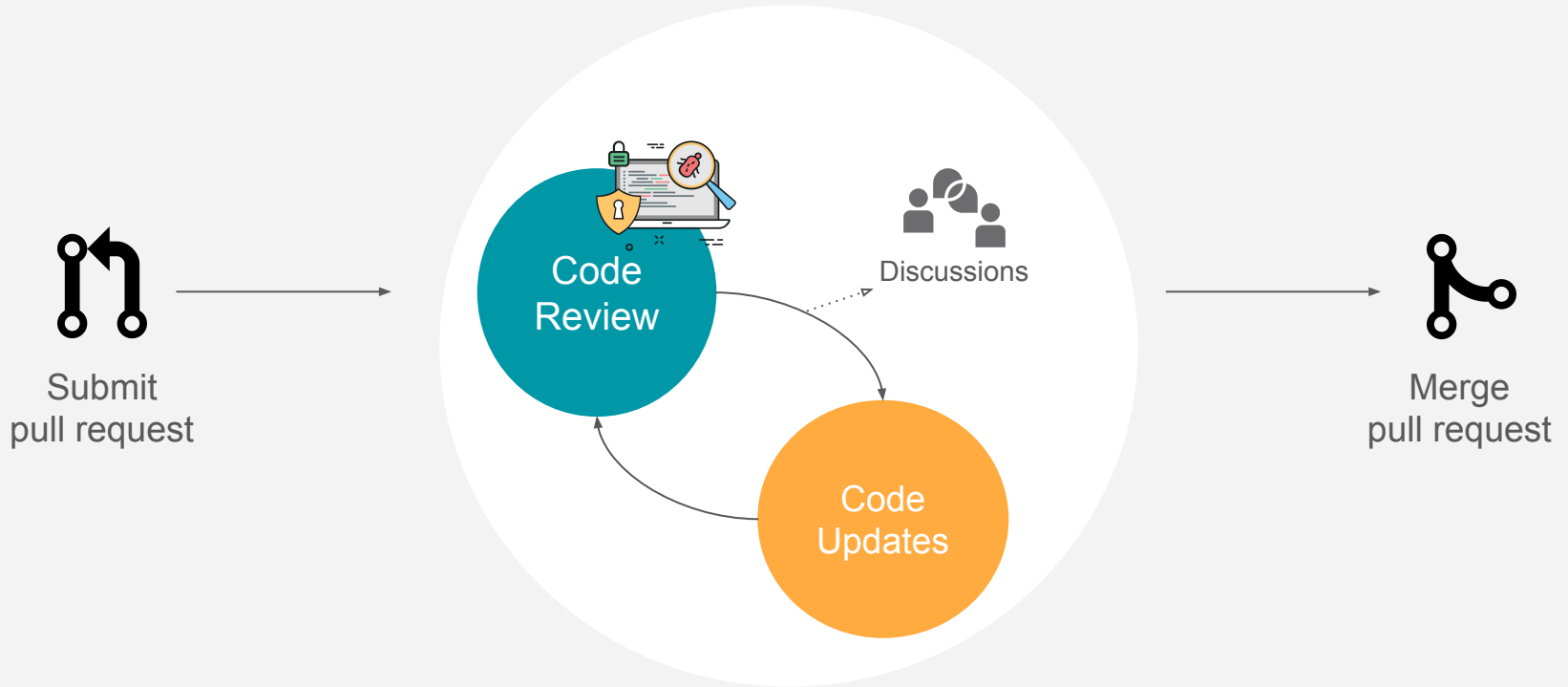
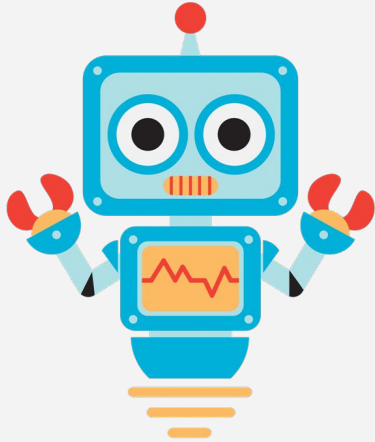


Effects of Adopting Code Review Bots on Pull Requests to OSS Projects

Mairieli Wessel, Alexander Serebrenik, Igor Wiese, Igor Steinmacher, Marco A. Gerosa



Pull Request Review Process

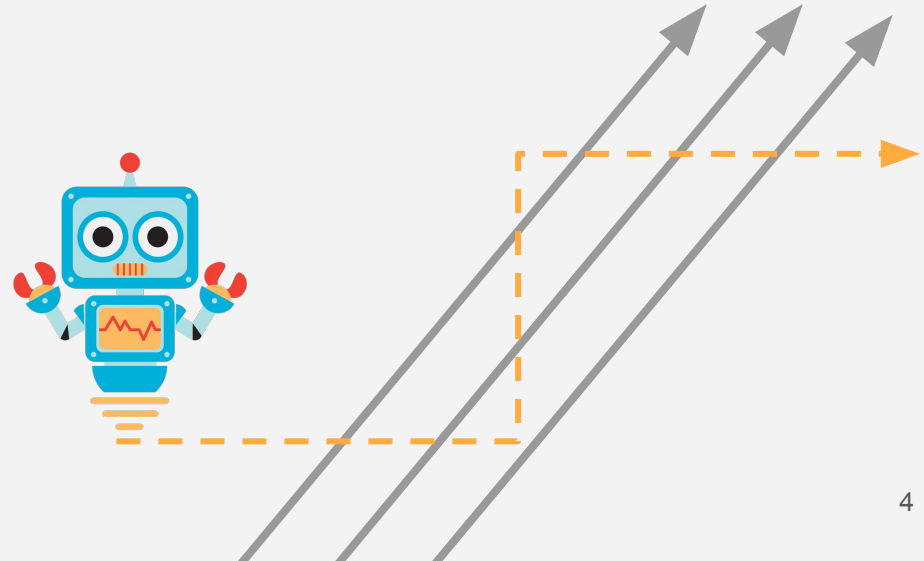


Code review bots play a prominent role in the code review process

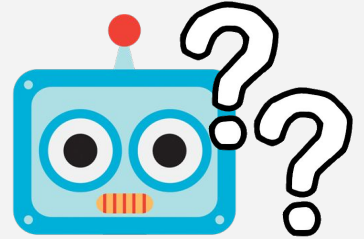
An interface between human and tools

New voices in the pull request conversation

As with any new technology adoption, **bots may impact group dynamics**



How do pull request activities change after a code review bot is adopted in a project?



Project Activity Indicators



Merged/Non-merged
Pull Requests



Comments on
Merged/Non-merged Pull Requests



Time-to-merge/Time-to-close
Pull Requests



Commits of
Merged/Non-merged Pull Requests

Exploratory Case Study



Exploratory Case Study

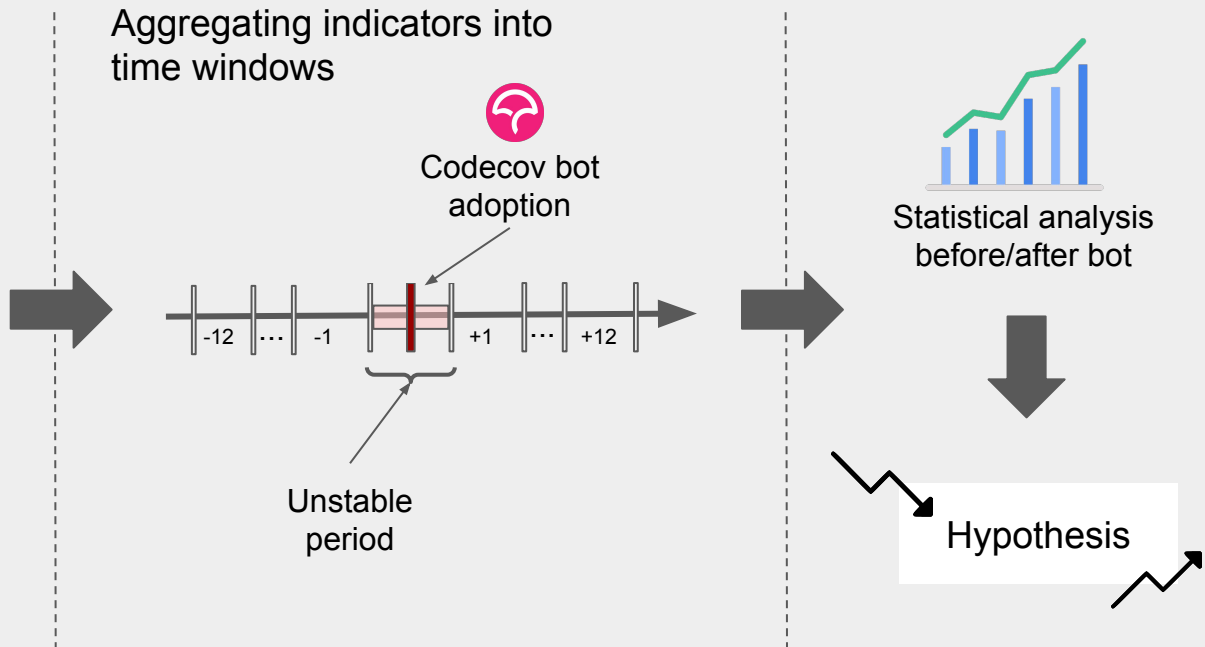
Two studied projects



- + 26.1k stars
- + 3.8k forks
- + 17k pull requests
- + 46.4k commits



- + 8.1k stars
- + 3.4k forks
- + 8.6k pull requests
- + 40.9k commits

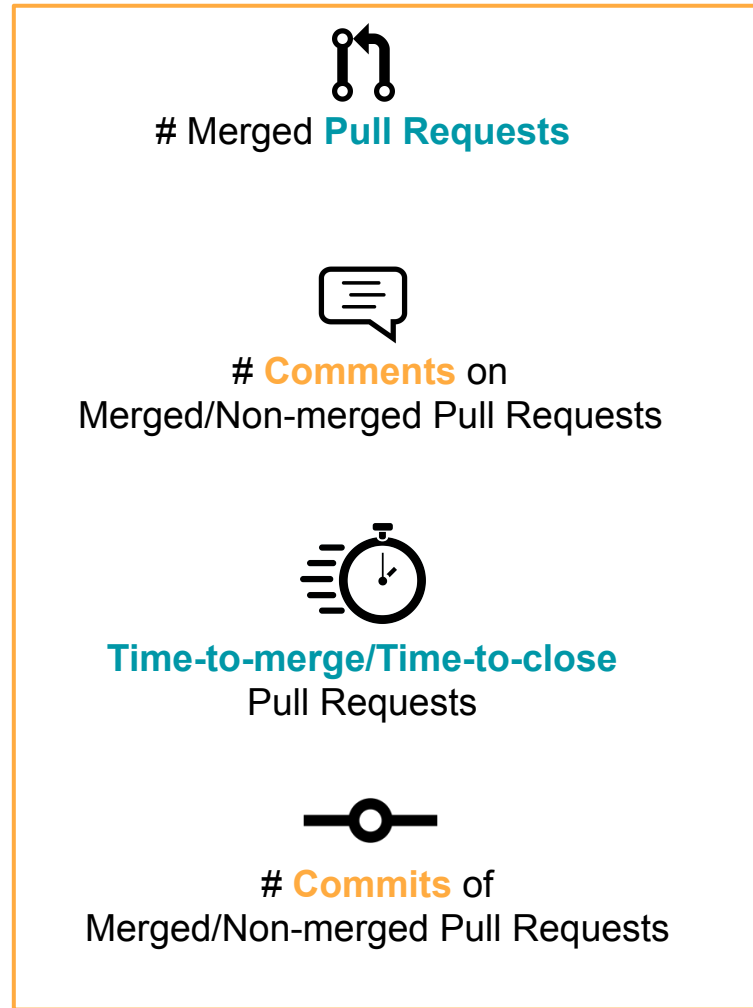


Hypothesis

Decrease after bot adoption



Increase after bot adoption

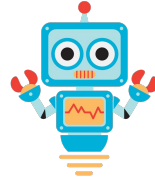


Main Study





GitHub



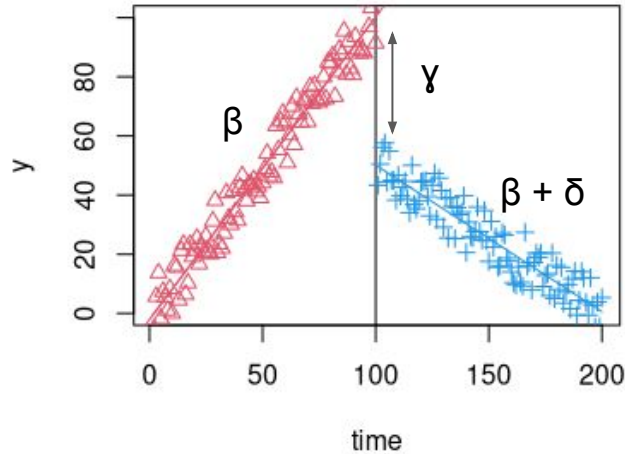
Code review bot

1194

Open Source Software Projects
in our sample

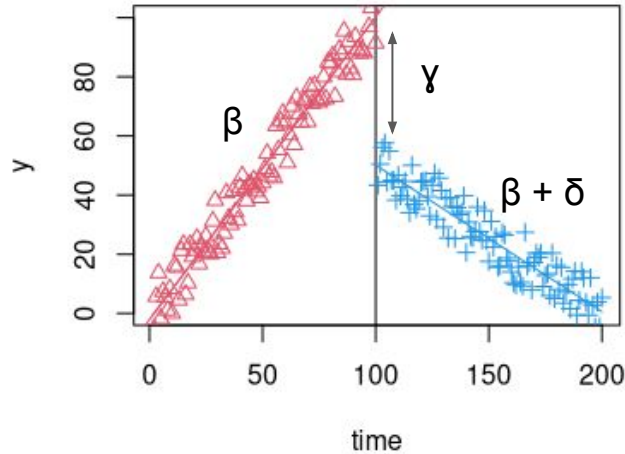
Coveralls bot
Codecov bot
Ansibot
Elasticmachine

Regression Discontinuity Design (RDD)



$$y_i = \alpha + \beta \cdot \text{time}_i + \gamma \cdot \text{intervention}_i + \delta \cdot \text{time_after_intervention}_i + \eta \cdot \text{controls}_i + \varepsilon_i$$

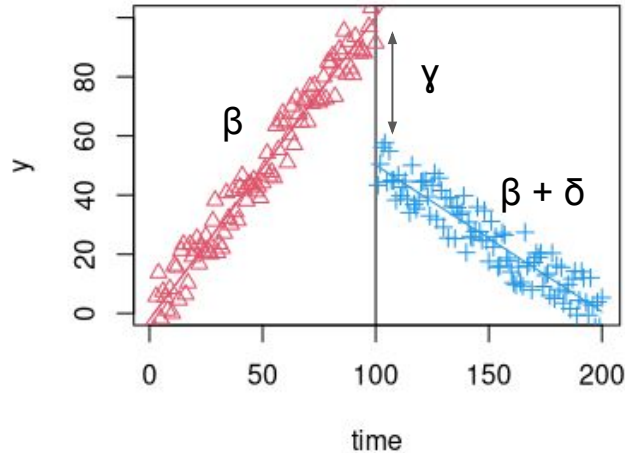
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Some Results: # Merged Pull Requests

	Coefficients	Sum of Squares
Intercept	-0.262***	
TimeSinceFirstPullRequest	0.00004**	4.3
log(TotalPullRequestAuthors)	-0.094***	171.8
log(TotalCommits)	0.042***	484.0
log(OpenedPullRequests)	0.494***	8227.1
log(PullRequestComments)	0.433***	2954.3
log(PullRequestCommits)	0.272***	721.0
time	0.004***	203.2
interventionTrue	0.095***	16.8
time after intervention	0.004**	1.7

Some Results: # Merged Pull Requests

Control
Variables

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More merged pull requests after bot adoption

Time series predictors




Results


vs Hypothesis

Increase after bot adoption


Decrease after bot adoption




Merged Pull Requests



Non-merged Pull Requests



Comments on Merged Pull Requests



Time-to-close Pull Requests



Comments on Non-merged Pull Requests

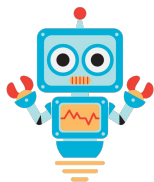


Time-to-merge Pull Requests

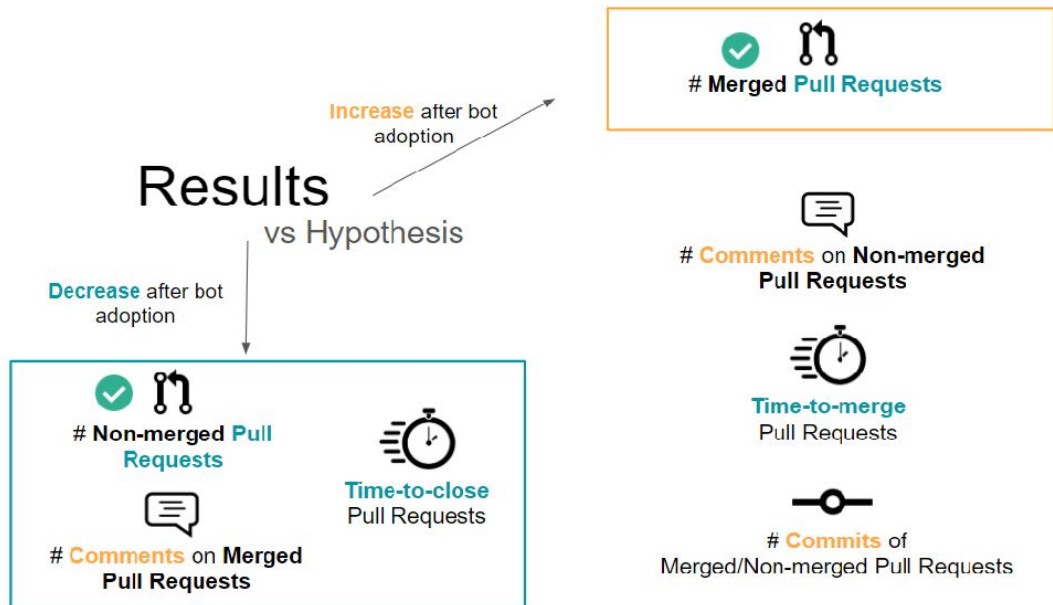


Commits of Merged/Non-merged Pull Requests

Effects of Adopting



Code review bots



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