Report on Wikipedia Portal A/B Test (2nd Edition)

Preferred Language Detection and Primary Link Reordering

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Executive Summary

The Wikimedia Foundation (WMF) is dedicated to encouraging the growth, development, and distribution of free, *multilingual*, educational content. WMF operates Wikipedia, a project to build free encyclopedias in *all languages of the world.* For the Discovery Department's Portal team (tasked with making the wikipedia.org a more engaging and friendlier portal to free knowledge), it is important that all visitors, regardless of language, receive a more welcoming experience.

In this A/B test, the test group were presented with primary links that were dynamically filled in according to the users' preferred languages. Users who received these dynamic primary links were more likely to engage with those primary links than the users who received the default, static experience, albeit not by a lot. The biggest impact is actually found in **where** those users went to from the Portal.

When they were presented with primary links that reflected their preferred languages, they had a 11.1-14.5% higher probability of visiting (and were 1.23-1.27 times more likely to visit, respectively) a Wikipedia in their most preferred language (or one of their preferred languages) on their first visit – 11.1% in the case of multilingual users, 14.5% in the case of users whose Accept-Language did not include English. We believe this is evidence of localization having a positive effect on the users' experience and engagement with the Portal.

How the Wikipedia Portal would look like to someone whose preferred languages are (in order): French, Arabic, Russian, German, Swahili, and English.

Introduction

The Wikimedia Foundation (WMF) is dedicated to encouraging the growth, development, and distribution of free, *multilingual*, educational content. WMF operates Wikipedia, a project to build free encyclopedias in *all languages of the world*. For the Discovery Department's Portal team (tasked with making wikipedia.org a more engaging and friendlier portal to free knowledge), it is important that all visitors, regardless of language, receive a more welcoming experience.

Figure 1: The three types of Wikipedia Portal interfaces we currently show our visitors. The language to search in is automatically set by the page according to user's preferred language. The third interface was the A/B test.

Methods

The code for the exploratory data analysis and the confirmatory data analysis can be found on the GitHub repository for this analysis.

Data Collection

In general, we randomly select 1 in 200 users to be included in the Wikipedia Portal EventLogging schema. Of those, we randomly selected 1 in 10 to be included in the A/B test. If selected for the test, the user is assigned either variation A (the default experience) or variation B (the experimental experience, see demo) with 50%/50% probability. The test was deployed 22 March 2016 (see T124112) and ran for 22 days, a period during which we logged 35K users' clickthroughs and abandonments.

Statistical Analysis

Under the conjugate Beta-Binomial model, each i-th group's number of successful outcomes y_i (out of a total n_i subjects in the group) follows a Binomial distribution with a Beta prior on the probability of success parameter π_i:

$$y_i \sim \text{ Binomial}(n_i, \pi_i), \ i = 1, 2;$$
$$\pi_i \sim \text{ Beta}(\alpha_i, \beta_i),$$

which yields a Beta posterior $p(\pi_i|y_i)$. We utilized the R package *BCDA* (0.1.0) to perform a Bayesian analysis of the collected logs, assuming a Beta-Binomial model for counts of successful outcomes among the groups.

Results

Clickthrough Rates

Daily & overall clickthrough rate (CTR)
Combined overall CTR is 57%; controls' (A) overall CTR is 57.17%; test group's (B) overall CTR is 56.95%
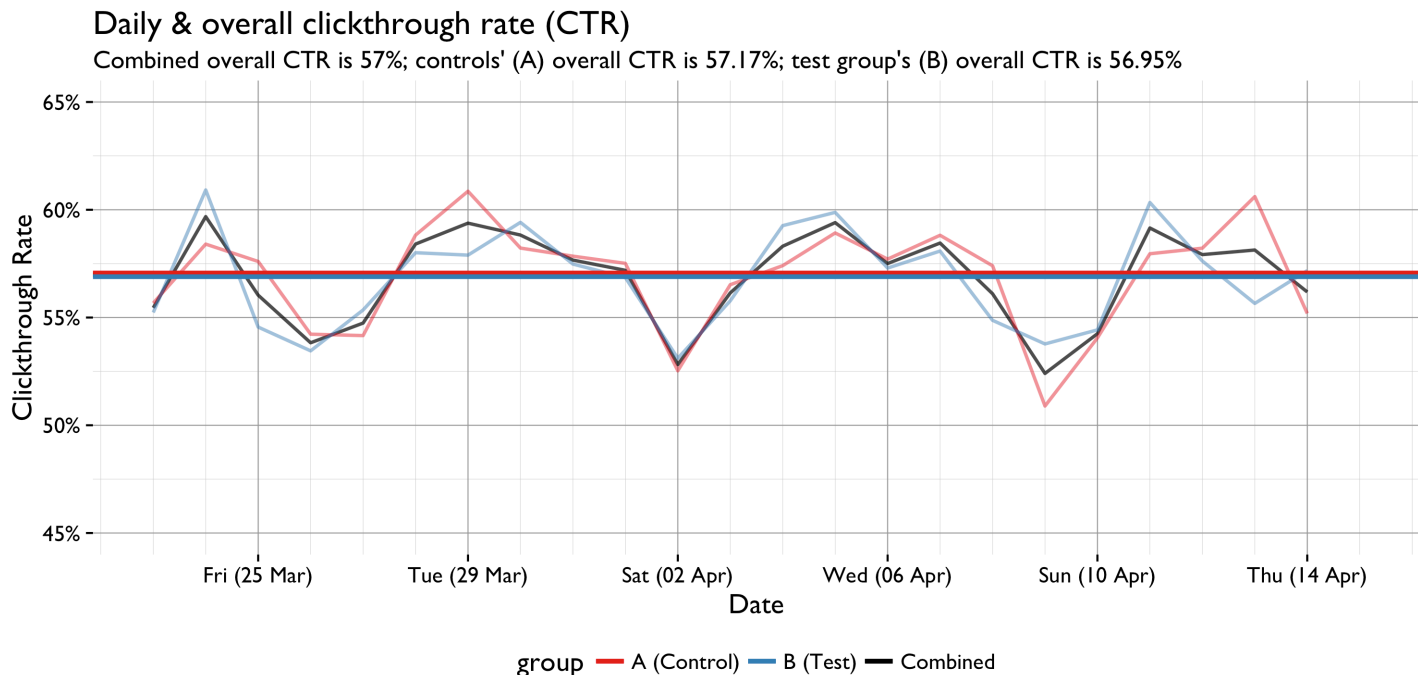
Figure 2: Daily and overall clickthrough rate for the whole dataset and broken down by group (controls vs test). If we look at just the clickthrough by group without breaking it up by section and without taking into consideration the user's preferred languages (from their Accept-Language header), the two groups behave nearly identically.

Our previous investigation of language preferences and engagement with Portal revealed that users whose preferences include English search more and engage with the primary links (the language links around the Wikipedia logo) more than users whose preferences do not include English. We see the same pattern in Fig. 4, where users whose preferences include English are much more likely to engage with the primary language links and the search box, while users whose preferences do not include English are more likely to engage with the secondary language links.

We can also see in Figure 4 and Table 1 that in both sets of users, the test group is slightly more likely to engage with the primary links (the part affected by the A/B test) than the control group. Specifically, when considering only the users whose preferences included English (where we observed the largest difference), the test group has a 1.4% higher primary link clickthrough and is 1.067 times more likely to clickthrough than the control group.

Unfortunately, these differences aren't "statistically significant" – the 95% Bayesian confidence intervals include 0 for the difference of proportions and 1 for the relative risk, meaning we don't have evidence of big impact. The same numbers for the users who did not include English are: 0.97% difference and 1.057 times more more likely to click on a primary link. However, as we will see in the following section, the real difference is hidden in the relationship between the language of the Wikipedia the user goes to and their preferred language(s).

Figure 3: Daily and overall clickthrough rate broken down by group (controls vs test) and section used (primary links around the globe, search box, secondary links) after excluding users who would not be affected by the test (users whose only preferred language is English).
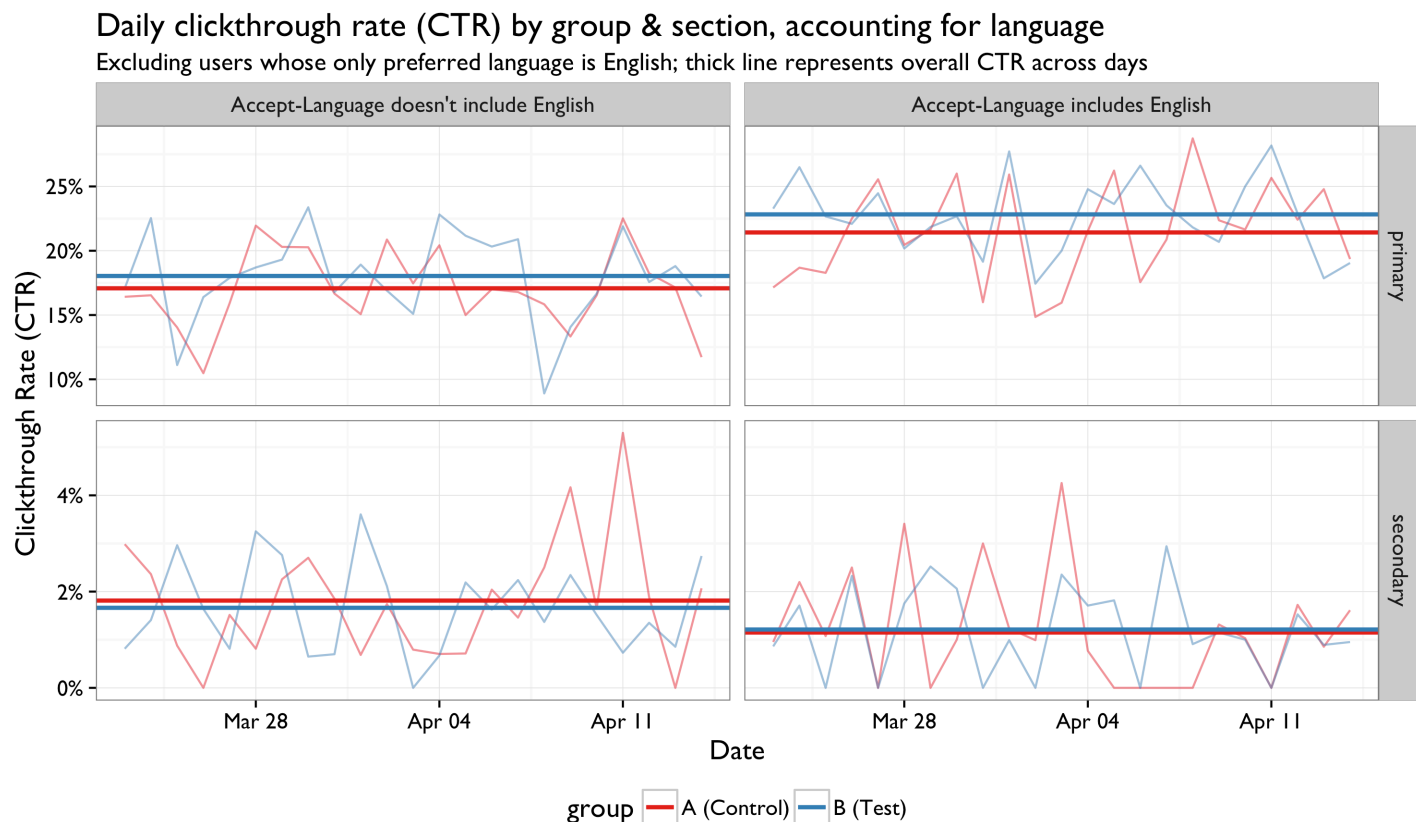
Table 1: Clickthrough rate by accept-language, link, and group. This is the table version of Figure 4. Increases in primary link clickthrough rate cannibalize the clickthrough rates of other sections.

Includes English	Link	Group	Clickthrough Rate
Accept-Language doesn't include English	primary	A (Control)	17.08
Accept-Language doesn't include English	primary	B (Test)	18.04 ↑
Accept-Language doesn't include English	secondary	A (Control)	1.81
Accept-Language doesn't include English	secondary	B (Test)	1.66 ↓
Accept-Language includes English	primary	A (Control)	21.42
Accept-Language includes English	primary	B (Test)	22.83 ↑
Accept-Language includes English	secondary	A (Control)	1.15
Accept-Language includes English	secondary	B (Test)	1.21 ↑

Destination

Figures 4–11 and Tables 2–9 below summarize the statistical comparisons of the test group against the controls on their first and second visits. "% Diff" refers to — for example — "π_B who visited Wikipedia in a preferred language *minus* π_A who visited Wikipedia in a preferred language", with positive numbers indicating that the probability of a successful outcome is greater in B than A. Relative risk is interpreted as "X times more likely to visit Wikipedia in a preferred language" ($RR = \pi_B/\pi_A$) and odds ratio is interpreted as "the odds of group B users visiting Wikipedia in a preferred language are X times the odds of group A users" ($OR = (\pi_B/(1 - \pi_B))/(\pi_A/(1 - \pi_A))$).

On First Visit

Figures 4–7 and Tables 2–5 below summarize the statistical comparisons of the test group against the controls on their first visit.

Most notably (in Figure 4 and Table 2) group B users whose Accept-Language header did not include English had a 14.5% higher probability (1.3 times more likely) of visiting Wikipedia in one of their preferred languages on their first visit. They also had a 14.1% higher probability (1.3 times more likely) of visitng a Wikipedia in their *most* preferred language than group A users.

The other two comparisons imply that (1) the test does not appear to have had an effect (or at least as much of an effect) on users whose Accept-Language header included English, and (2) the results for secondary links mirror the results for the primary links, but negative, which implies that people were indeed using the dynamic primary links to visit a Wikipedia in their language rather than the secondary links.

In Figure 5 and Table 3, where we excluded users whose most preferred language was English, we see the some of the same results as in Table 2 — since the users whose Accept-Language doesn't include English would be in both subpopulations — but we also notice that test group users whose Accept-Language *does* include English (just not as the first language) had 11.3% higher probability of visiting (and were 1.34 times more likely to visit) a Wikipedia in their most preferred language.

We see a similar pattern in Figure 6 and Table 4, where we excluded users whose only preferred language is English. In Figure 7 and Table 5, where we only looked at multilingual users, users were 1.16 times more likely to visit a Wikipedia in their most preferred language.

On Second Visit

Figures 8–11 and Tables 6–9 below summarize the statistical comparisons of the test group against the controls on their second visit. The results do not have statistical significance and are presented here as a curiosity.

Conclusion/Discussion

In summary, users who saw the primary links that were dynamically filled in according to the users' preferred languages were more likely to engage with those primary links than the users who received the default, static experience, albeit not by a lot. The biggest impact is actually found in **where** those users went to from the Portal.

When they were presented with primary links that reflected their preferred languages, they had a 7.5-16.1% higher probability of visiting – and were 1.15-1.3 times more likely to visit – a Wikipedia in their most preferred language (or one of their preferred languages) — 7.5% in the case of multilingual users, 16.1% in the case of users whose Accept-Language did not include English. We believe this is evidence of localization having a positive effect on the users' experience and engagement with the Portal.

Figure 4: The types of Wikipedias that all users visited from the Portal on their first visit.
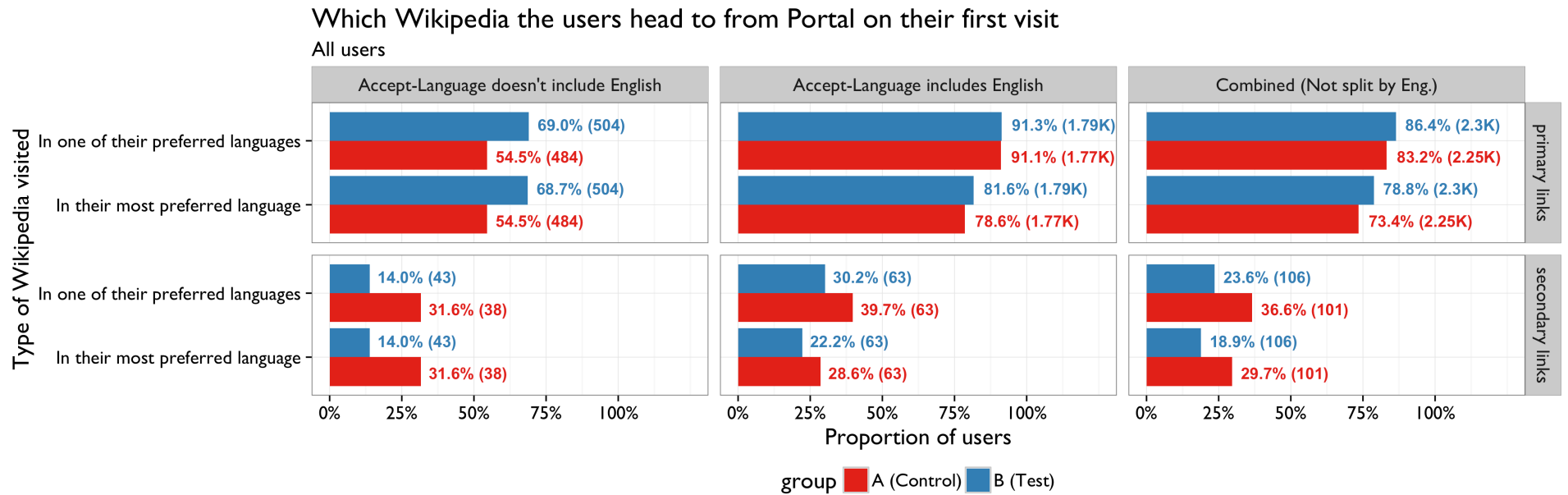
Table 2: Statistical comparisons of test group vs controls with respect to language of the Wikipedia they visited through a primary or secondary link on their first visit, not excluding any users. Values in parentheses represent 95% Bayesian Confidence Intervals – meaning there is a 95% probability the value of interest is inside the interval. ("Prim" = primary link, "Sec" = secondary link)

Link	Includes English	Wikipedia language	n_B	n_A	π_B (%)	π_A (%)	% Diff (B vs A)	Relative Risk	Odds Ratio
Prim	A-L doesn't include En	one of preferred	504	484	69.0 (64.8, 72.9)	54.5 (50.2, 58.9)	14.5 (8.2, 20.2)	1.27 (1.14, 1.39)	1.87 (1.40, 2.37)
Prim	A-L doesn't include En	most preferred	504	484	68.6 (64.4, 72.5)	54.5 (50.2, 58.9)	14.1 (8.3, 20.3)	1.26 (1.14, 1.39)	1.84 (1.38, 2.32)
Prim	A-L includes En	one of preferred	1.8K	1.8K	91.3 (89.9, 92.5)	91.0 (89.7, 92.3)	0.2 (-1.6, 2.1)	1.00 (0.98, 1.02)	1.04 (0.81, 1.29)
Prim	A-L includes En	most preferred	1.8K	1.8K	81.6 (79.7, 83.3)	78.6 (76.6, 80.4)	3.0 (0.3, 5.5)	1.04 (1.00, 1.07)	1.21 (1.02, 1.42)
Sec	A-L doesn't include En	one of preferred	43	38	15.6 (5.7, 26.1)	32.5 (18.3, 46.4)	-17.0 (-34.6, 0.8)	0.51 (0.15, 0.95)	0.43 (0.08, 0.92)
Sec	A-L doesn't include En	most preferred	43	38	15.6 (5.7, 26.1)	32.5 (18.3, 46.4)	-17.0 (-34.6, 0.8)	0.51 (0.15, 0.95)	0.43 (0.08, 0.92)
Sec	A-L includes En	one of preferred	63	63	30.8 (19.9, 42.2)	40.0 (28.6, 52.0)	-9.3 (-25.2, 6.8)	0.79 (0.43, 1.15)	0.71 (0.26, 1.23)
Sec	A-L includes En	most preferred	63	63	23.1 (12.9, 33.1)	29.2 (18.2, 39.8)	-6.2 (-20.5, 9.2)	0.82 (0.38, 1.32)	0.78 (0.27, 1.44)

Figure 5: The types of Wikipedias that non-**primarily**-English-speaking users visited from the Portal on their first visit.
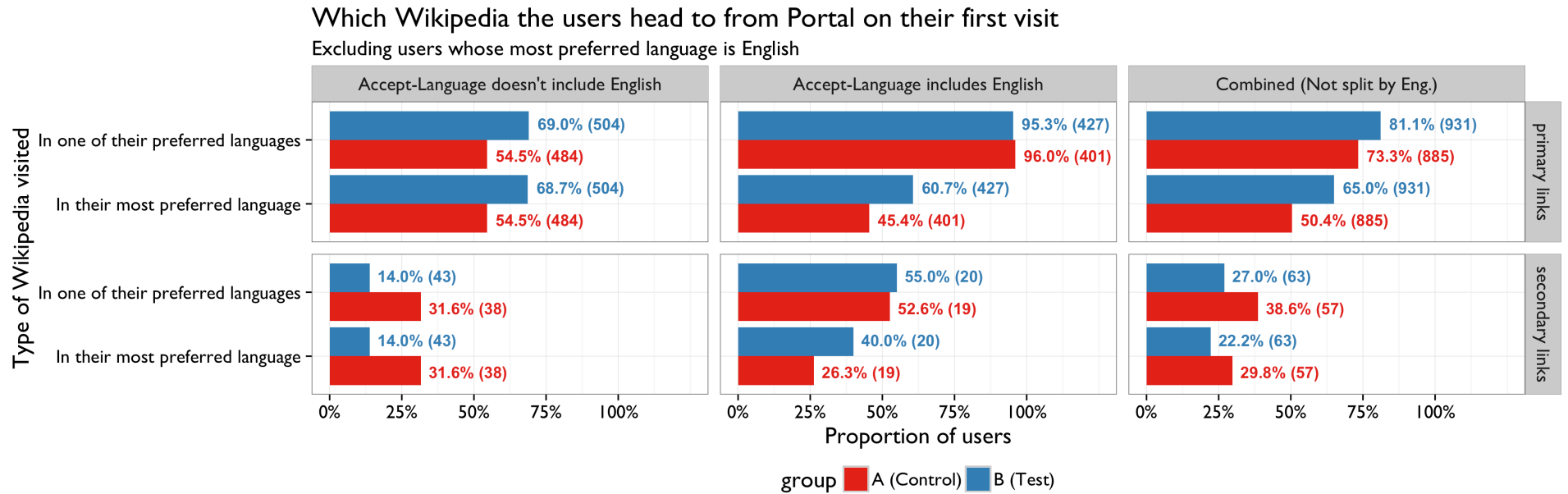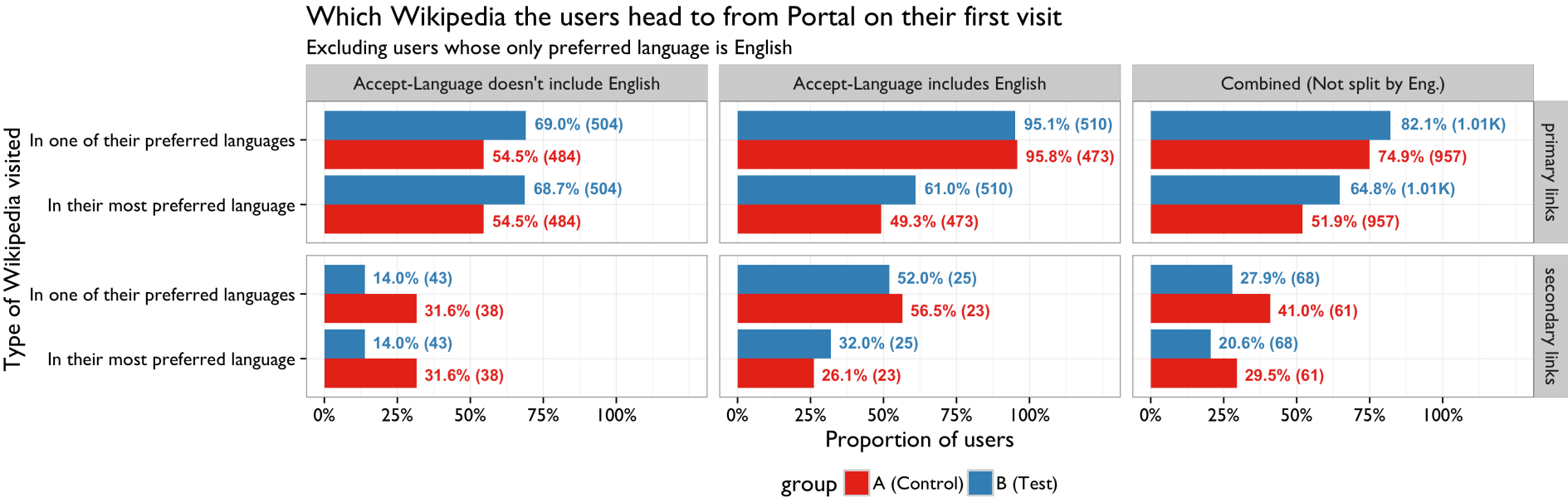
Table 3: Statistical comparisons of test group vs controls with respect to language of the Wikipedia they visited through a primary or secondary link on their first visit, excluding users whose most preferred language is English. Values in parentheses represent 95% Bayesian Confidence Intervals – meaning there is a 95% probability the value of interest is inside the interval. ("Prim" = primary link, "Sec" = secondary link)

Link	Includes English	Wikipedia language	n_B	n_A	π_B (%)	π_A (%)	% Diff (B vs A)	Relative Risk	Odds Ratio
Prim	A-L doesn't include En	one of preferred	504	484	69.0 (64.8, 72.9)	54.5 (50.2, 58.9)	14.5 (8.2, 20.2)	1.27 (1.14, 1.39)	1.87 (1.40, 2.37)
Prim	A-L doesn't include En	most preferred	504	484	68.6 (64.4, 72.5)	54.5 (50.2, 58.9)	14.1 (8.3, 20.3)	1.26 (1.14, 1.39)	1.84 (1.38, 2.32)
Prim	A-L includes En	one of preferred	427	401	95.1 (93.0, 97.1)	95.8 (93.8, 97.6)	-0.7 (-3.4, 2.3)	0.99 (0.96, 1.02)	0.90 (0.38, 1.54)
Prim	A-L includes En	most preferred	427	401	60.6 (55.9, 65.2)	45.4 (40.6, 50.2)	15.2 (8.7, 22.1)	1.34 (1.16, 1.52)	1.87 (1.38, 2.41)
Sec	A-L doesn't include En	one of preferred	43	38	15.6 (5.7, 26.1)	32.5 (18.3, 46.4)	-17.0 (-34.6, 0.8)	0.51 (0.15, 0.95)	0.43 (0.08, 0.92)
Sec	A-L doesn't include En	most preferred	43	38	15.6 (5.7, 26.1)	32.5 (18.3, 46.4)	-17.0 (-34.6, 0.8)	0.51 (0.15, 0.95)	0.43 (0.08, 0.92)
Sec	A-L includes En	one of preferred	20	19	54.5 (33.4, 73.9)	52.3 (31.0, 71.8)	2.2 (-26.6, 31.0)	1.09 (0.52, 1.74)	1.33 (0.19, 3.16)
Sec	A-L includes En	most preferred	20	19	40.9 (21.0, 61.1)	28.6 (10.9, 47.5)	12.3 (-16.2, 39.1)	1.64 (0.48, 3.22)	2.26 (0.26, 5.50)

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Figure 6: The types of Wikipedias that not-**just**-English-speaking users visited from the Portal on their first visit.

Which Wikipedia the users head to from Portal on their first visit
Excluding users whose only preferred language is English

Table 4: Statistical comparisons of test group vs controls with respect to language of the Wikipedia they visited through a primary or secondary link on their first visit, excluding users whose only preferred language is English. Values in parentheses represent 95% Bayesian Confidence Intervals – meaning there is a 95% probability the value of interest is inside the interval. ("Prim" = primary link, "Sec" = secondary link)

Link	Includes English	Wikipedia language	n_B	n_A	π_B (%)	π_A (%)	% Diff (B vs A)	Relative Risk	Odds Ratio
Prim	A-L doesn't include En	one of preferred	504	484	69.0 (64.8, 72.9)	54.5 (50.2, 58.9)	14.5 (8.2, 20.2)	1.27 (1.14, 1.39)	1.87 (1.40, 2.37)
Prim	A-L doesn't include En	most preferred	504	484	68.6 (64.4, 72.5)	54.5 (50.2, 58.9)	14.1 (8.3, 20.3)	1.26 (1.14, 1.39)	1.84 (1.38, 2.32)
Prim	A-L includes En	one of preferred	510	473	94.9 (93.0, 96.8)	95.6 (93.7, 97.3)	-0.7 (-3.3, 2.0)	0.99 (0.97, 1.02)	0.90 (0.43, 1.47)
Prim	A-L includes En	most preferred	510	473	60.9 (56.7, 65.1)	49.3 (45.0, 53.8)	11.7 (5.7, 18.1)	1.24 (1.10, 1.38)	1.62 (1.23, 2.05)
Sec	A-L doesn't include En	one of preferred	43	38	15.6 (5.7, 26.1)	32.5 (18.3, 46.4)	-17.0 (-34.6, 0.8)	0.51 (0.15, 0.95)	0.43 (0.08, 0.92)
Sec	A-L doesn't include En	most preferred	43	38	15.6 (5.7, 26.1)	32.5 (18.3, 46.4)	-17.0 (-34.6, 0.8)	0.51 (0.15, 0.95)	0.43 (0.08, 0.92)
Sec	A-L includes En	one of preferred	25	23	51.8 (33.1, 70.0)	55.9 (36.7, 74.2)	-4.1 (-31.4, 21.5)	0.96 (0.51, 1.49)	0.99 (0.19, 2.21)
Sec	A-L includes En	most preferred	25	23	33.4 (16.2, 50.8)	28.0 (11.7, 45.2)	5.3 (-19.0, 29.8)	1.33 (0.38, 2.53)	1.58 (0.23, 3.64)

Figure 7: *The types of Wikipedias that multilingual users visited from the Portal on their first visit.*

Which Wikipedia the users head to from Portal on their first visit
Only multilingual users; subgroups with <10 users were excluded for quality-control
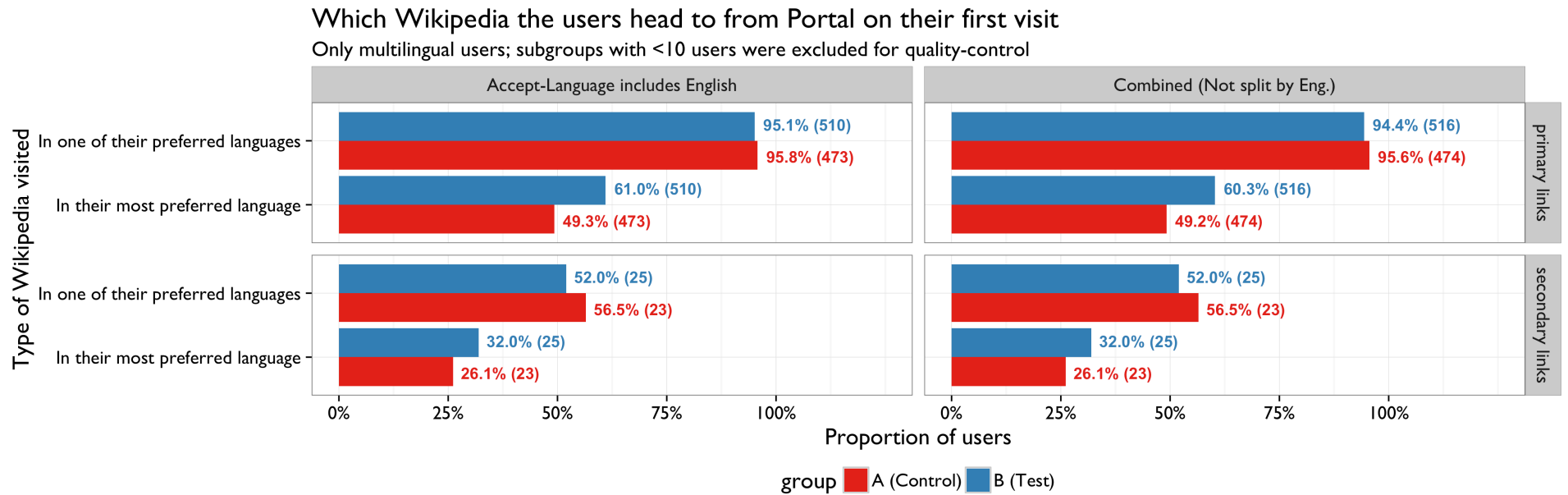
Table 5: *Statistical comparisons of test group vs controls with respect to language of the Wikipedia they visited through a primary or secondary link on their first visit, looking at multilingual users only. Values in parentheses represent 95% Bayesian Confidence Intervals — meaning there is a 95% probability the value of interest is inside the interval. ("Prim" = primary link, "Sec" = secondary link)*

Link	Includes English	Wikipedia language	n_B	n_A	π_B (%)	π_A (%)	% Diff (B vs A)	Relative Risk	Odds Ratio
Prim	A-L includes En	one of preferred	510	473	94.9 (93.0, 96.8)	95.6 (93.7, 97.3)	-0.7 (-3.3, 2.0)	0.99 (0.97, 1.02)	0.90 (0.43, 1.47)
Prim	A-L includes En	most preferred	510	473	60.9 (56.7, 65.1)	49.3 (45.0, 53.8)	11.7 (5.7, 18.1)	1.24 (1.10, 1.38)	1.62 (1.23, 2.05)
Prim	Combined (Not split by Eng.)	one of preferred	516	474	94.2 (92.2, 96.2)	95.4 (93.5, 97.1)	-1.2 (-4.0, 1.4)	0.99 (0.96, 1.02)	0.82 (0.41, 1.30)
Prim	Combined (Not split by Eng.)	most preferred	516	474	60.2 (56.0, 64.4)	49.2 (44.8, 53.7)	11.1 (4.5, 17.0)	1.23 (1.08, 1.37)	1.58 (1.19, 1.99)
Sec	A-L includes En	one of preferred	25	23	51.8 (33.1, 70.0)	55.9 (36.7, 74.2)	-4.1 (-31.4, 21.5)	0.96 (0.51, 1.49)	0.99 (0.19, 2.21)
Sec	A-L includes En	most preferred	25	23	33.4 (16.2, 50.8)	28.0 (11.7, 45.2)	5.3 (-19.0, 29.8)	1.33 (0.38, 2.53)	1.58 (0.23, 3.64)
Sec	Combined (Not split by Eng.)	one of preferred	25	23	51.8 (33.1, 70.0)	55.9 (36.7, 74.2)	-4.1 (-31.4, 21.5)	0.96 (0.51, 1.49)	0.99 (0.19, 2.21)
Sec	Combined (Not split by Eng.)	most preferred	25	23	33.4 (16.2, 50.8)	28.0 (11.7, 45.2)	5.3 (-19.0, 29.8)	1.33 (0.38, 2.53)	1.58 (0.23, 3.64)

Figure 8: *The types of Wikipedias that all users visited from the Portal on their second visit.*

Which Wikipedia the users head to from Portal on their second visit
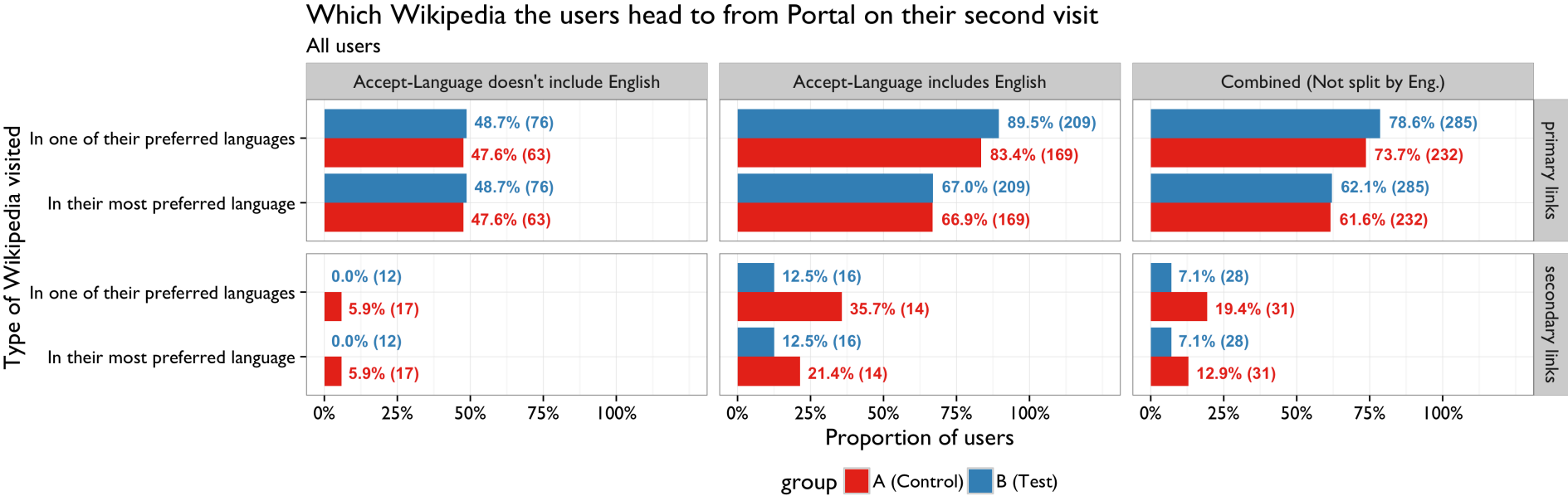All users

Table 6: *Statistical comparisons of test group vs controls with respect to language of the Wikipedia they visited through a primary or secondary link on their second visit, not excluding any users. Values in parentheses represent 95% Bayesian Confidence Intervals — meaning there is a 95% probability the value of interest is inside the interval. ("Prim" = primary link, "Sec" = secondary link)*

Link	Includes English	Wikipedia language	n_B	n_A	π_B (%)	π_A (%)	% Diff (B vs A)	Relative Risk	Odds Ratio
Prim	A-L doesn't include En	one of preferred	76	63	48.7 (37.6, 59.7)	47.7 (36.4, 60.2)	1.0 (-15.2, 17.6)	1.04 (0.70, 1.41)	1.10 (0.45, 1.86)
Prim	A-L doesn't include En	most preferred	76	63	48.7 (37.6, 59.7)	47.7 (36.4, 60.2)	1.0 (-15.2, 17.6)	1.04 (0.70, 1.41)	1.10 (0.45, 1.86)
Prim	A-L includes En	one of preferred	209	169	89.1 (84.9, 93.2)	83.0 (77.6, 88.6)	6.1 (-1.3, 12.6)	1.07 (0.98, 1.16)	1.76 (0.81, 2.83)
Prim	A-L includes En	most preferred	209	169	66.8 (60.2, 73.0)	66.6 (59.5, 73.4)	0.2 (-9.2, 9.5)	1.01 (0.86, 1.15)	1.03 (0.61, 1.47)
Sec	A-L doesn't include En	one of preferred	12	17	7.1 (0.0, 20.4)	10.6 (0.4, 23.7)	-3.5 (-22.3, 16.9)	1.26 (0.00, 4.37)	1.38 (0.00, 5.06)
Sec	A-L doesn't include En	most preferred	12	17	7.1 (0.0, 20.4)	10.6 (0.4, 23.7)	-3.5 (-22.3, 16.9)	1.26 (0.00, 4.37)	1.38 (0.00, 5.06)
Sec	A-L includes En	one of preferred	16	14	16.7 (2.2, 33.3)	37.6 (15.6, 60.2)	-20.9 (-48.9, 7.9)	0.50 (0.04, 1.14)	0.43 (0.01, 1.18)
Sec	A-L includes En	most preferred	16	14	16.7 (2.2, 33.3)	25.0 (6.4, 45.5)	-8.3 (-34.7, 18.0)	0.83 (0.04, 2.09)	0.86 (0.02, 2.51)

Figure 9: The types of Wikipedias that non-**primarily**-English-speaking users visited from the Portal on their second visit.

Which Wikipedia the users head to from Portal on their second visit
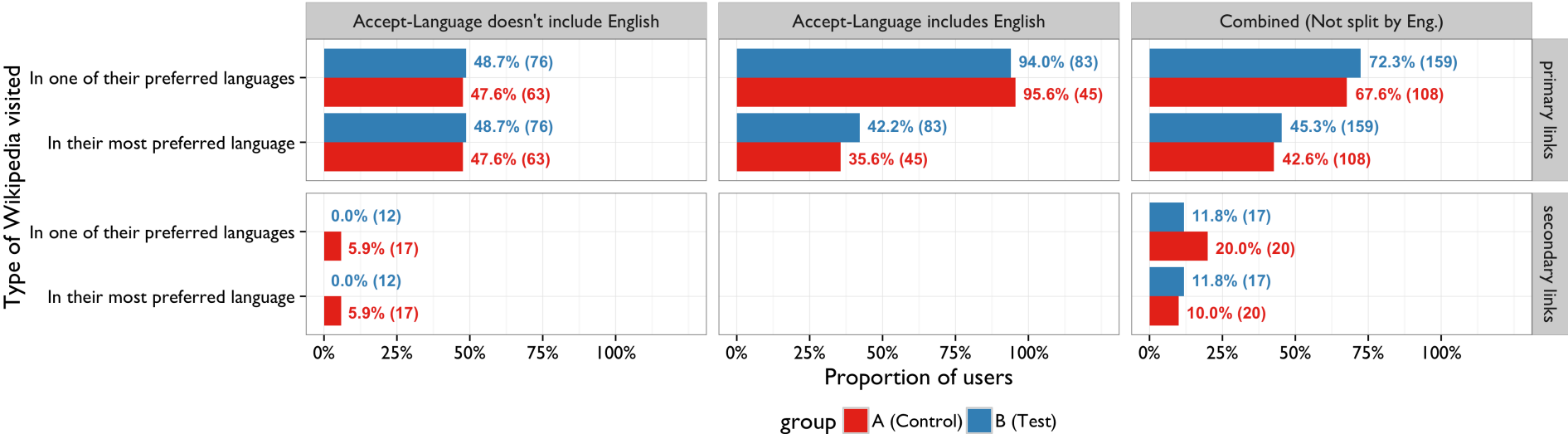
Excluding users whose most preferred language is English

Table 7: Statistical comparisons of test group vs controls with respect to language of the Wikipedia they visited through a primary or secondary link on their second visit, excluding users whose most preferred language is English. Values in parentheses represent 95% Bayesian Confidence Intervals – meaning there is a 95% probability the value of interest is inside the interval. ("Prim" = primary link, "Sec" = secondary link)

Link	Includes English	Wikipedia language	n_B	n_A	π_B (%)	π_A (%)	% Diff (B vs A)	Relative Risk	Odds Ratio
Prim	A-L doesn't include En	one of preferred	76	63	48.7 (37.6, 59.7)	47.7 (36.4, 60.2)	1.0 (-15.2, 17.6)	1.04 (0.70, 1.41)	1.10 (0.45, 1.86)
Prim	A-L doesn't include En	most preferred	76	63	48.7 (37.6, 59.7)	47.7 (36.4, 60.2)	1.0 (-15.2, 17.6)	1.04 (0.70, 1.41)	1.10 (0.45, 1.86)
Prim	A-L includes En	one of preferred	83	45	92.9 (87.5, 97.9)	93.6 (86.8, 99.3)	-0.6 (-9.4, 8.3)	0.99 (0.90, 1.10)	1.11 (0.05, 2.91)
Prim	A-L includes En	most preferred	83	45	42.4 (32.1, 53.0)	36.2 (23.4, 50.3)	6.1 (-10.9, 23.5)	1.22 (0.69, 1.80)	1.41 (0.52, 2.52)
Sec	A-L doesn't include En	one of preferred	12	17	7.1 (0.0, 20.4)	10.6 (0.4, 23.7)	-3.5 (-22.3, 16.9)	1.26 (0.00, 4.37)	1.38 (0.00, 5.06)
Sec	A-L doesn't include En	most preferred	12	17	7.1 (0.0, 20.4)	10.6 (0.4, 23.7)	-3.5 (-22.3, 16.9)	1.26 (0.00, 4.37)	1.38 (0.00, 5.06)

*Figure 10: The types of Wikipedias that not-**just**-English-speaking users visited from the Portal on their second visit.*

Which Wikipedia the users head to from Portal on their second visit
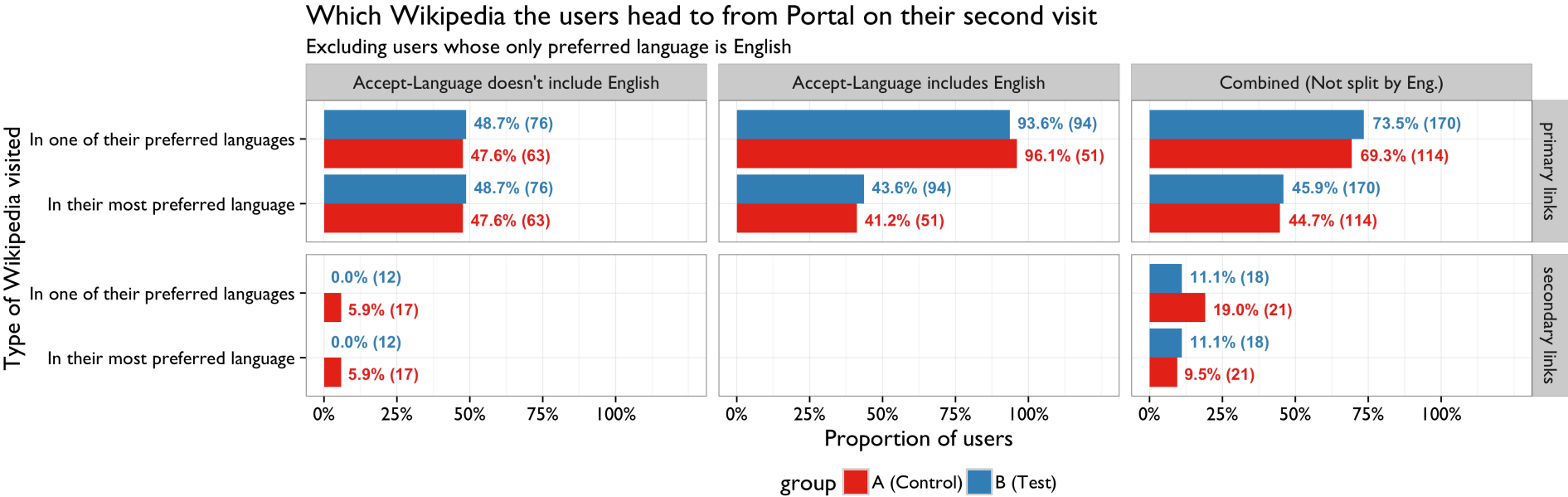Excluding users whose only preferred language is English

Table 8: Statistical comparisons of test group vs controls with respect to language of the Wikipedia they visited through a primary or secondary link on their second visit, excluding users whose only preferred language is English. Values in parentheses represent 95% Bayesian Confidence Intervals – meaning there is a 95% probability the value of interest is inside the interval. ("Prim" = primary link, "Sec" = secondary link)

Link	Includes English	Wikipedia language	n_B	n_A	π_B (%)	π_A (%)	% Diff (B vs A)	Relative Risk	Odds Ratio
Prim	A-L doesn't include En	one of preferred	76	63	48.7 (37.6, 59.7)	47.7 (36.4, 60.2)	1.0 (-15.2, 17.6)	1.04 (0.70, 1.41)	1.10 (0.45, 1.86)
Prim	A-L doesn't include En	most preferred	76	63	48.7 (37.6, 59.7)	47.7 (36.4, 60.2)	1.0 (-15.2, 17.6)	1.04 (0.70, 1.41)	1.10 (0.45, 1.86)
Prim	A-L includes En	one of preferred	94	51	92.7 (87.6, 97.6)	94.3 (88.3, 99.3)	-1.6 (-9.3, 7.1)	0.98 (0.90, 1.07)	0.91 (0.06, 2.31)
Prim	A-L includes En	most preferred	94	51	43.8 (34.0, 53.7)	41.6 (28.8, 54.7)	2.2 (-13.9, 18.5)	1.08 (0.70, 1.54)	1.17 (0.49, 2.00)
Sec	A-L doesn't include En	one of preferred	12	17	7.1 (0.0, 20.4)	10.6 (0.4, 23.7)	-3.5 (-22.3, 16.9)	1.26 (0.00, 4.37)	1.38 (0.00, 5.06)
Sec	A-L doesn't include En	most preferred	12	17	7.1 (0.0, 20.4)	10.6 (0.4, 23.7)	-3.5 (-22.3, 16.9)	1.26 (0.00, 4.37)	1.38 (0.00, 5.06)

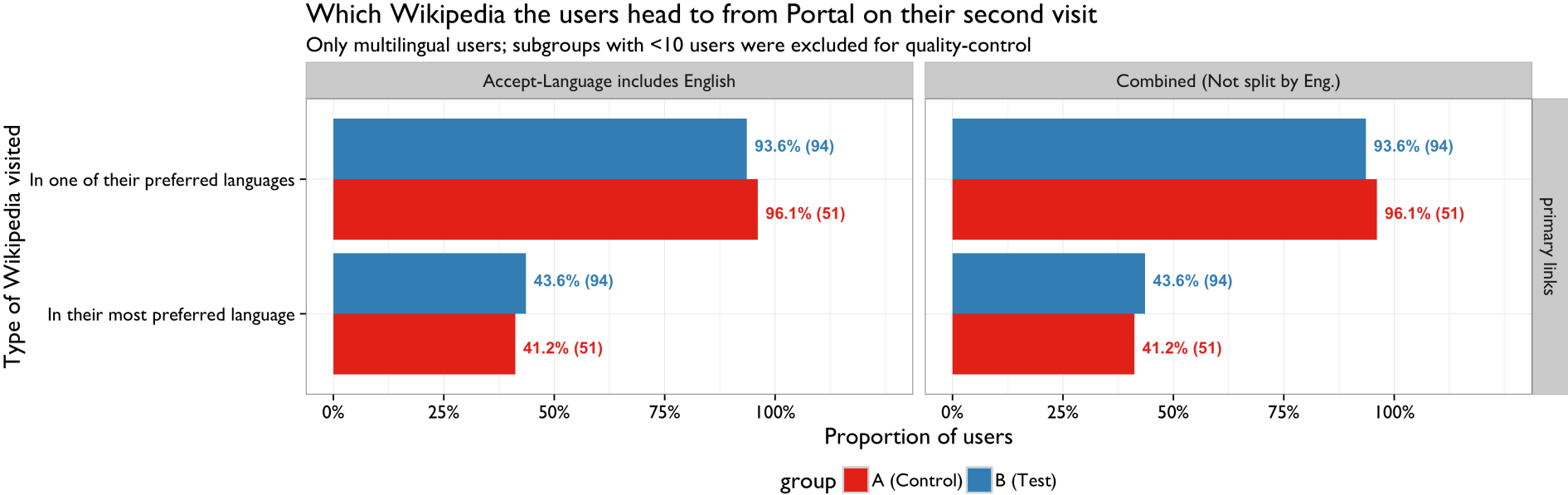Figure 11: The types of Wikipedias that multilingual users visited from the Portal on their second visit.

Table 9: Statistical comparisons of test group vs controls with respect to language of the Wikipedia they visited through a primary or secondary link on their second visit, looking at multilingual users only. Values in parentheses represent 95% Bayesian Confidence Intervals – meaning there is a 95% probability the value of interest is inside the interval. ("Prim" = primary link, "Sec" = secondary link)

Link	Includes English	Wikipedia language	n_B	n_A	π_B (%)	π_A (%)	% Diff (B vs A)	Relative Risk	Odds Ratio
Prim	A-L includes En	one of preferred	94	51	92.7 (87.6, 97.6)	94.3 (88.3, 99.3)	-1.6 (-9.3, 7.1)	0.98 (0.90, 1.07)	0.91 (0.06, 2.31)
Prim	A-L includes En	most preferred	94	51	43.8 (34.0, 53.7)	41.6 (28.8, 54.7)	2.2 (-13.9, 18.5)	1.08 (0.70, 1.54)	1.17 (0.49, 2.00)
Prim	Combined (Not split by Eng.)	one of preferred	94	51	92.7 (87.6, 97.6)	94.3 (88.3, 99.3)	-1.6 (-9.3, 7.1)	0.98 (0.90, 1.07)	0.91 (0.06, 2.31)
Prim	Combined (Not split by Eng.)	most preferred	94	51	43.8 (34.0, 53.7)	41.6 (28.8, 54.7)	2.2 (-13.9, 18.5)	1.08 (0.70, 1.54)	1.17 (0.49, 2.00)