L1 English group in Experiment 1, testing*
awareness effect, with consonantal (A), vocalic (B), and tonal (C) minimal pair trials as the
reference level, respectively.

Table S6 (A)

Fixed Effects	Estimate	SD Error	Z	*p*
(Intercept)	-0.083	0.141	-0.587	.557
block	0.116	0.026	4.445	<.001 ***
MPtypeN	0.626	0.135	4.629	<.001 ***
MPtypeT	-0.223	0.185	-1.205	.228
MPtypeV	0.138	0.194	0.711	.477

Number of observations: 4025, Participants: 28, Item, 12. AIC = 5383.5, BIC = 6171.0, log-likelihood = -2566.7.

Table S6 (B)

Fixed Effects	Estimate	SD Error	Z	*p*
(Intercept)	0.053	0.173	0.307	.759
block	0.115	0.026	4.422	<.001 ***
MPtypeT	-0.358	0.181	-1.971	.049 *
MPtypeC	-0.138	0.194	-0.711	.477
MPtypeN	0.489	0.166	2.941	.003 **

Number of observations: 4025, Participants: 28, Item, 12. AIC = 5383.5, BIC = 6171.0, log-likelihood = -2566.8.

Table S6 (C)

Fixed Effects	Estimate	SD Error	Z	*p*

(Intercept)	-0.303	0.135	-2.251	.024 *
block	0.115	0.026	4.425	<.001 ***
MPtypeV	0.360	0.182	1.984	.047 *
MPtypeC	0.219	0.185	1.185	.236
MPtypeN	0.847	0.195	4.351	<.001 ***

Number of observations: 4025, Participants: 28, Item, 12. AIC = 5383.5, BIC = 6171.0, log-likelihood = -2566.8.

R syntax: glmer(acc ~ block + MPtype + (1 + block + awareness + MPtype + block:awareness:MPtype | item) + (1 + block + MPtype | subjectID), family = binomial, data = fulld.awareness, glmerControl(optCtrl=list(maxfun=2e5), optimizer = "nloptwrap", calc.derivs = FALSE))

Table S7. *Best fitting model for accuracy in Block 6 for the L1 English group in Experiment 1, testing awareness effect*

Fixed Effects	Estimate	SD Error	Z	*p*
(Intercept)	1.618	0.322	5.020	<.001 ***
MPtypeC	-1.264	0.325	-3.885	<.001 ***
MPtypeT	-1.516	0.353	-4.295	<.001 ***
MPtypeV	-0.695	0.300	-2.321	.020 *

Number of observations: 671, Participants: 28, Item, 12. AIC = 873.2, BIC = 1003.9, log-likelihood = -407.6.

R syntax: glmer(acc ~ MPtype + (1 + awareness + MPtype | item) + (1 + MPtype | subjectID), family = binomial, data = awarenessblock6, glmerControl(optCtrl=list(maxfun=2e5), optimizer = "nloptwrap", calc.derivs = FALSE))

Table S8. *Best fitting model for accuracy in Experiment 2, with consonantal (A), vocalic (B), and tonal (C) minimal pair trials as the reference level, respectively.*

Table S8 (A)

Fixed Effects	Estimate	SD Error	Z	p
(Intercept)	0.103	0.133	0.775	.438
block	0.112	0.035	3.164	.002 **
exposureshort	-0.161	0.112	-1.443	.149
MPtypeN	0.527	0.151	3.491	<.001 ***
MPtypeT	-0.155	0.165	-0.937	.349
MPtypeV	0.168	0.197	0.851	.395
block:exposurelong:MPtypeC	0.015	0.040	0.381	.703
block:exposureshort:MPtypeC	-0.008	0.044	-0.188	.851
block:exposurelong:MPtypeN	0.023	0.041	0.545	.586
block:exposureshort:MPtypeN	0.025	0.043	0.596	.551
block:exposurelong:MPtypeT	-0.095	0.037	-2.526	.012*
block:exposureshort:MPtypeT	-0.048	0.041	-1.170	.242
block:exposurelong:MPtypeV	-0.011	0.034	-0.325	.745

Number of observations: 11793, Participants: 55, Item, 12. AIC = 14092.9, BIC = 14454.3, log-likelihood = -6997.4.

Table S8 (B)

Fixed Effects	Estimate	SD Error	Z	p
(Intercept)	0.276	0.179	1.541	.123
block	0.063	0.033	1.908	.056
exposureshort	-0.163	0.111	-1.469	.142

MPtypeC	-0.172	0.201	-0.856	.392
MPtypeN	0.352	0.174	2.027	.043 *
MPtypeT	-0.325	0.185	-1.760	.078
block:exposurelong:MPtypeV	0.038	0.035	1.075	.282
block:exposureshort:MPtypeV	0.048	0.041	1.158	.247
block:exposurelong:MPtypeC	0.064	0.036	1.806	.071
block:exposureshort:MPtypeC	0.040	0.041	0.973	.330
block:exposurelong:MPtypeN	0.072	0.036	2.006	.045 *
block:exposureshort:MPtypeN	0.076	0.047	1.625	.104
block:exposurelong:MPtypeT	-0.046	0.028	-1.615	.106

Number of observations: 11793, Participants: 55, Item, 12. AIC = 14092.3, BIC = 14453.7, log-likelihood = -6997.1.

Table S8 (C)

Fixed Effects	Estimate	SD Error	Z	p
(Intercept)	-0.048	0.147	-0.325	.745
block	0.137	0.040	3.434	<.001 ***
exposureshort	-0.163	0.111	-1.458	.145
MPtypeV	0.325	0.184	1.763	.078
MPtypeC	0.155	0.167	0.930	.353
MPtypeN	0.680	0.187	3.640	<.001 ***
block:exposurelong:MPtypeT	-0.120	0.043	-2.777	.005 **
block:exposureshort:MPtypeT	-0.074	0.047	-1.582	.114
block:exposurelong:MPtypeV	-0.036	0.046	-0.787	.431
block:exposureshort:MPtypeV	-0.026	0.043	-0.598	.550

block:exposurelong:MPtypeC	-0.011	0.046	-0.228	.819
block:exposureshort:MPtypeC	-0.035	0.042	-0.838	.402
block:exposurelong:MPtypeN	-0.002	0.042	-0.058	.954

Number of observations: 11793, Participants: 55, Item, 12. AIC = 14091.6, BIC = 14453.0, log-likelihood = -6996.8.

R syntax: glmer(acc ~ block + exposure + MPtype + exposure:MPtype:block + (1 + block + exposure + MPtype | item) + (1 + block + MPtype | subjectID), family = binomial, data = fulld, glmerControl(optCtrl=list(maxfun=2e5), optimizer = "nloptwrap", calc.derivs = FALSE))

Table S9. *Best fitting model for reaction time in Experiment 2, showing fixed effects*

Fixed Effects	Estimate	SD Error	Z	*p*
(Intercept)	6.912	0.121	57.011	<.001 ***
block	-0.164	0.028	-5.878	<.001 ***
exposureshort	0.159	0.169	0.943	.346
MPtypeC	-0.210	0.095	2.204	.028 *
MPtypeT	0.076	0.098	0.776	.438
MPtypeV	-0.095	0.099	-0.964	.335
block:exposurelong:MPtypeN	0.087	0.033	2.606	.009 **
block:exposureshort:MPtypeN	-0.029	0.028	-1.039	.299
block:exposurelong:MPtypeC	0.072	0.034	2.154	.031 *
block:exposureshort:MPtypeC	-0.056	0.030	-1.858	.063
block:exposurelong:MPtypeT	0.083	0.034	2.408	.016 *
block:exposureshort:MPtypeT	-0.050	0.029	-1.704	.088
block:exposurelong:MPtypeV	0.094	0.031	3.066	.002 **

Number of observations: 7513, Participants: 55, Item, 12. AIC = 111970.3, BIC = 112316.5, log-likelihood = -55935.1.

R syntax: glmer(RT ~ block + exposure + MPtype + exposure:MPtype:block + (1 + block + exposure + MPtype | item) + (1 + block + MPtype | subjectID), family = Gamma (link = "log"), data = fulld.correct, glmerControl(optCtrl=list(maxfun=2e5), optimizer = "nloptwrap", calc.derivs = FALSE))