



**User & Developer Survey 2021**

**Andrew Claster & Viral Shah**

# Methodology

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**We conducted 2,660 interviews online among Julia users and developers June 2 – July 7, 2021**

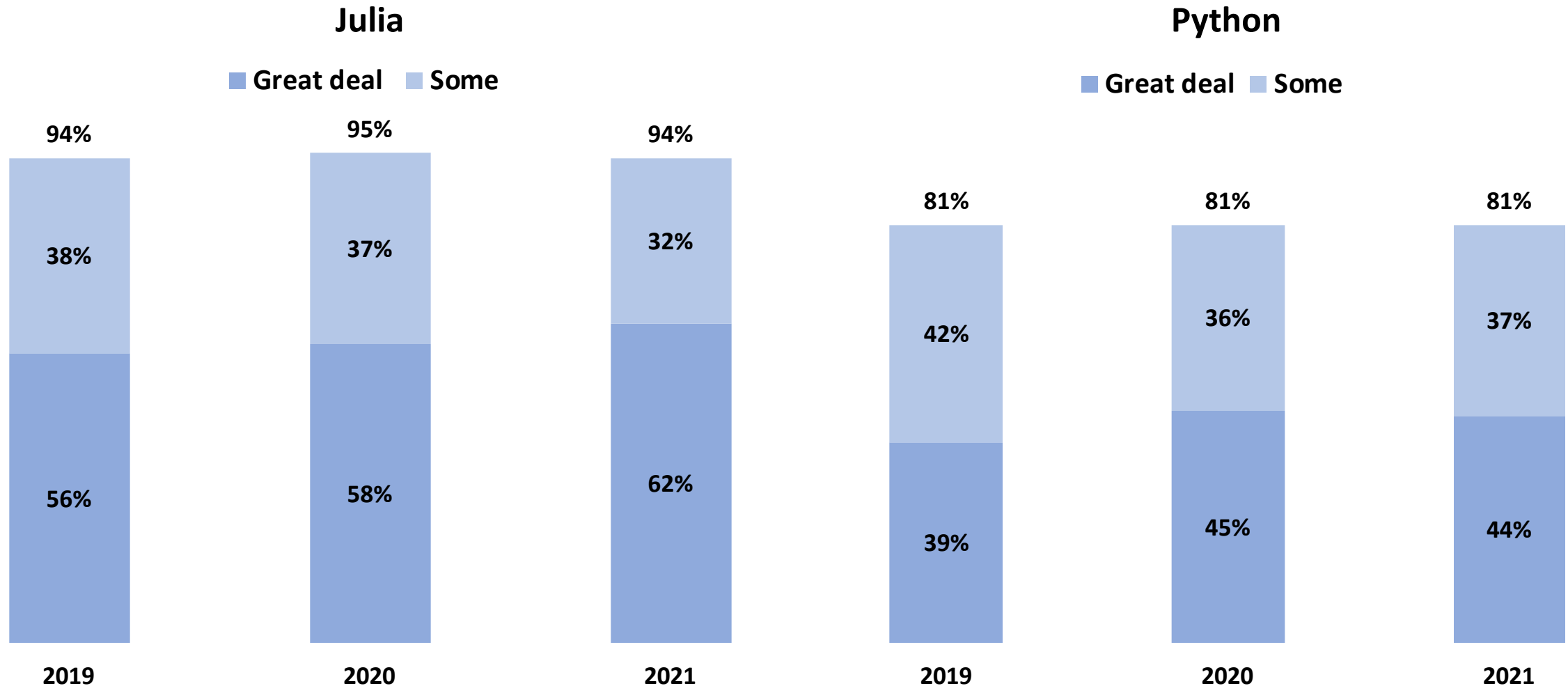
**Margin of error is +/- 1.9 percentage points**

**We recruited respondents online using Slack, Discourse, Twitter, LinkedIn, Facebook, email, JuliaLang.org and JuliaComputing.com**

**The survey was administered in 4 languages: English, Chinese, Japanese and Spanish**

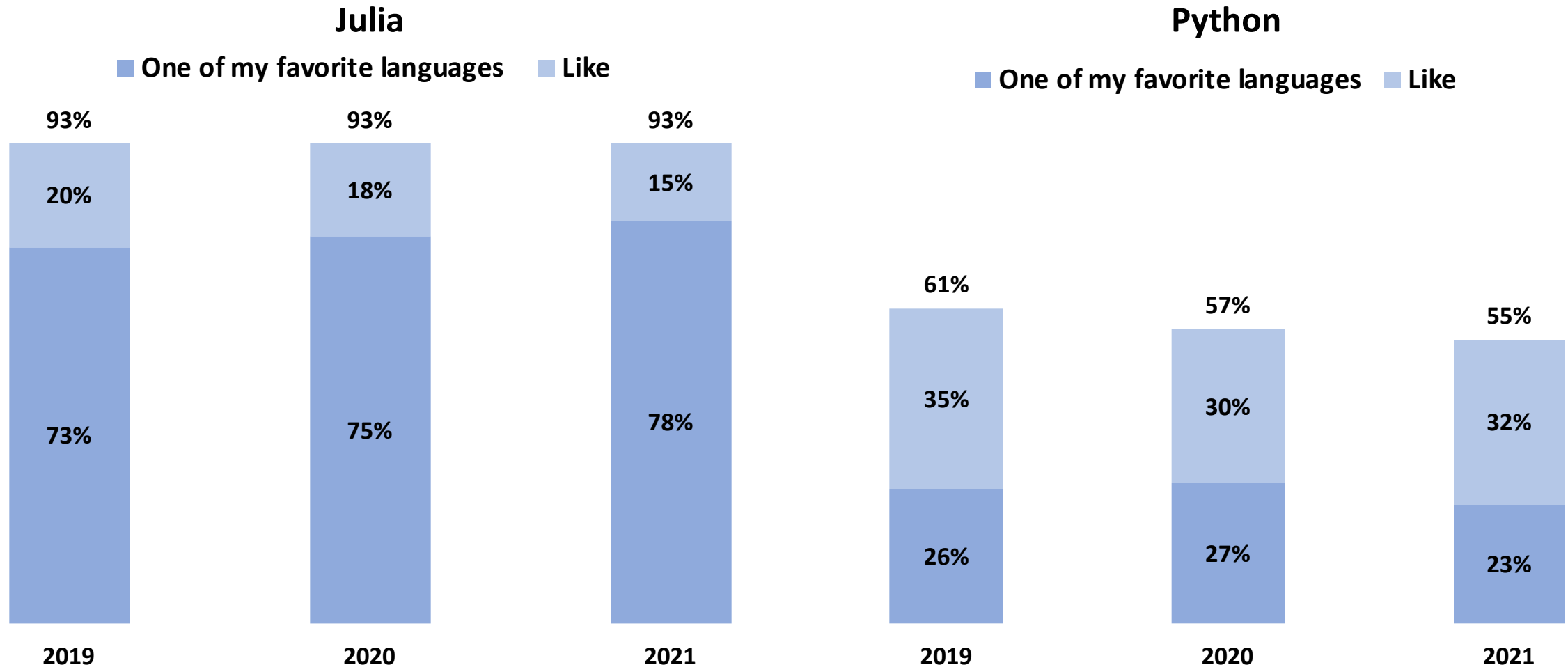
# 62% Use Julia 'A Great Deal', Up from 56% in 2019; Python Is #2 for Julia Users & Developers

*How frequently do you use each of the following languages?*



# 78% Say Julia Is 'One of My Favorite Languages', Up from 73% in 2019; Python Has Been Declining Among Julia Users Since 2019

*How much do you like each of the following languages?*

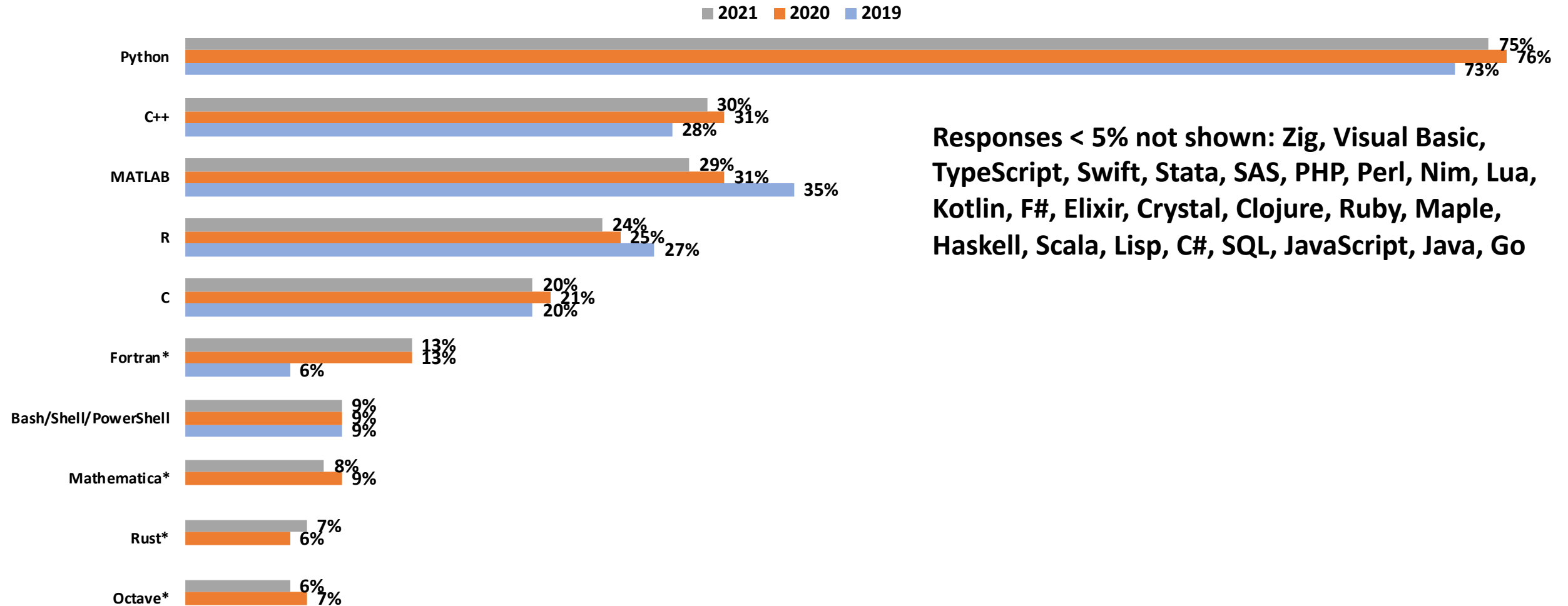


Other languages not shown include C (26% 'one of my favorite languages' + 'like'), Bash/Shell/PowerShell (19% 'one of my favorite languages' + 'like'), R (19% 'one of my favorite languages' + 'like'), C++ (18% 'one of my favorite languages' + 'like'), MATLAB (18% 'one of my favorite languages' + 'like')

# Python Is #2 for Julia Users, Followed by C++, MATLAB, R and C

## R and MATLAB Continue to Decline Among Julia Users

Thinking about the tasks for which you use Julia, if you weren't using Julia for these tasks, what programming language would you be using?

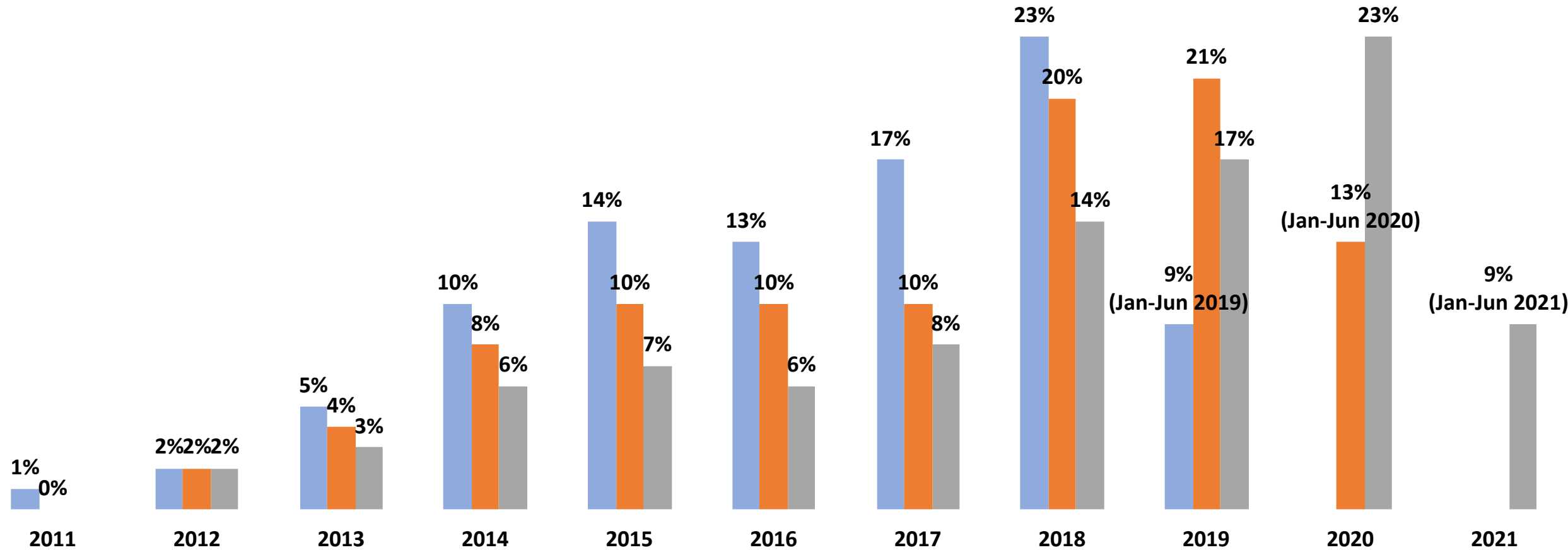


Responses < 5% not shown: Zig, Visual Basic, TypeScript, Swift, Stata, SAS, PHP, Perl, Nim, Lua, Kotlin, F#, Elixir, Crystal, Clojure, Ruby, Maple, Haskell, Scala, Lisp, C#, SQL, JavaScript, Java, Go

# Most Started Using Julia in the Last 3-4 Years – After Julia 1.0 Release (Aug 2018)

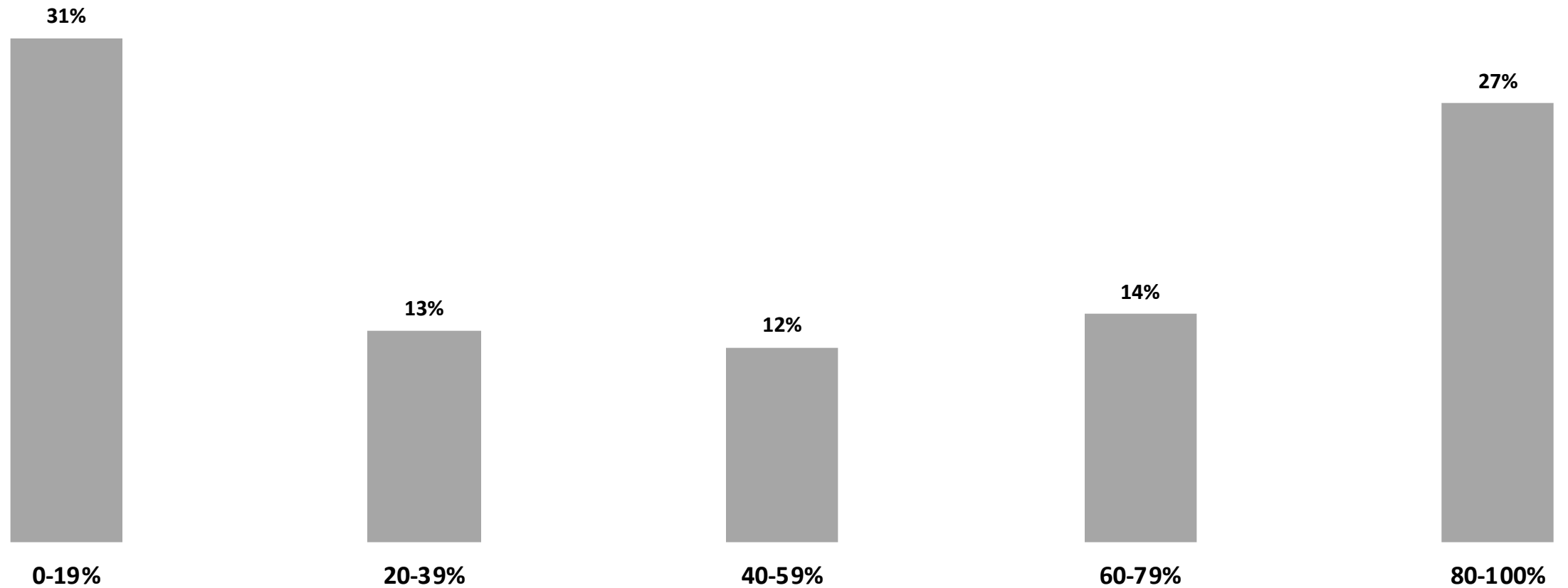
When did you first start using Julia?

■ 2019 ■ 2020 ■ 2021



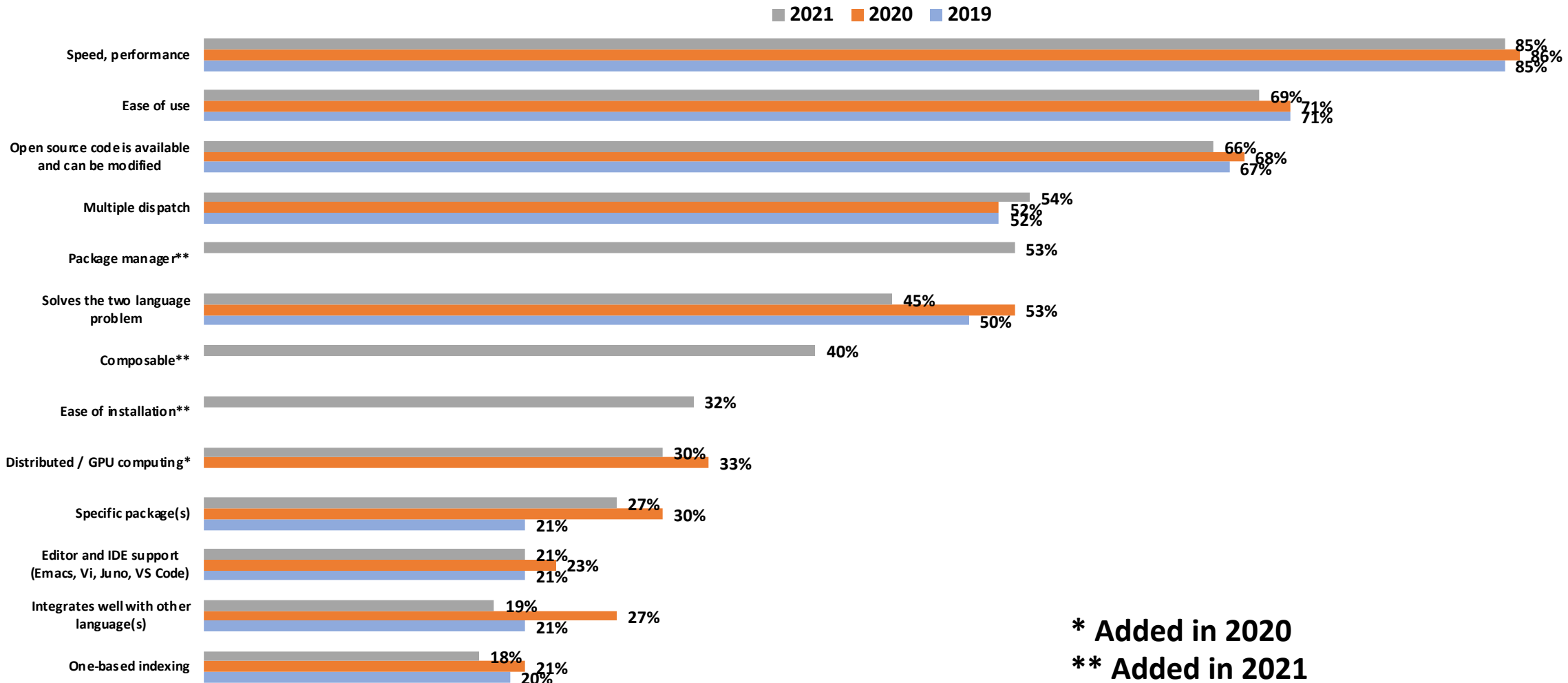
# Most Julia Users & Developers Do At Least 40% of Their Programming Work in Julia

*What percentage of the programming work you do is in Julia?*



# The MOST Popular TECHNICAL Features of Julia Are Speed/Performance, Ease of Use, Open Source, Multiple Dispatch, Package Manager, Solves Two Language Problem, Composable

*Thinking only about the TECHNICAL aspects or features of Julia, what are the TECHNICAL aspects or features you like MOST about Julia?*



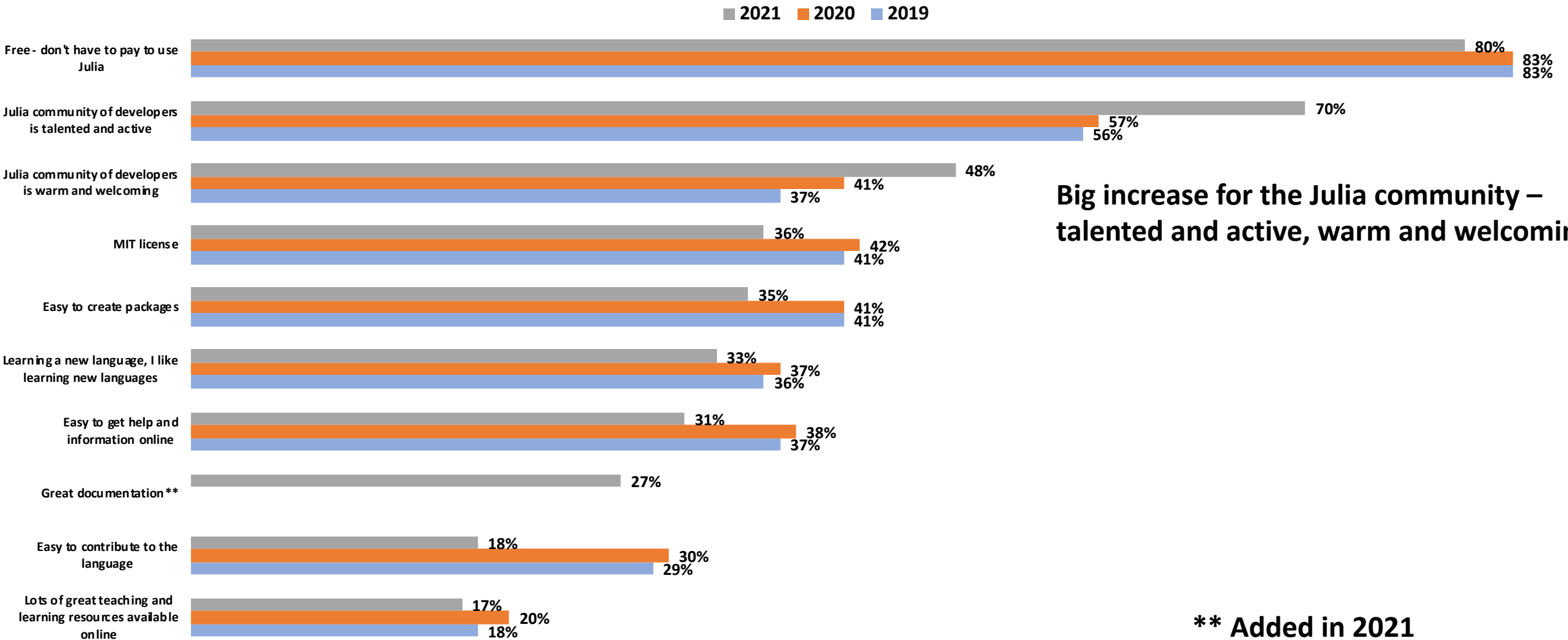
\* Added in 2020

\*\* Added in 2021



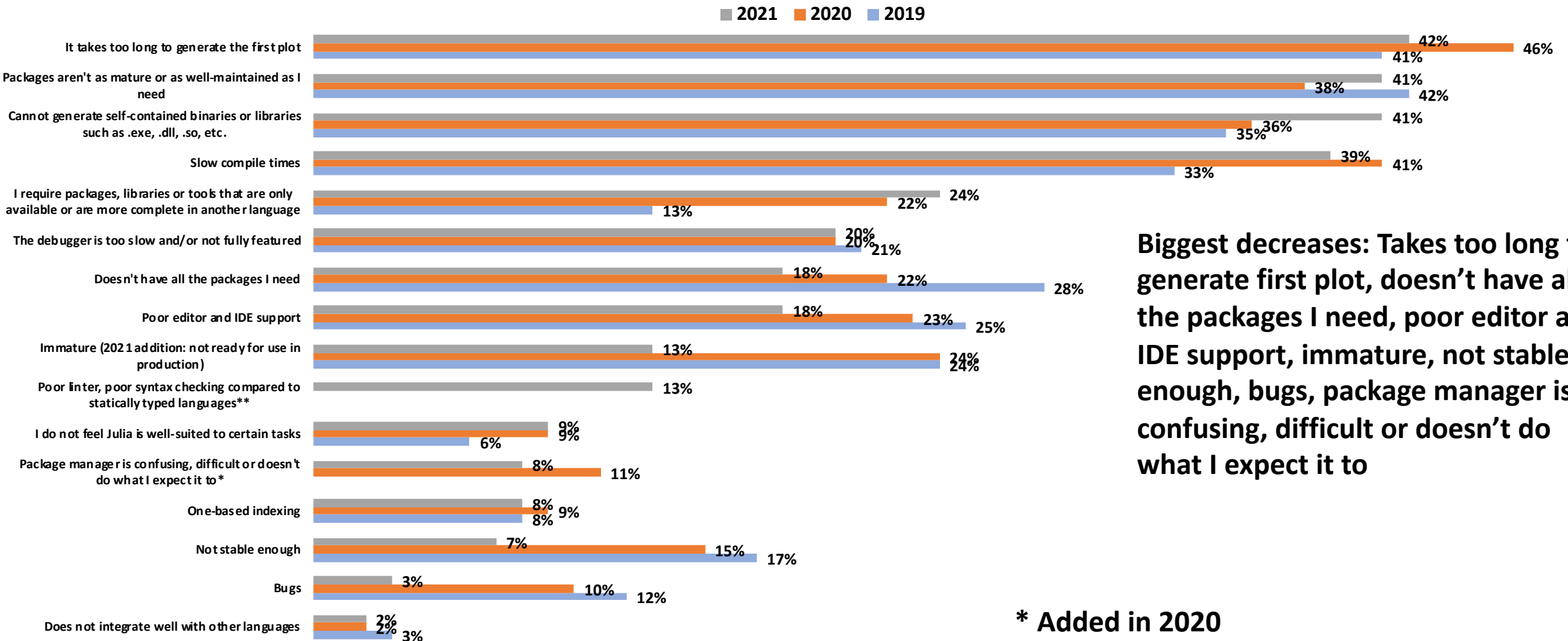
# The MOST Popular NON-TECHNICAL Features of Julia Are Free (Don't Have to Pay) and the Julia Community

Thinking only about the NON-TECHNICAL aspects or features of Julia, what are the NON-TECHNICAL aspects or features you like MOST about Julia?



# The Biggest TECHNICAL PROBLEMS with Julia Are Too Long to Generate the First Plot, Packages, Cannot Generate Self-Contained Binaries and Slow Compile Times

Thinking only about the TECHNICAL aspects or features of Julia, what are the TECHNICAL aspects or features you like LEAST about Julia?



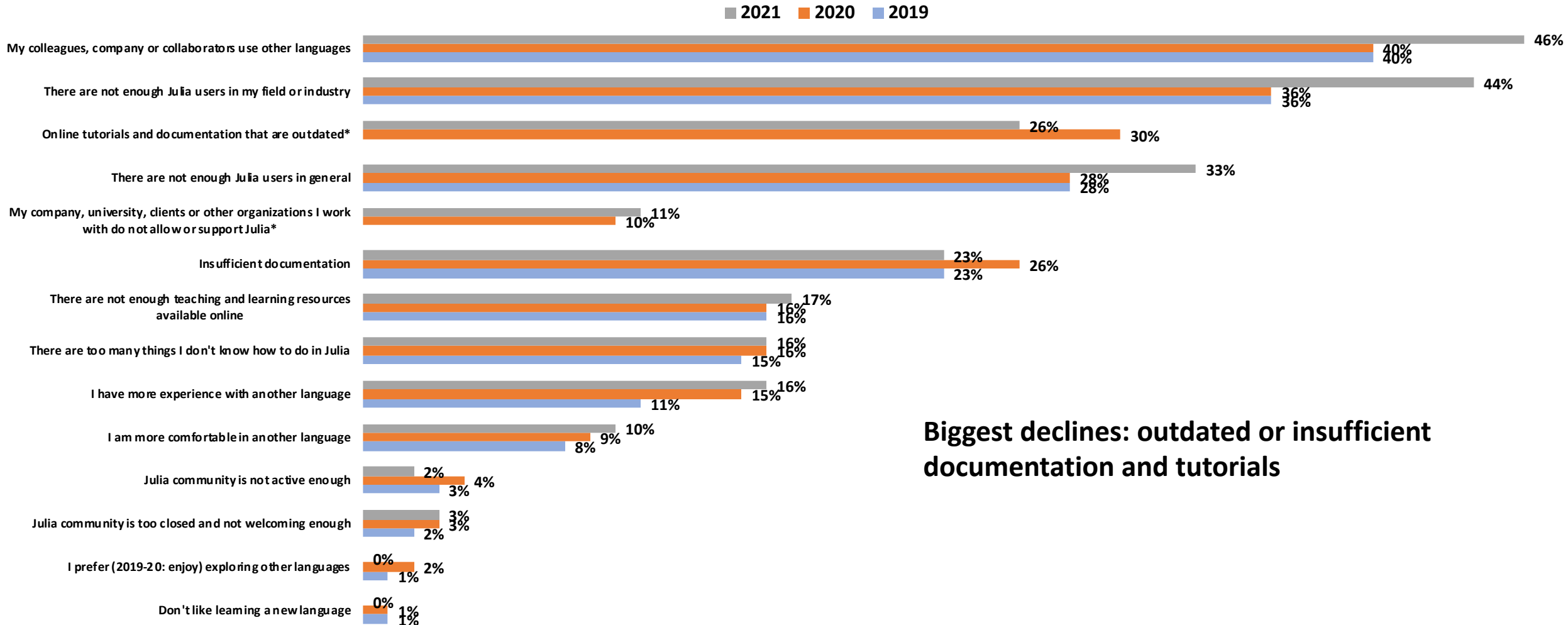
**Biggest decreases:** Takes too long to generate first plot, doesn't have all the packages I need, poor editor and IDE support, immature, not stable enough, bugs, package manager is confusing, difficult or doesn't do what I expect it to

\* Added in 2020

\*\* Added in 2021

# The Biggest NON-TECHNICAL PROBLEMS with Julia Are Related to Adoption: Too Many Colleagues, Collaborators and Others Use Other Languages

Thinking only about the NON-TECHNICAL aspects or features of Julia, what are the NON-TECHNICAL aspects or features you like LEAST about Julia?

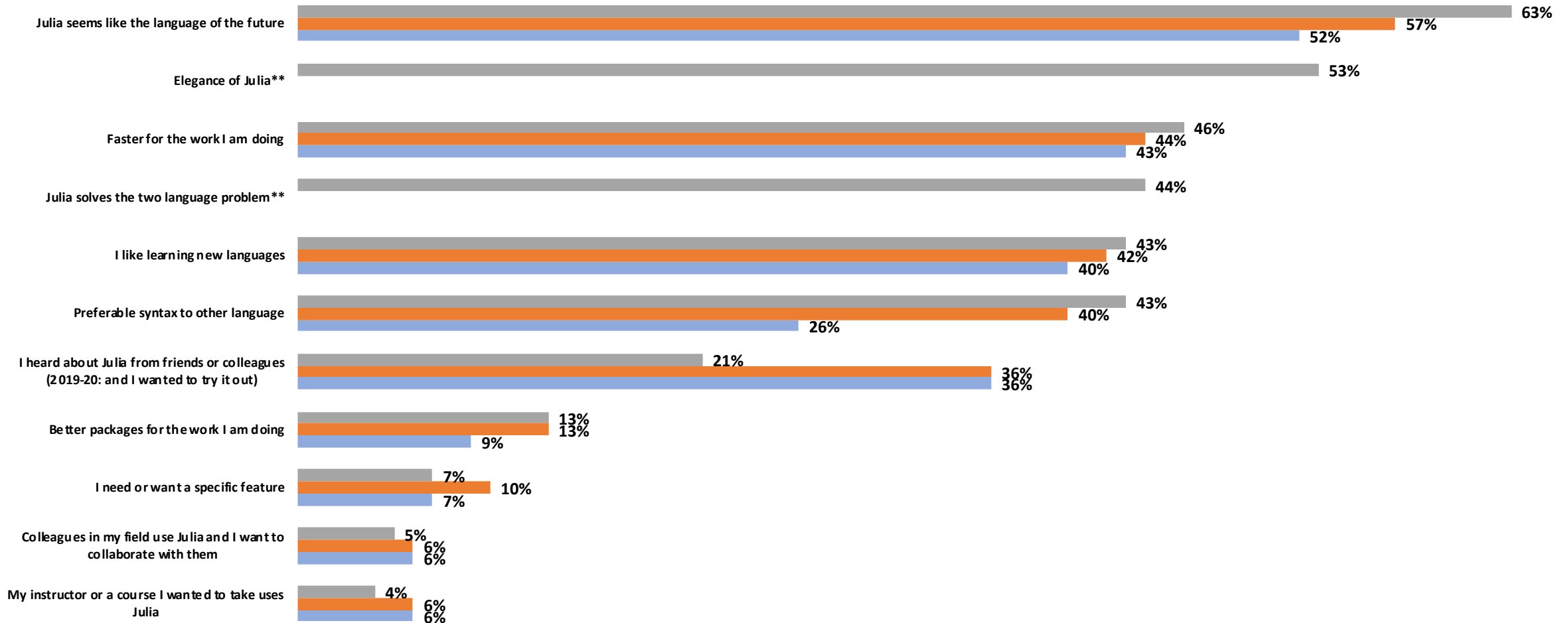


**Biggest declines: outdated or insufficient documentation and tutorials**

# Reasons for Choosing Julia: Seems Like the Language of the Future, Elegance, Speed, Solves the Two Language Problem, Like Learning New Languages, Preferable Syntax

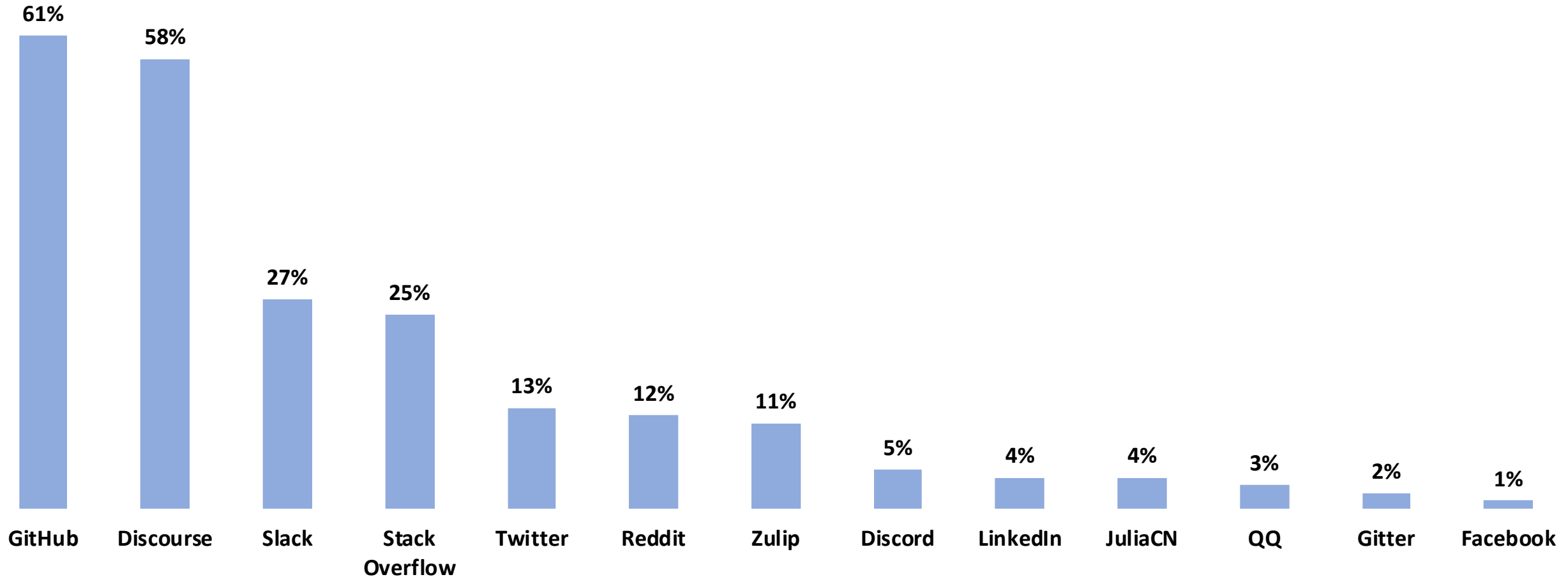
Why did you start using Julia?

■ 2021 ■ 2020 ■ 2019



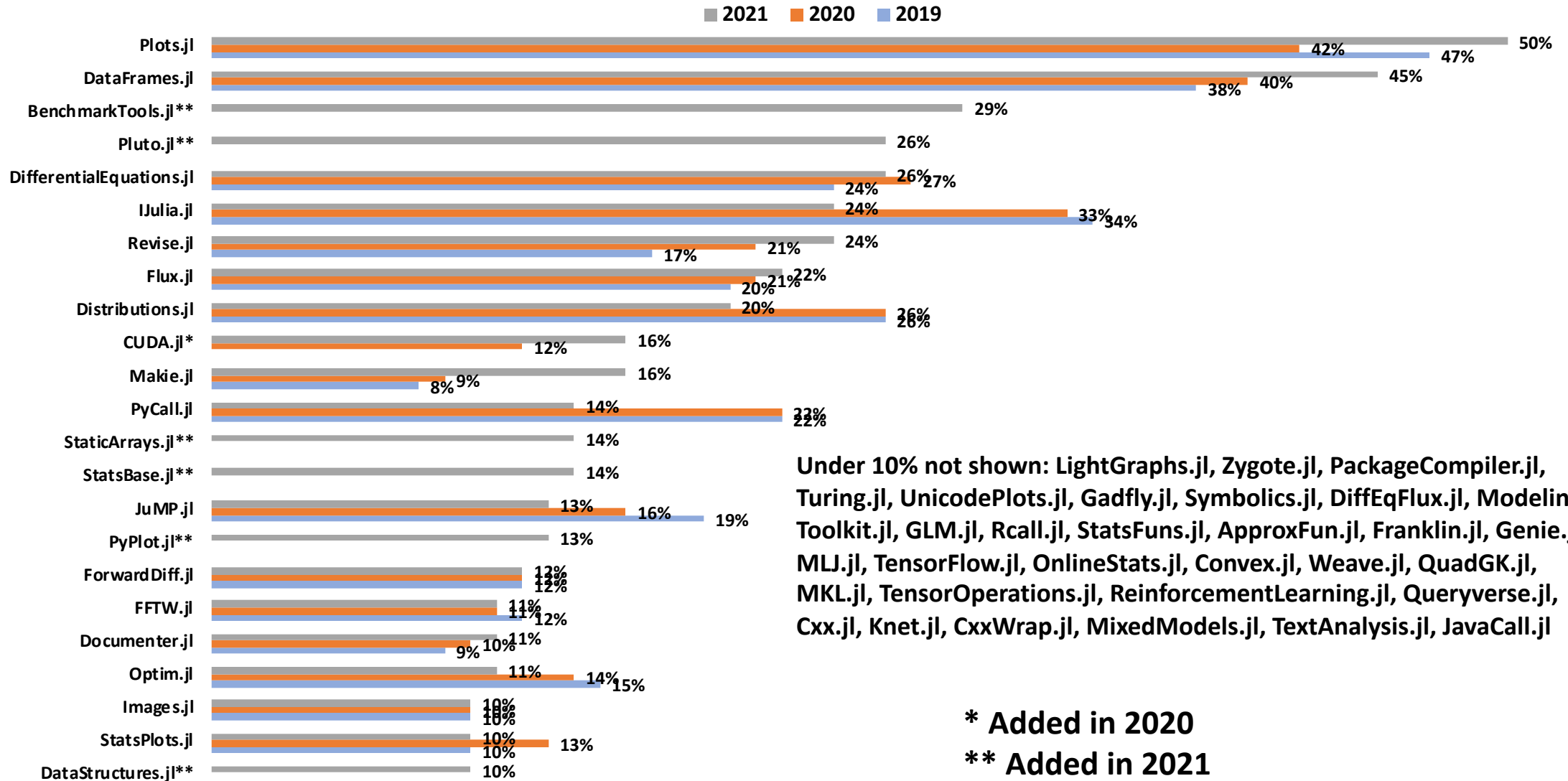
# Julia Users & Developers Interact on GitHub, Discourse, Slack and Stack Overflow

*Where do you interact with the Julia community?*



# Most Popular Packages: Plots, DataFrames, BenchmarkTools, Pluto, DifferentialEquations, IJulia, Revise, Flux, Distributions, CUDA, Makie

What are some of your favorite Julia packages?



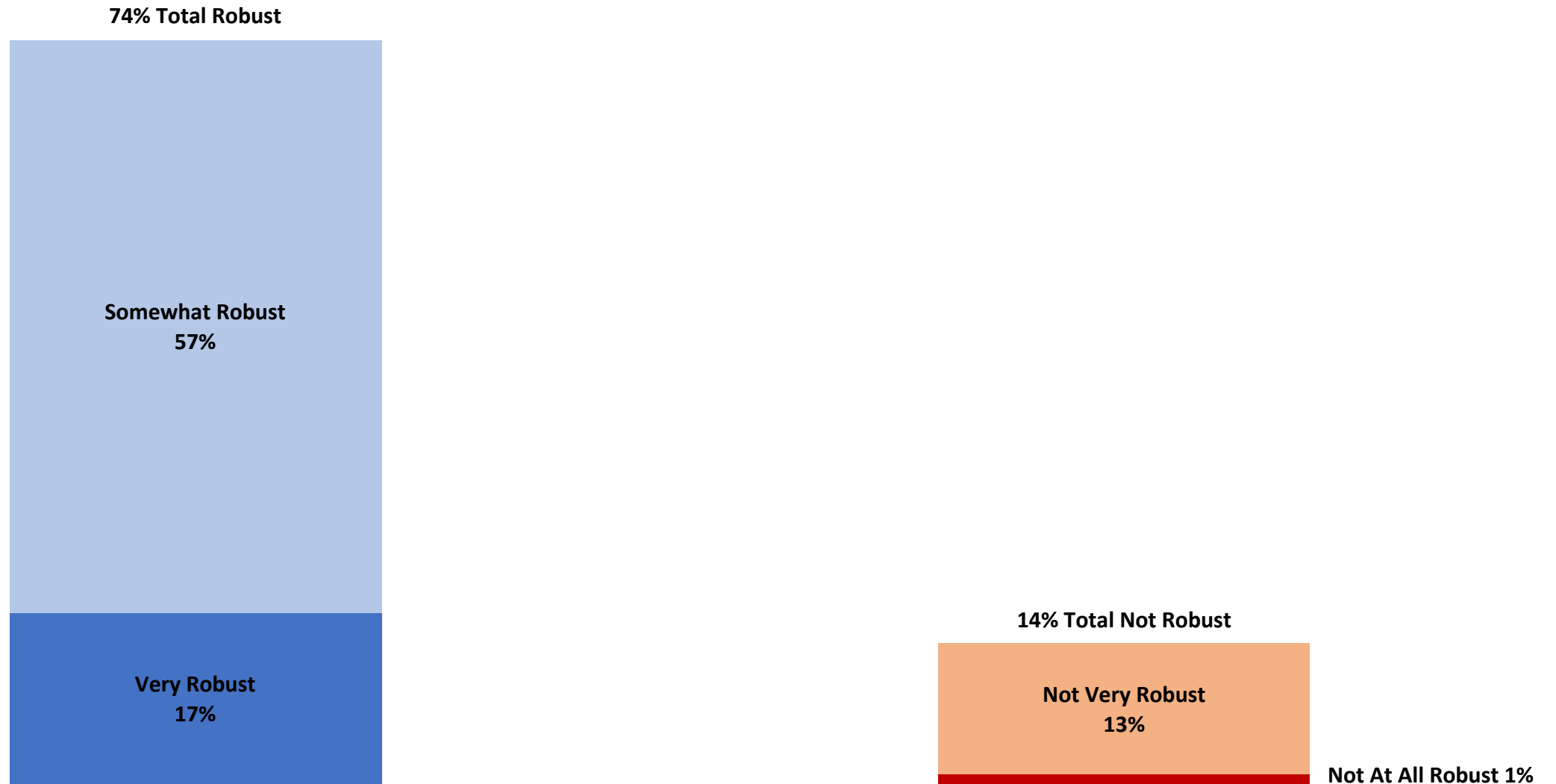
Under 10% not shown: LightGraphs.jl, Zygote.jl, PackageCompiler.jl, Turing.jl, UnicodePlots.jl, Gadfly.jl, Symbolics.jl, DiffEqFlux.jl, ModelingToolkit.jl, GLM.jl, Rcall.jl, StatsFuns.jl, ApproxFun.jl, Franklin.jl, Genie.jl, MLJ.jl, TensorFlow.jl, OnlineStats.jl, Convex.jl, Weave.jl, QuadGK.jl, MKL.jl, TensorOperations.jl, ReinforcementLearning.jl, Queryverse.jl, Cxx.jl, Knet.jl, CxxWrap.jl, MixedModels.jl, TextAnalysis.jl, JavaCall.jl

\* Added in 2020

\*\* Added in 2021

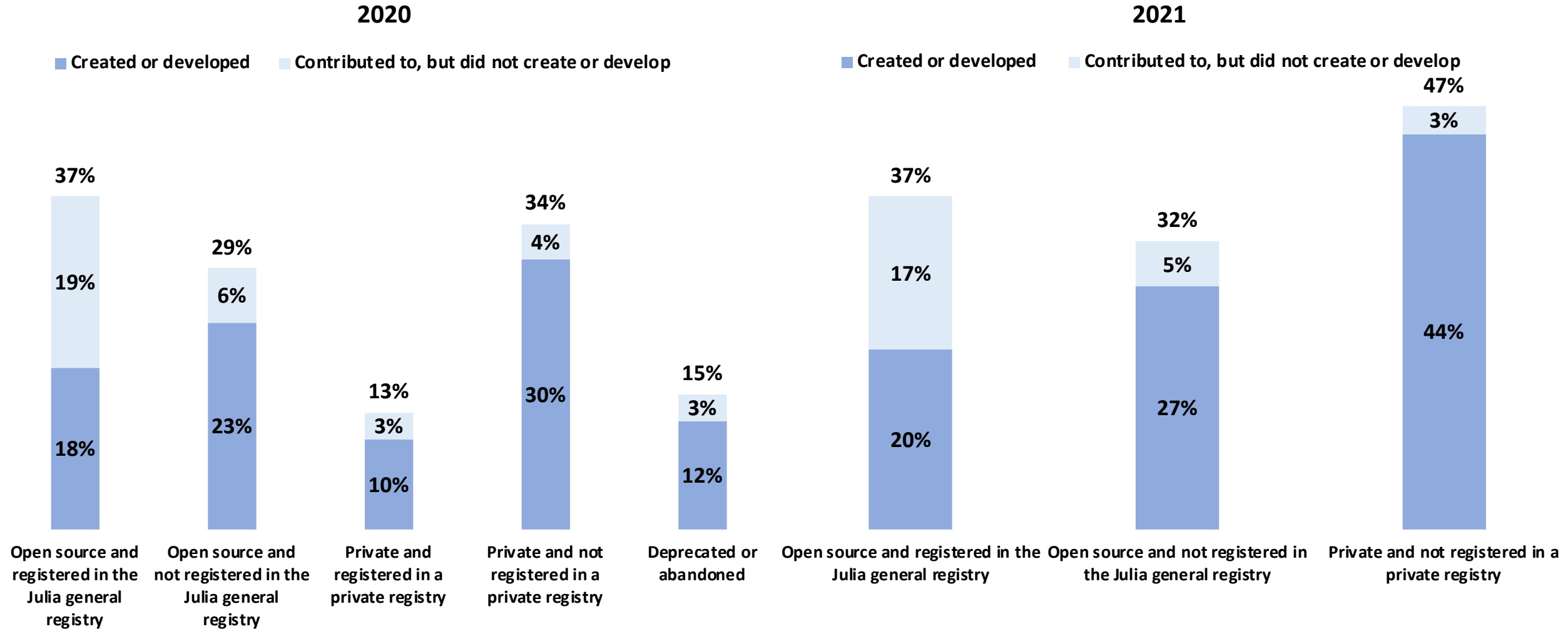
# Most Say the Julia Package Ecosystem is 'Somewhat' Robust

*How robust is the current Julia package ecosystem?*



# More Users & Developers Have Created or Developed Packages This Year

*Which of the following types of Julia packages have you created or developed, or contributed to, but did not create or develop?*



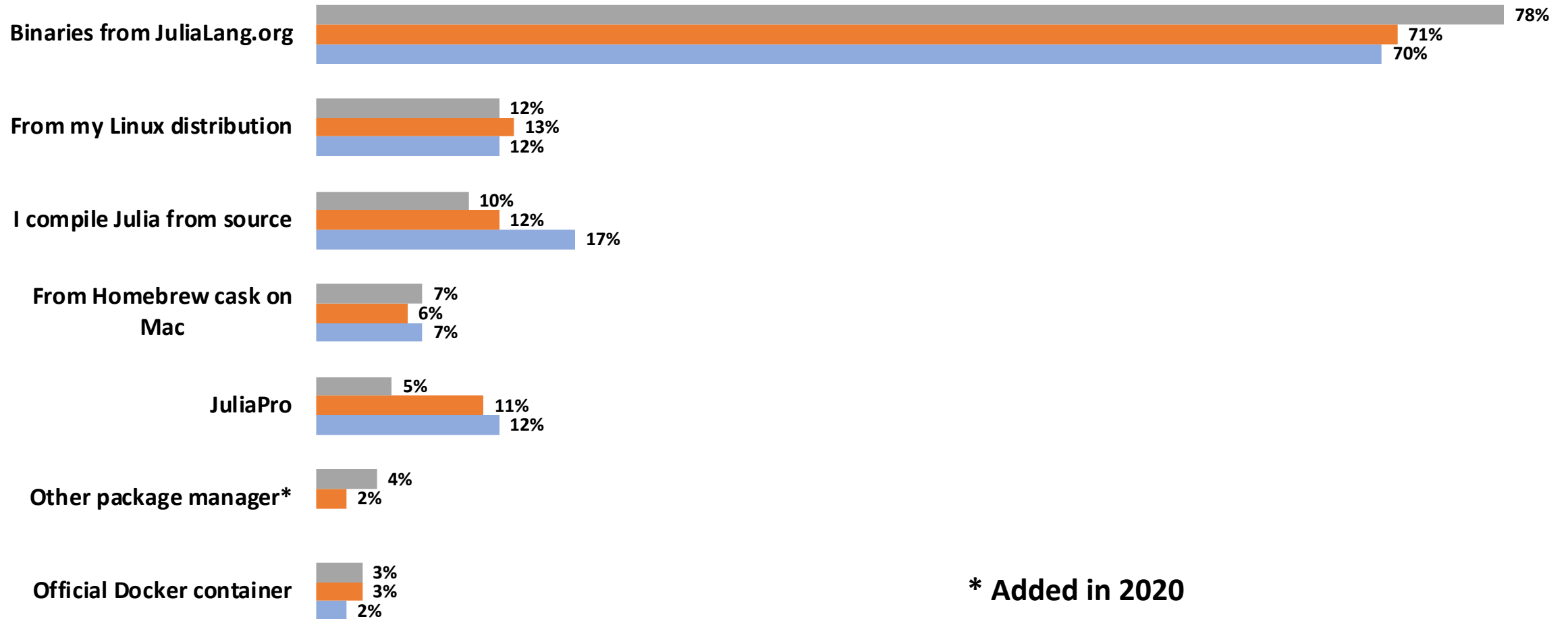


# Most Downloaded or Installed Binaries from JuliaLang.org

## Fewer Users Compile Julia from Source

*How did you download or install the Julia version you use most frequently?*

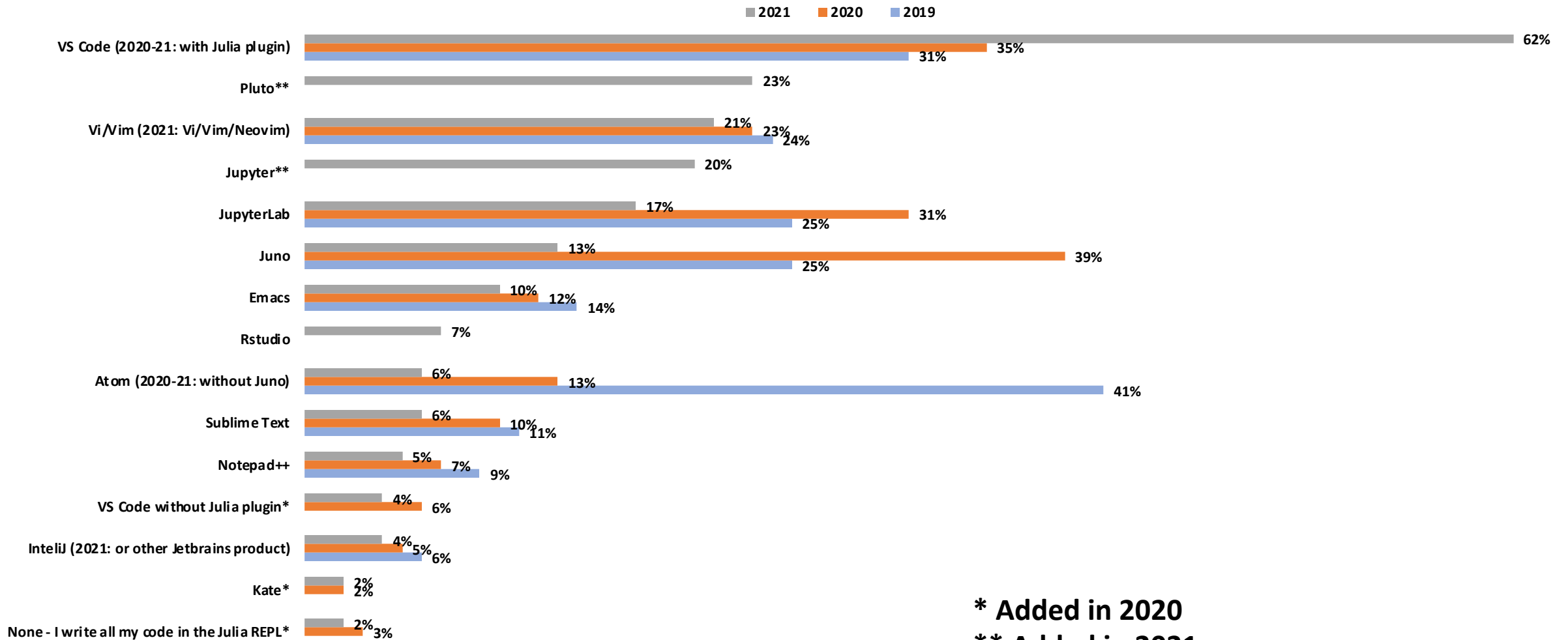
■ 2021 ■ 2020 ■ 2019



\* Added in 2020

# VS Code with Julia Plugin Has Rapidly Become the Editor of Choice for Julia Users & Developers

Which editors or IDEs do you use frequently?



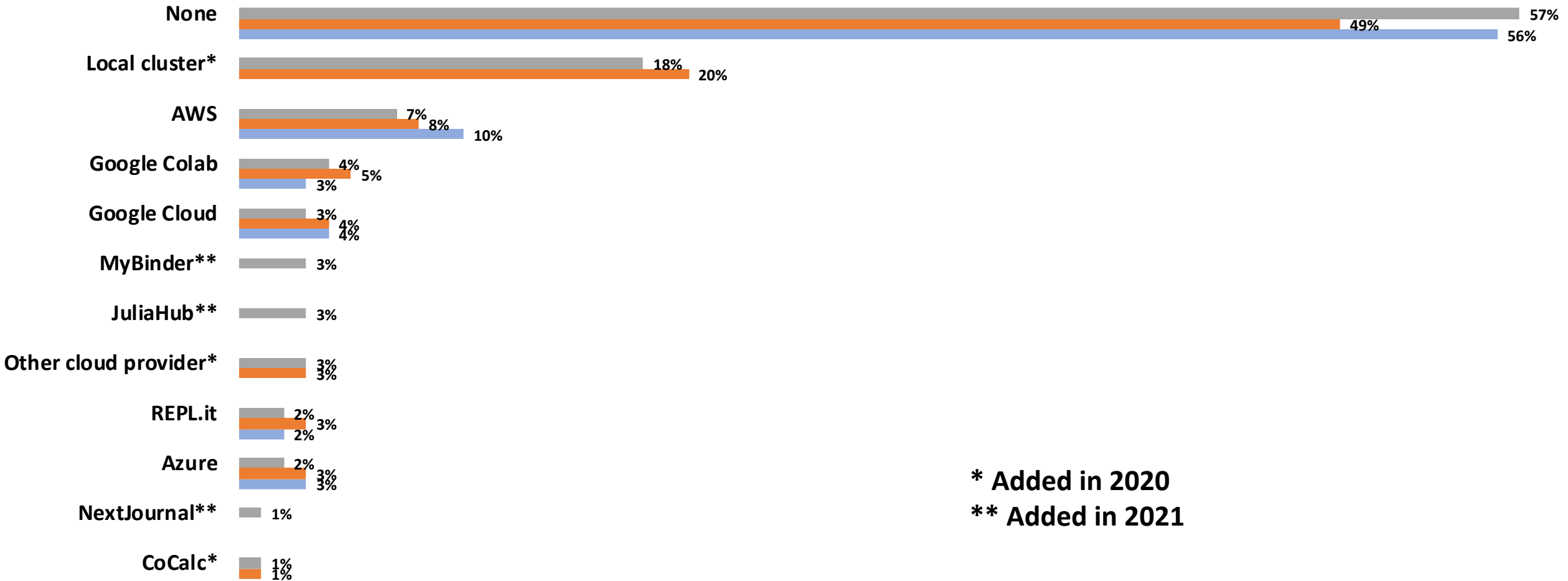
\* Added in 2020

\*\* Added in 2021

# Most Use a Local Cluster or No Cloud Solution

Which cloud solutions, if any, do you use together with Julia?

■ 2021 ■ 2020 ■ 2019

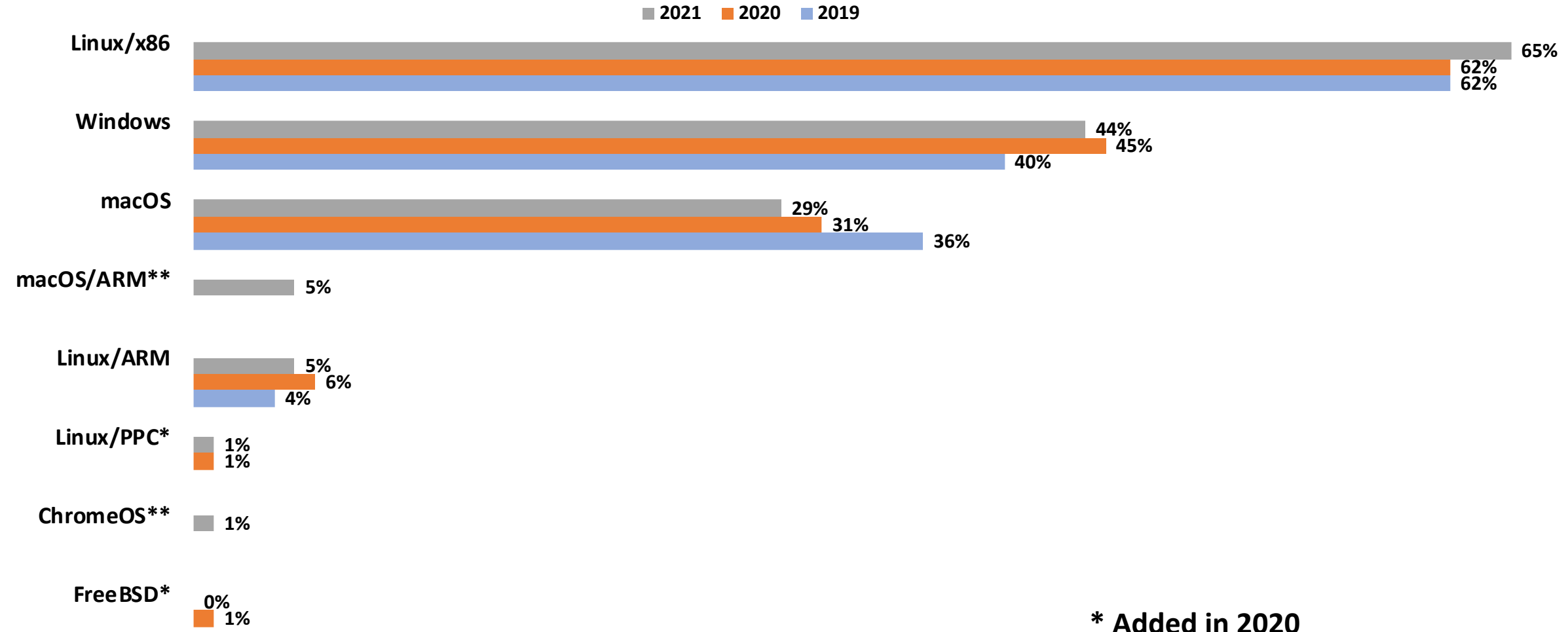


\* Added in 2020

\*\* Added in 2021

# Most Use Julia with Linux/x86

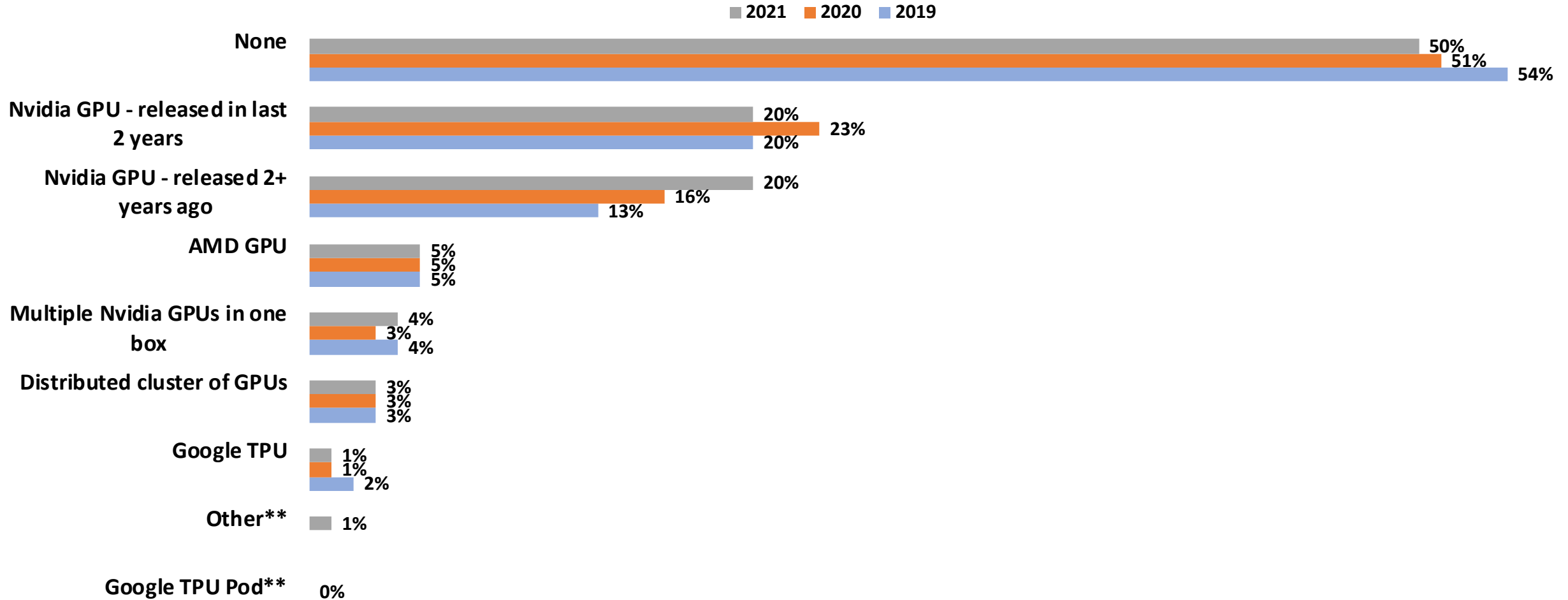
With which operating system(s) do you use Julia?



\* Added in 2020  
\*\* Added in 2021

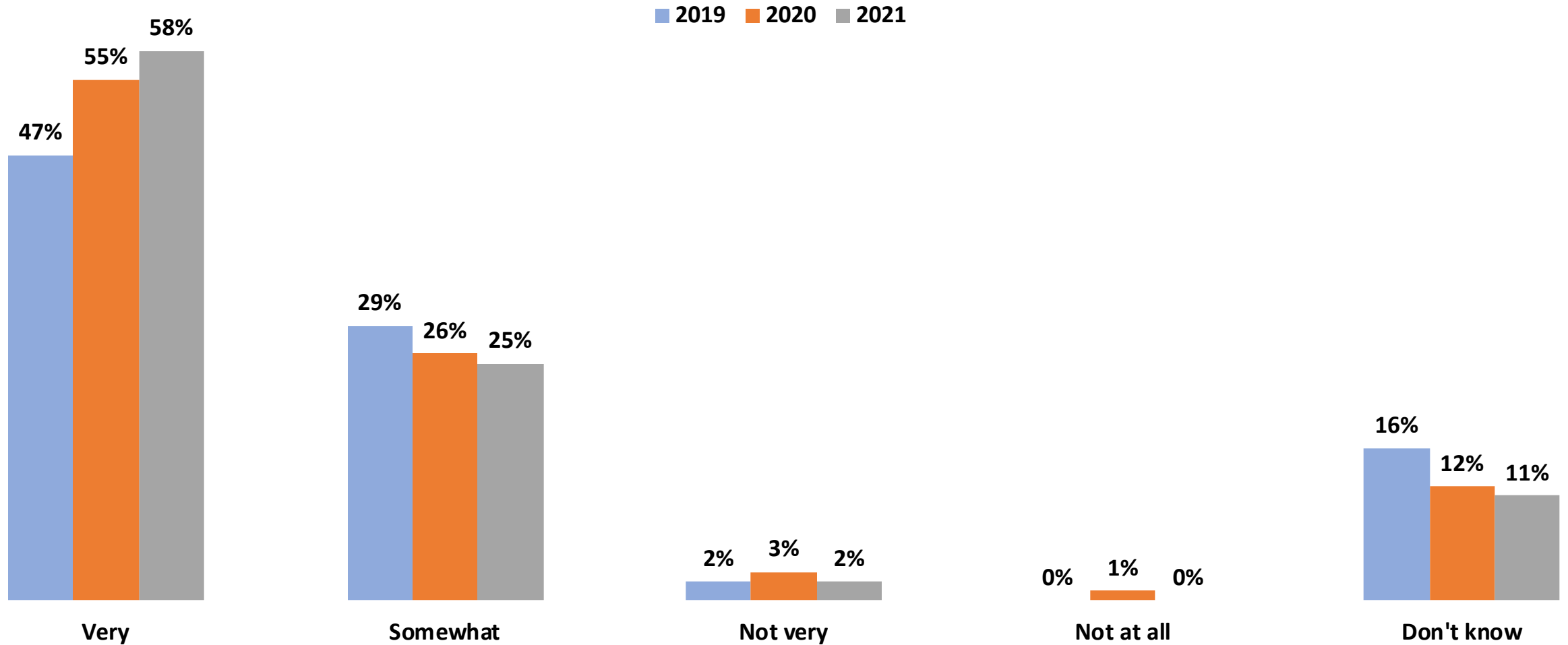
# Nvidia GPUs Are the Most Common Hardware Accelerators

Which hardware accelerators, if any, do you use together with Julia?



# Even More Respondents This Year Say the Julia Community Is Very Helpful and Collaborative

*How helpful and collaborative is the Julia community?*

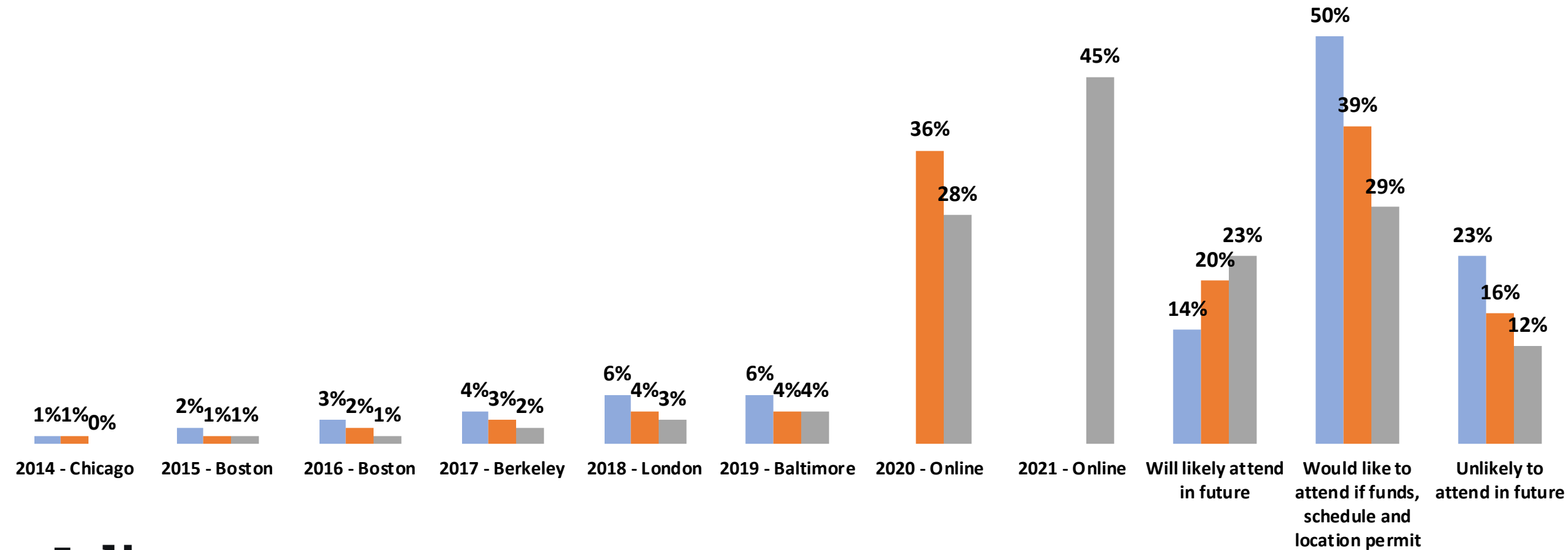


# JuliaCon Continues to Grow Every Year

## Virtual Conferences in 2020 and 2021 Made JuliaCon Much More Accessible

*Have you attended or do you plan to attend JuliaCon?*

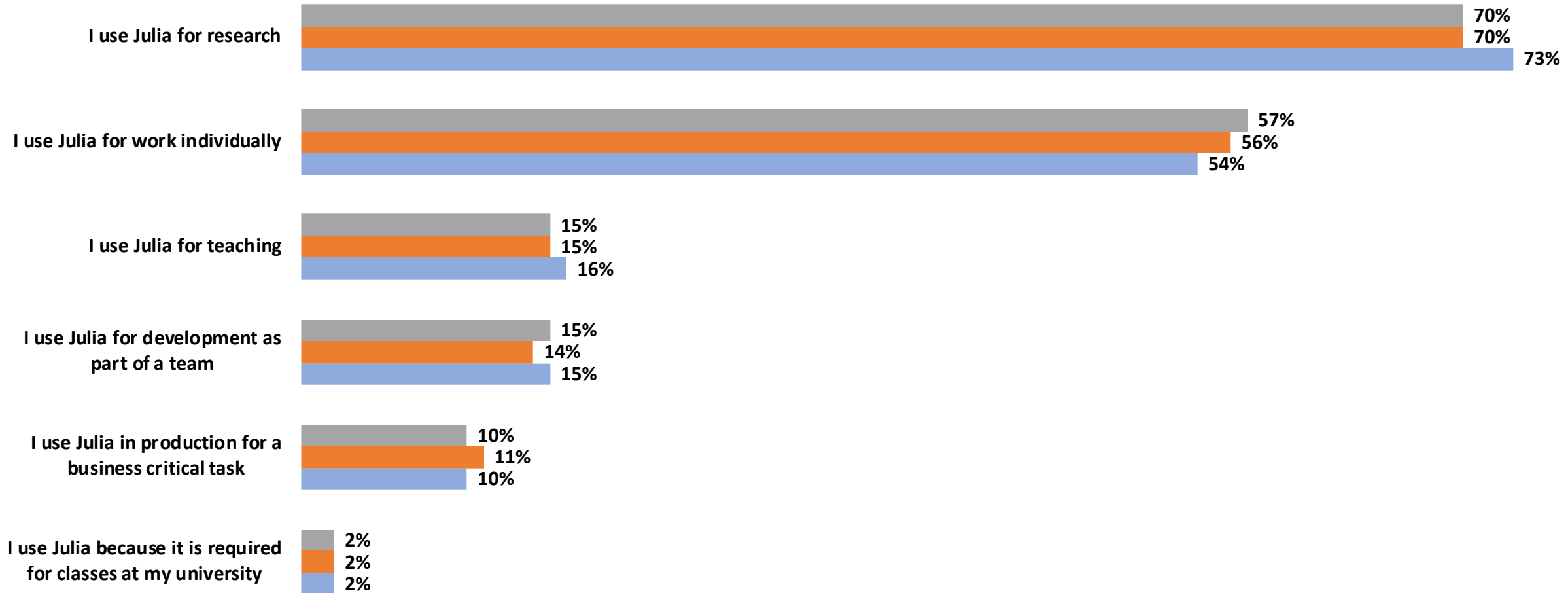
■ 2019 ■ 2020 ■ 2021



# Most Use Julia for Research and Individual Work

*Which of the following best describe your use of Julia?*

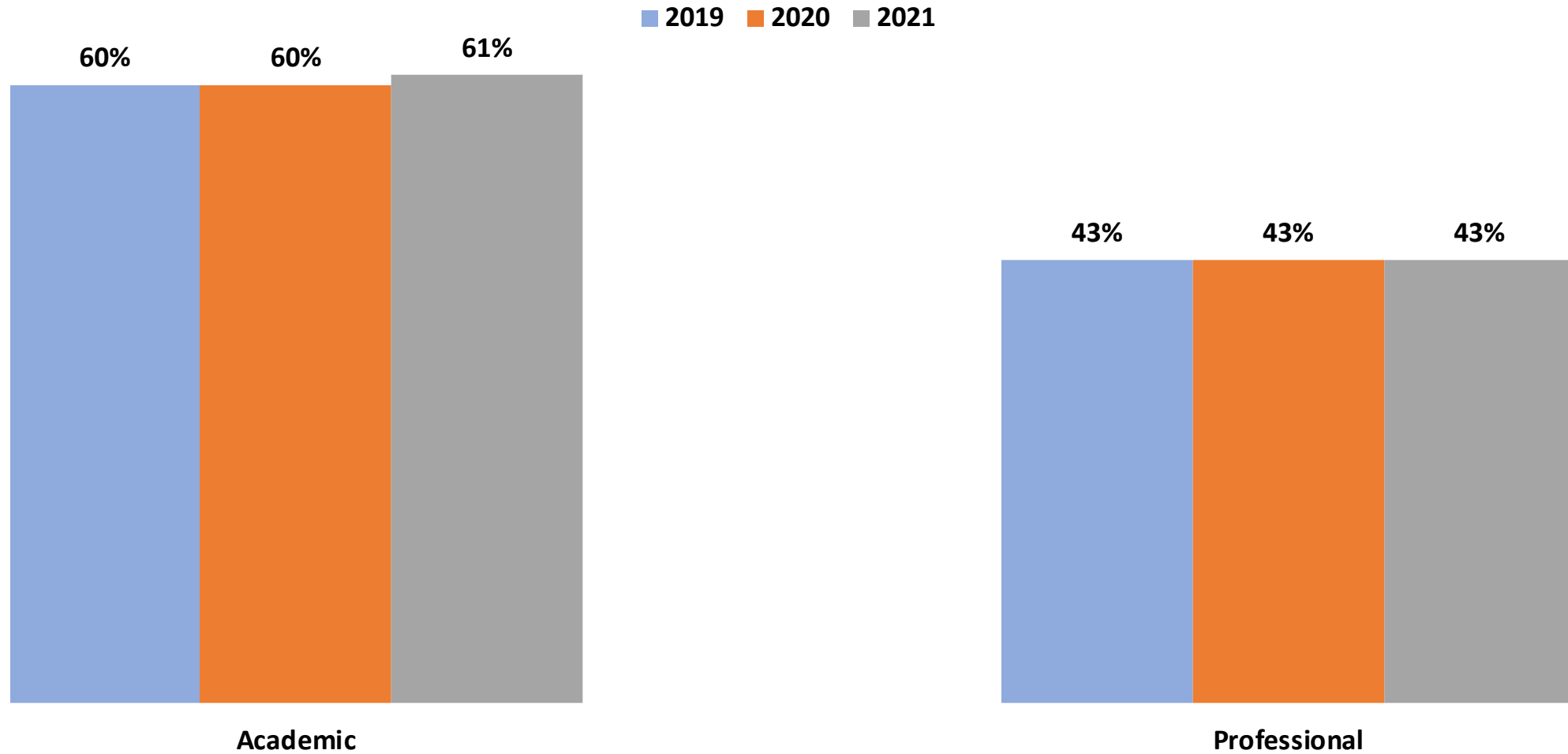
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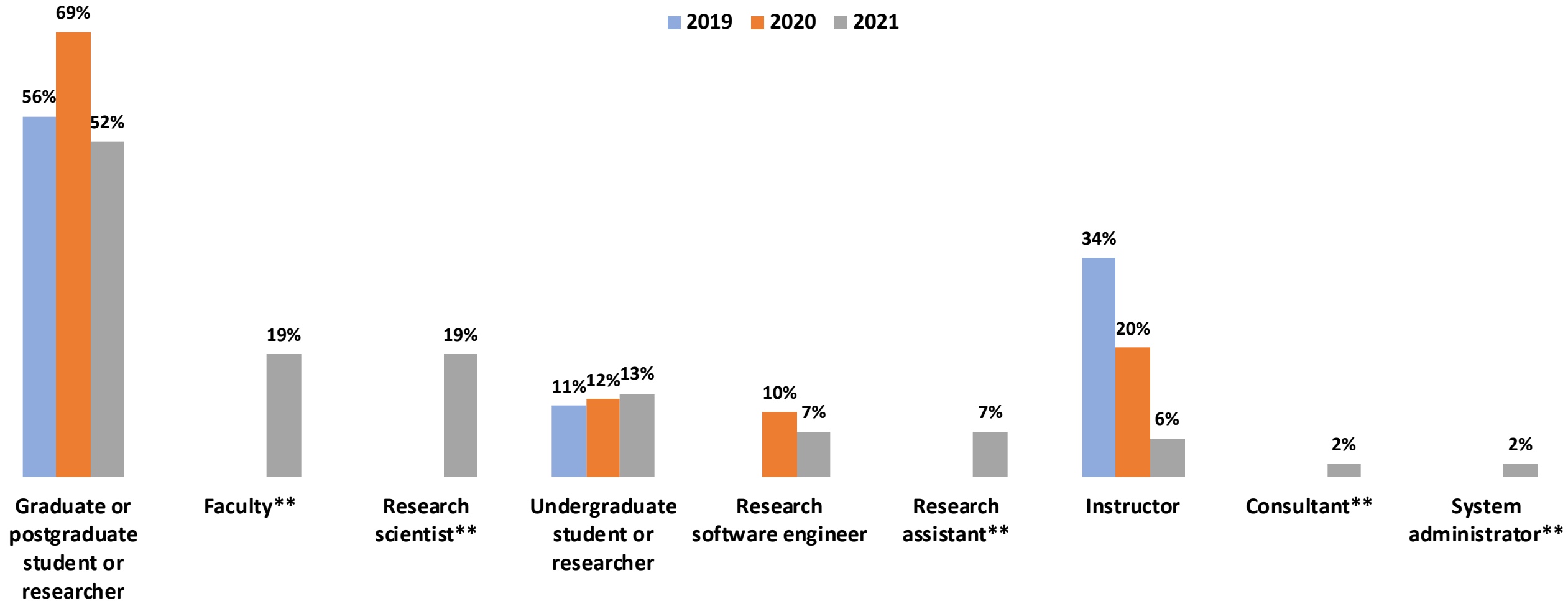
# Most Respondents Are Academics (61%)

*Which of the following best describes you?*



# Among Academics, Most Respondents Are Graduate or Postgraduate Students or Researchers

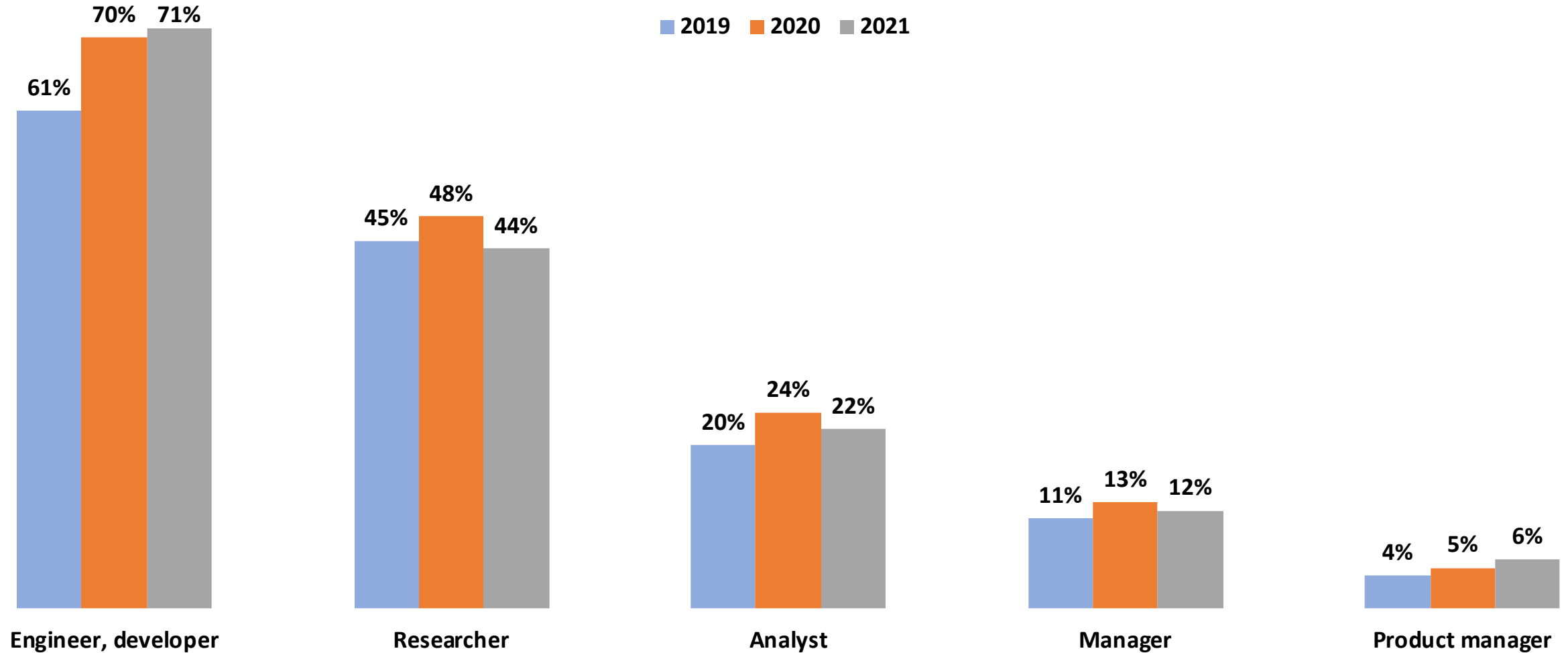
AMONG ACADEMICS: Are you a(n):



# Among Professionals, Most Respondents Are Engineers or Developers

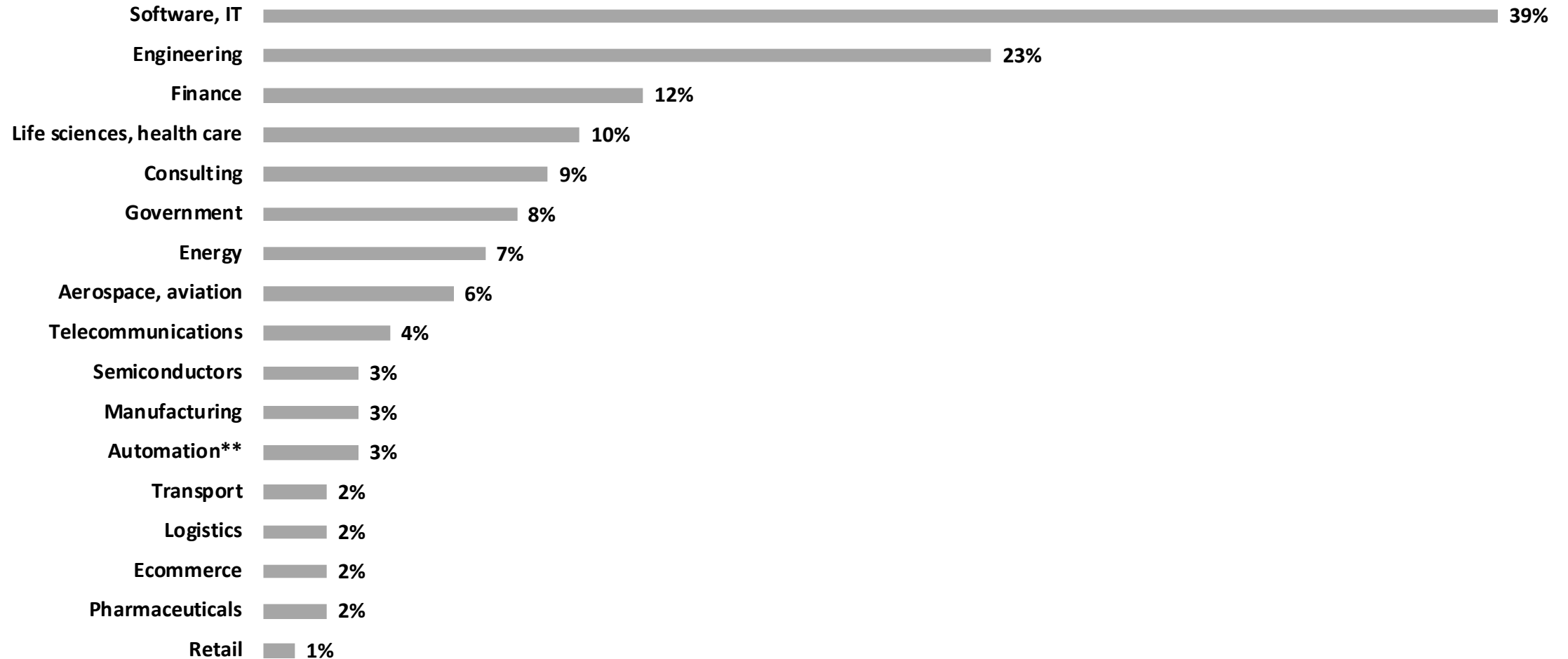
AMONG PROFESSIONALS: Are you a(n):

2019 2020 2021



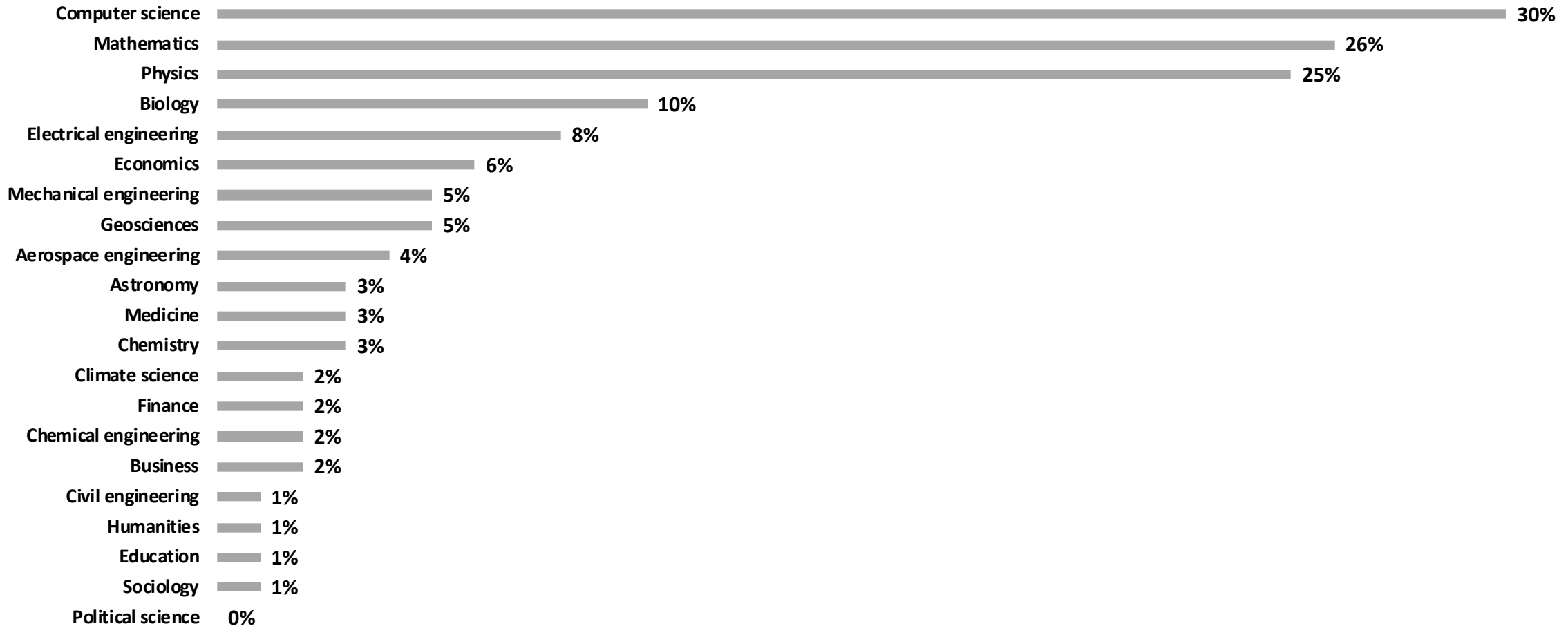
# Among Professionals, the Most Common Industries Include Software, IT and Engineering

*AMONG PROFESSIONALS: What is the primary industry in which you work?*



# Among Academics, the Most Common Fields Are Computer Science, Mathematics, Physics and Biology

*AMONG ACADEMICS: What is your primary field of study or research?*

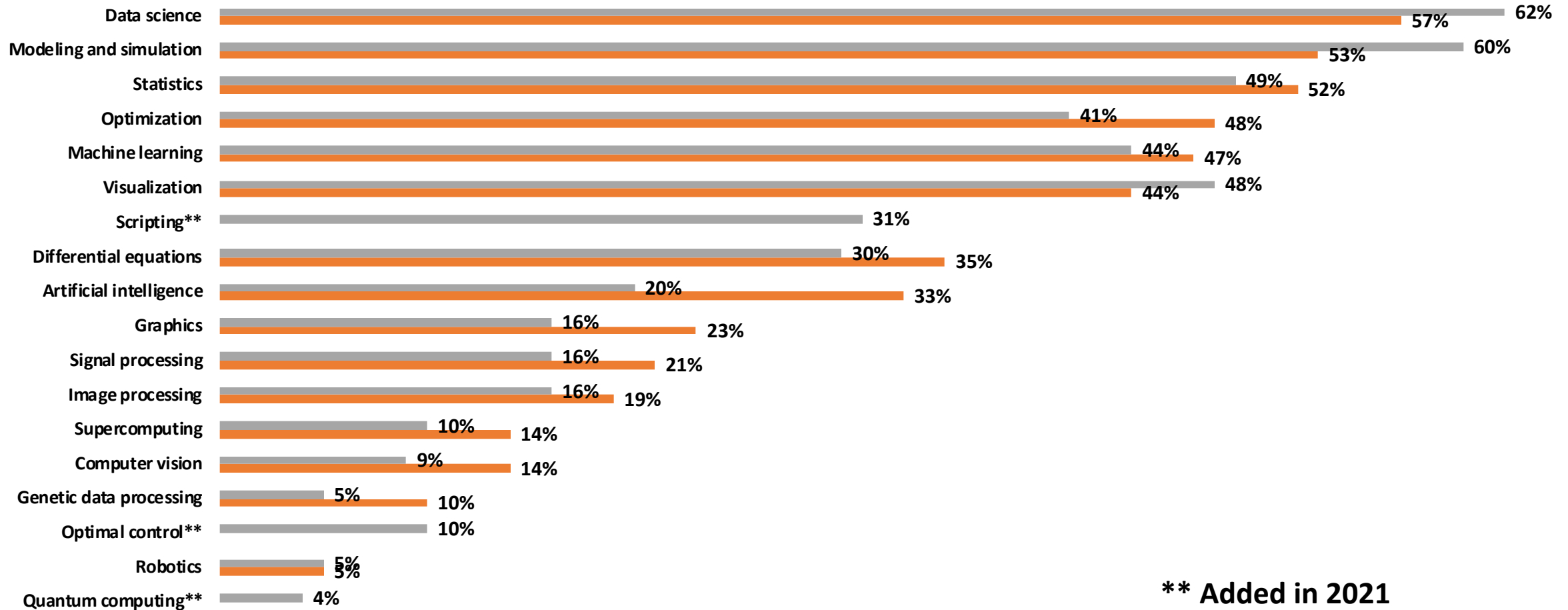


# Most Respondents Use Data Science, Modeling and Simulation as Part of their Work

Statistics, Optimization, Machine Learning, Visualization, Scripting, Differential Equations and Artificial Intelligence Are Also Used by Many

*Which of the following do you use as part of your work?*

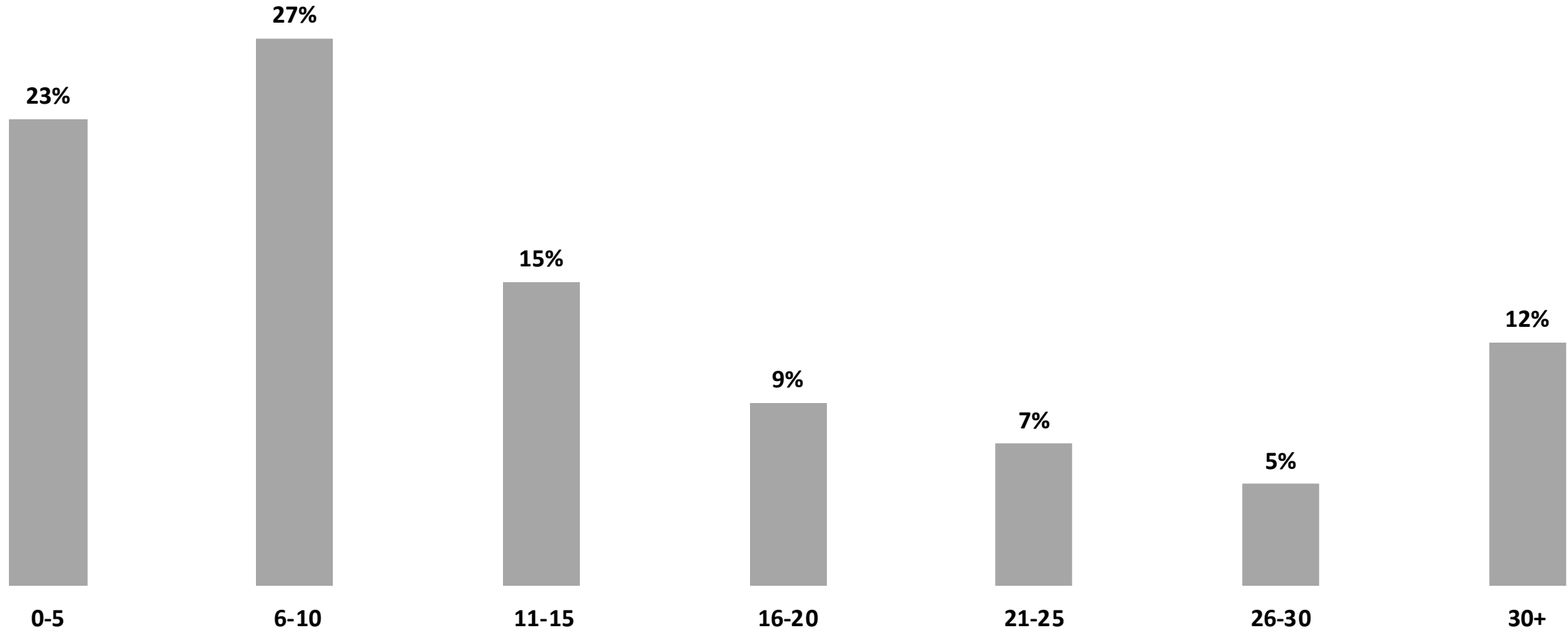
■ 2021 ■ 2020



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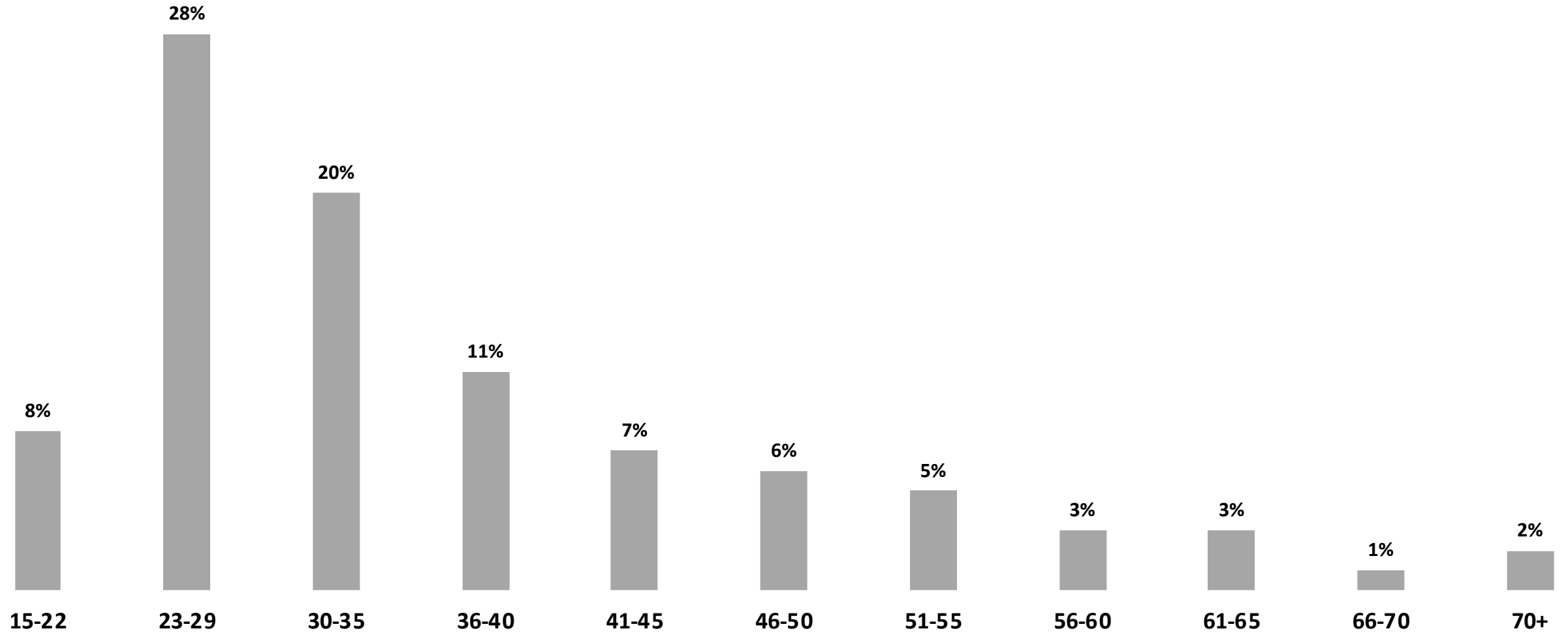
# Most Julia Users & Developers Have 15 Years Coding Experience or Less

*How many years of coding experience do you have?*



# Most Julia Users and Developers Are Age 23-40

*What is your age?*

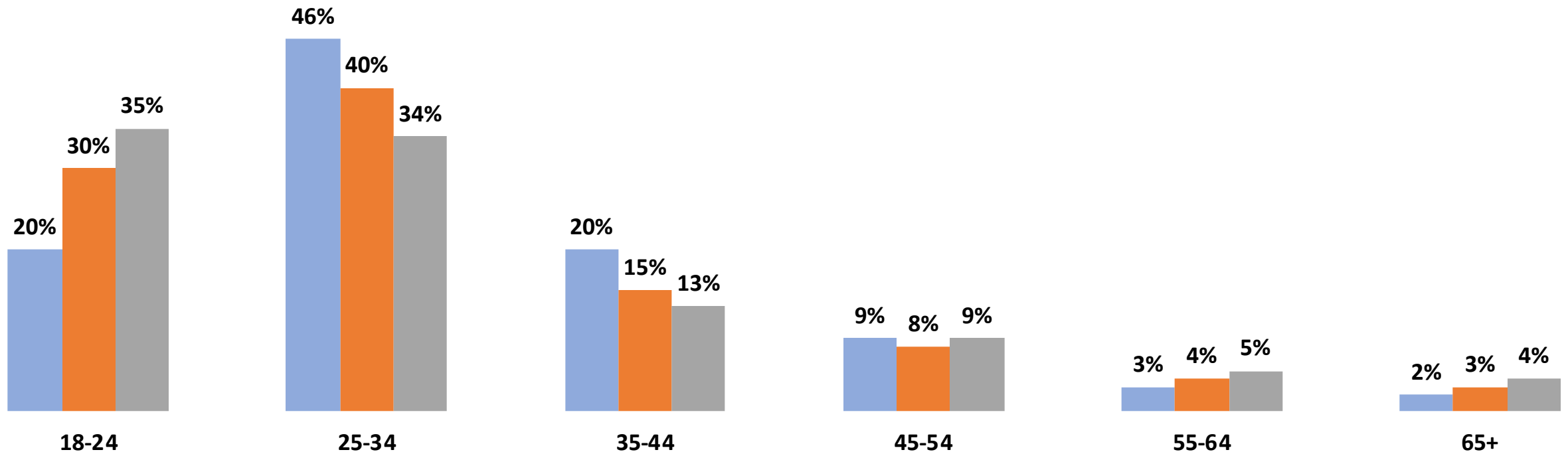




# Google Analytics - Docs.JuliaLang.Org: Growth Among 18-24 Year-Olds and 45+

Google Analytics: Docs.JuliaLang.Org

2019 2020 2021



# Respondents Live or Work in 90 Countries and Regions

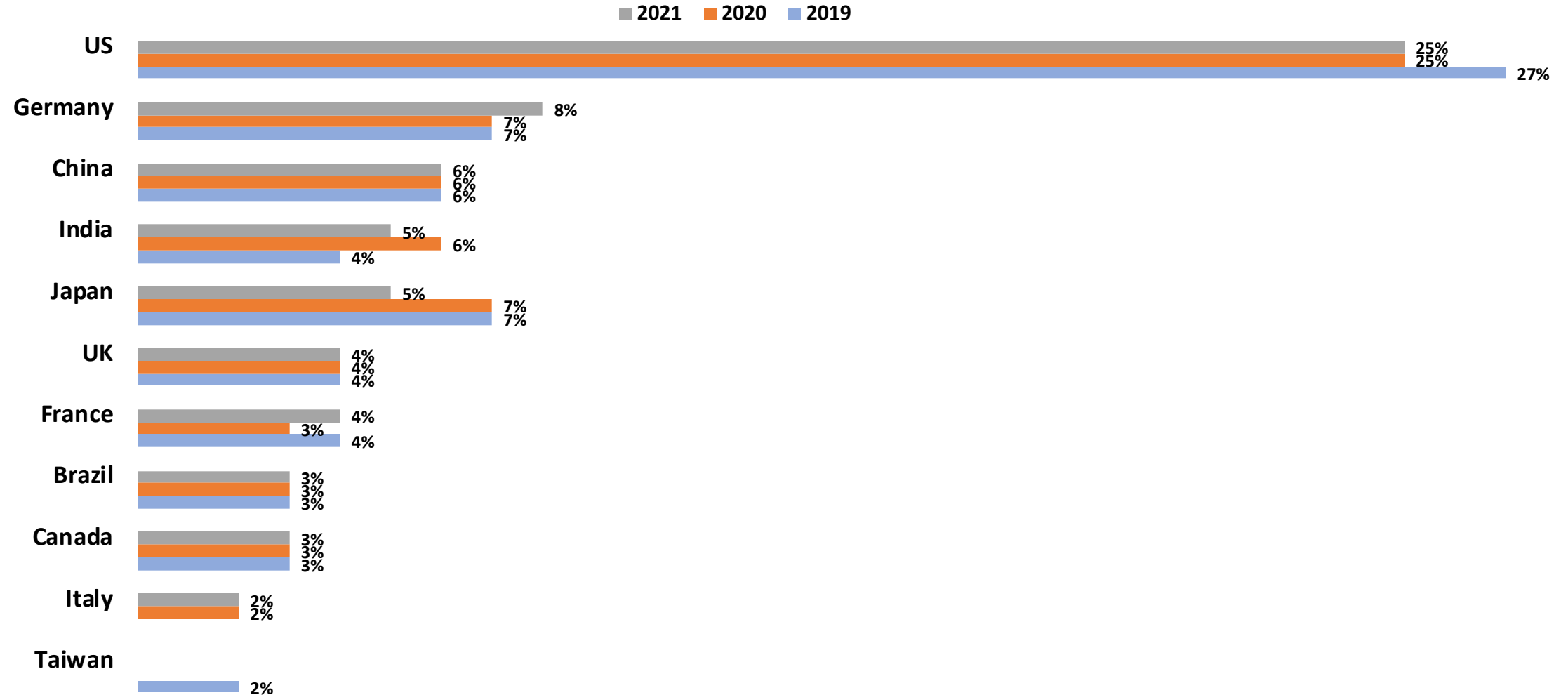
*What is the country or region where you currently live or work?*



Respondents also live or work in: Ireland, Argentina, Israel, Hungary, Finland, Turkey, Colombia, New Zealand, Portugal, Czech Republic, South Africa, Poland, Norway, Denmark, Austria, Belgium, Mexico, Spain, Russia, Taiwan, Greece, South Korea, Singapore, Philippines, Peru, Chile, Nigeria, Hong Kong, Romania, Slovenia, Ukraine, Malaysia, Pakistan, Latvia, Iran, Vietnam, Indonesia, Guatemala, Ecuador, Estonia, Uganda, Thailand, Cost Rica, Slovakia, Bolivia, Venezuela, Luxembourg, Malta, Lithuania, Honduras, Liechtenstein, Kuwait, Bulgaria, Jamaica, Belarus, Cameroon, Saint Kitts and Nevis, Brunei, Saudi Arabia, Nicaragua, Bangladesh, Tanzania, Georgia, Tunisia, Iraq, Croatia, Barbados, Iceland, Namibia, Vanuatu, Cyprus, Egypt, Zimbabwe, Jordan, Algeria, Kenya

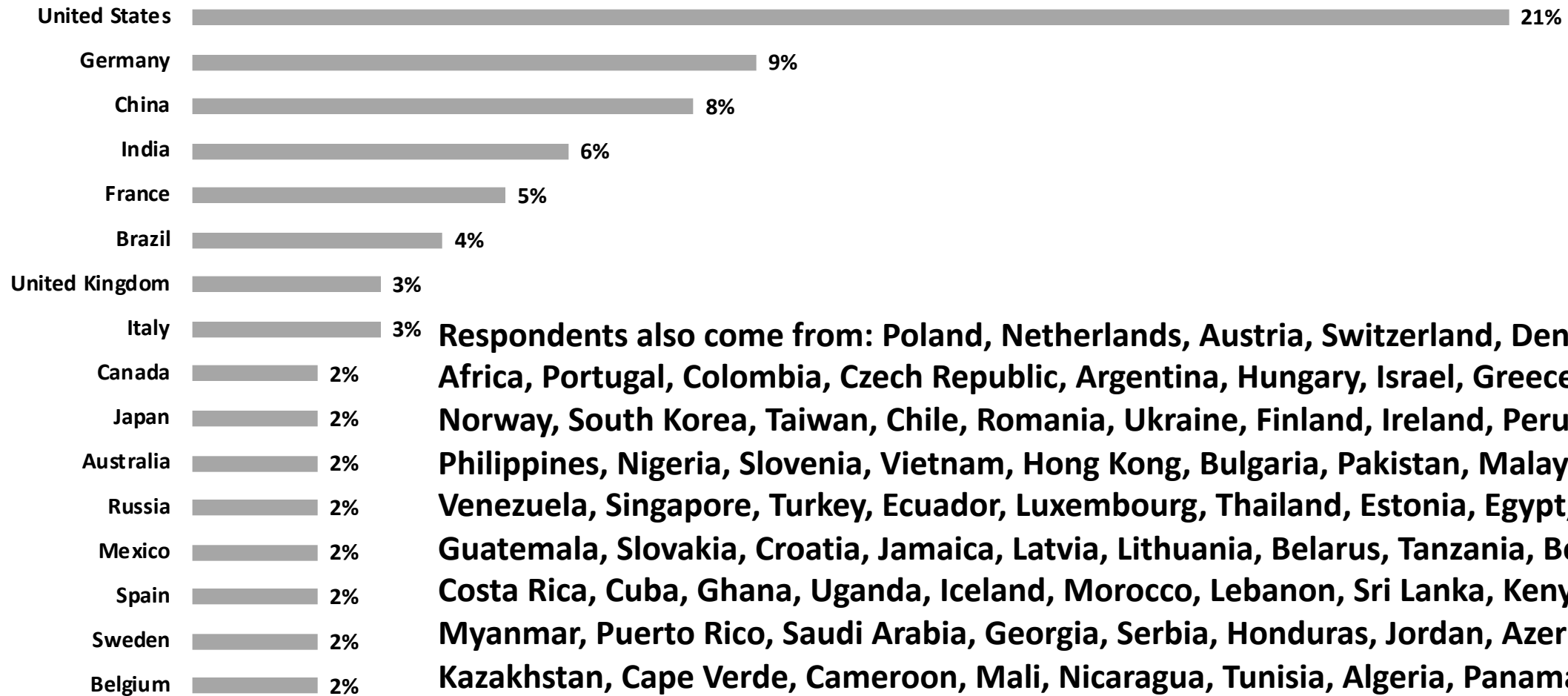
# Google Analytics – Docs.JuliaLang.Org: Website Visitors Are Also About ¼ US-Based, Followed by Germany, China, India, Japan, UK, France, Brazil and Canada

Google Analytics – Docs.JuliaLang.Org



# Respondents Come from 104 Countries and Regions

*What is the country or region where you are originally from?*



**Respondents also come from: Poland, Netherlands, Austria, Switzerland, Denmark, South Africa, Portugal, Colombia, Czech Republic, Argentina, Hungary, Israel, Greece, New Zealand, Norway, South Korea, Taiwan, Chile, Romania, Ukraine, Finland, Ireland, Peru, Iran, Philippines, Nigeria, Slovenia, Vietnam, Hong Kong, Bulgaria, Pakistan, Malaysia, Indonesia, Venezuela, Singapore, Turkey, Ecuador, Luxembourg, Thailand, Estonia, Egypt, Malta, Bolivia, Guatemala, Slovakia, Croatia, Jamaica, Latvia, Lithuania, Belarus, Tanzania, Benin, Zimbabwe, Costa Rica, Cuba, Ghana, Uganda, Iceland, Morocco, Lebanon, Sri Lanka, Kenya, Togo, Myanmar, Puerto Rico, Saudi Arabia, Georgia, Serbia, Honduras, Jordan, Azerbaijan, Kazakhstan, Cape Verde, Cameroon, Mali, Nicaragua, Tunisia, Algeria, Panama, Monaco, Iraq, Uruguay, Bangladesh, Nepal, Barbados, Rwanda, Bosnia and Herzegovina, Kuwait**

# Respondents Are Fluent in 59 Languages

*In what language(s) are you fluent?*

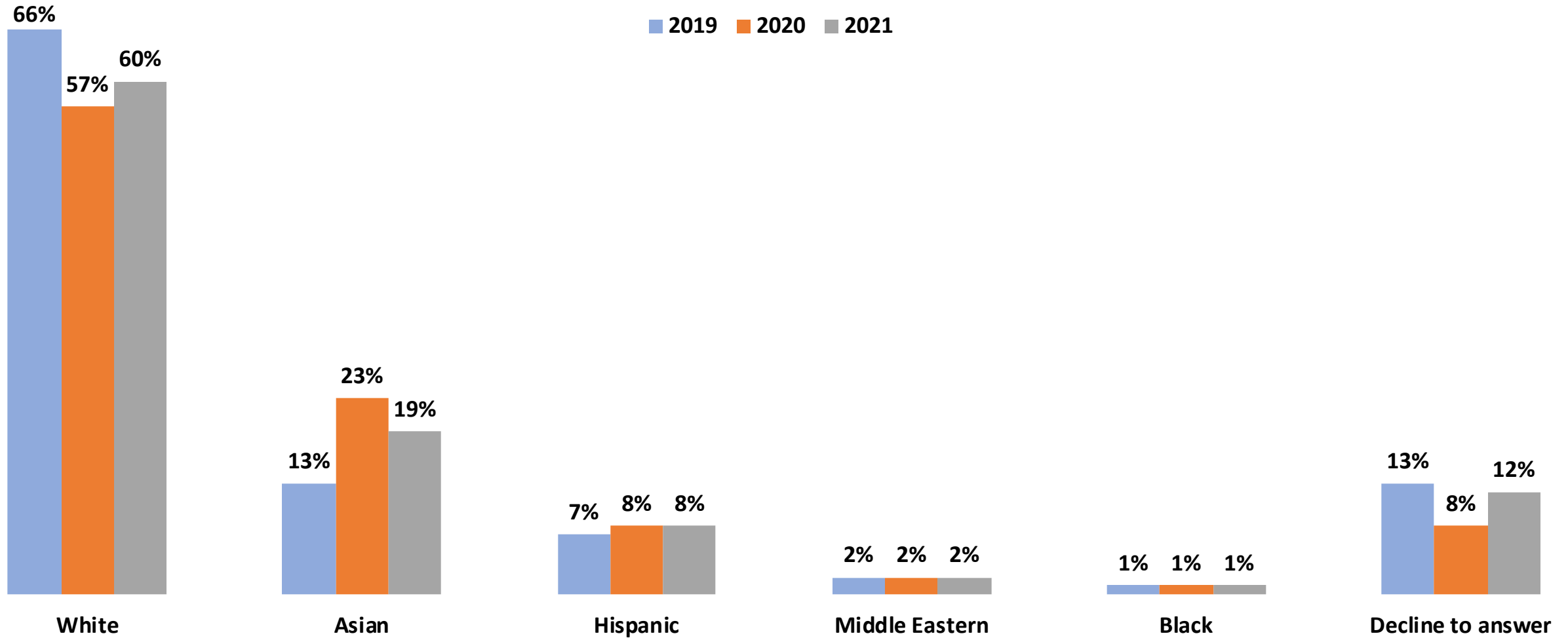


Respondents are also fluent in: Afrikaans, American Sign Language, Arabic, Bengali, Bosnian, Bulgarian, Croatian, Czech, Dutch, Estonian, Farsi, Finnish, Georgian, Greek, Gujarati, Hebrew, Hungarian, Icelandic, Indonesian, Kannada, Kazakh, Korean, Lithuania, Luxembourgish, Malay, Marathi, Malayalam, Nepali, Norwegian, Oriya, Punjabi, Romanian, Serbian, Slovakian, Slovenian, Swahili, Tagalog, Tamil, Telugu, Thai, Turkish, Ukrainian, Urdu, Vietnamese, Yoruba, Zulu

# Most Respondents Are White or Asian

*Which of the following best describes your race or ethnicity?*

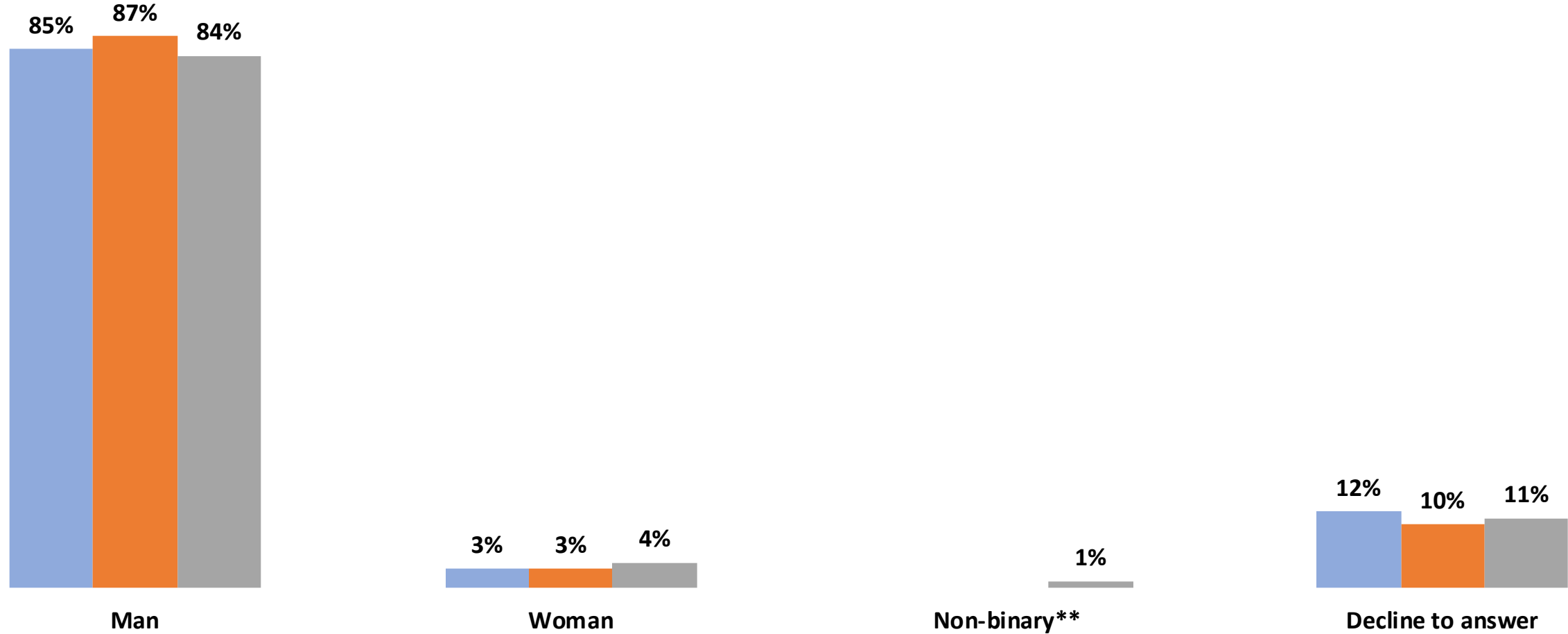
■ 2019 ■ 2020 ■ 2021



# 84% Identify as Men, 4% Identify as Women, 1% as Non-Binary and 11% Decline to Answer

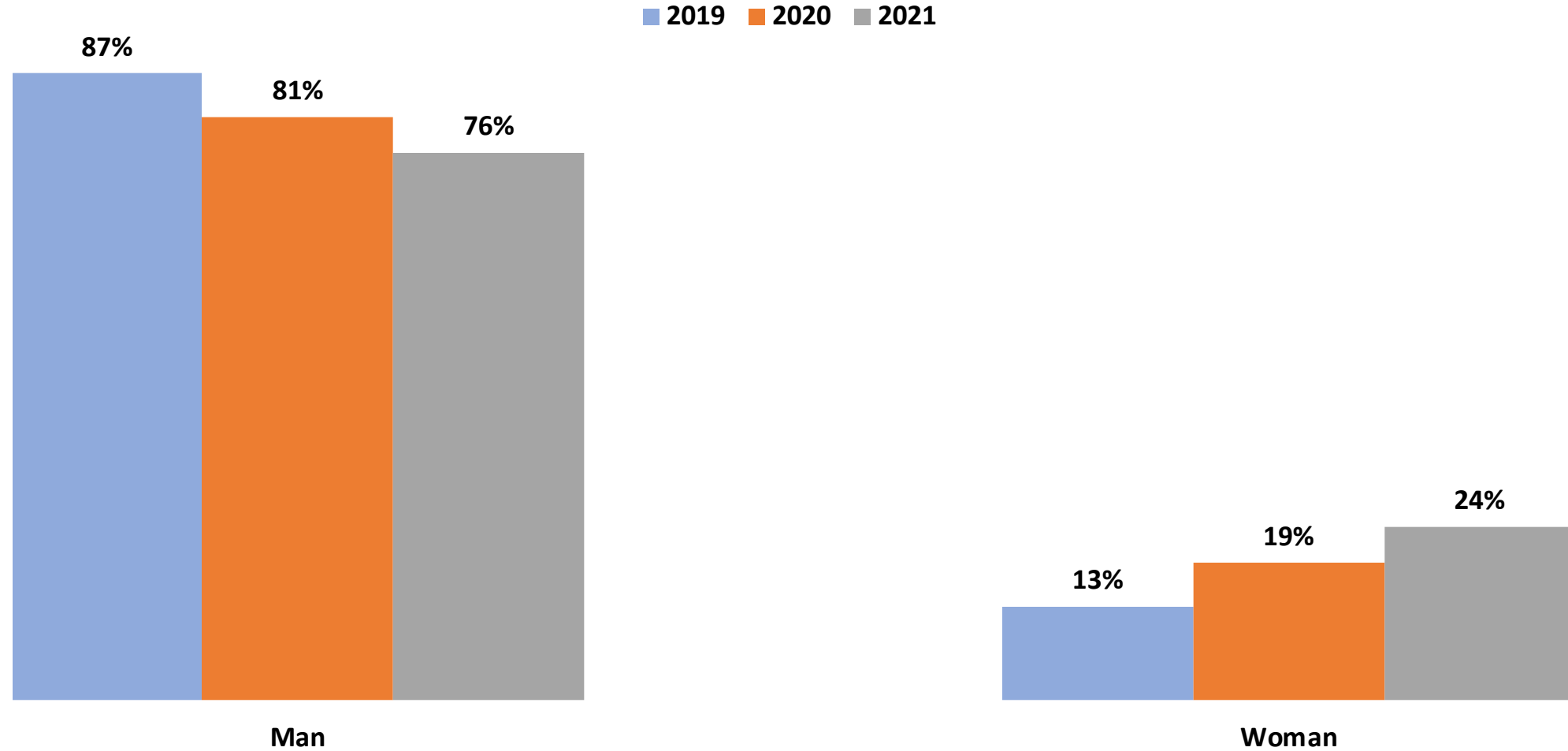
*Which of the following best describes how you identify?*

■ 2019 ■ 2020 ■ 2021



# Google Analytics - Docs.JuliaLang.Org: The Share of Website Visits That Are From Women Has Nearly Doubled in Just Two Years

Google Analytics: Docs.JuliaLang.Org

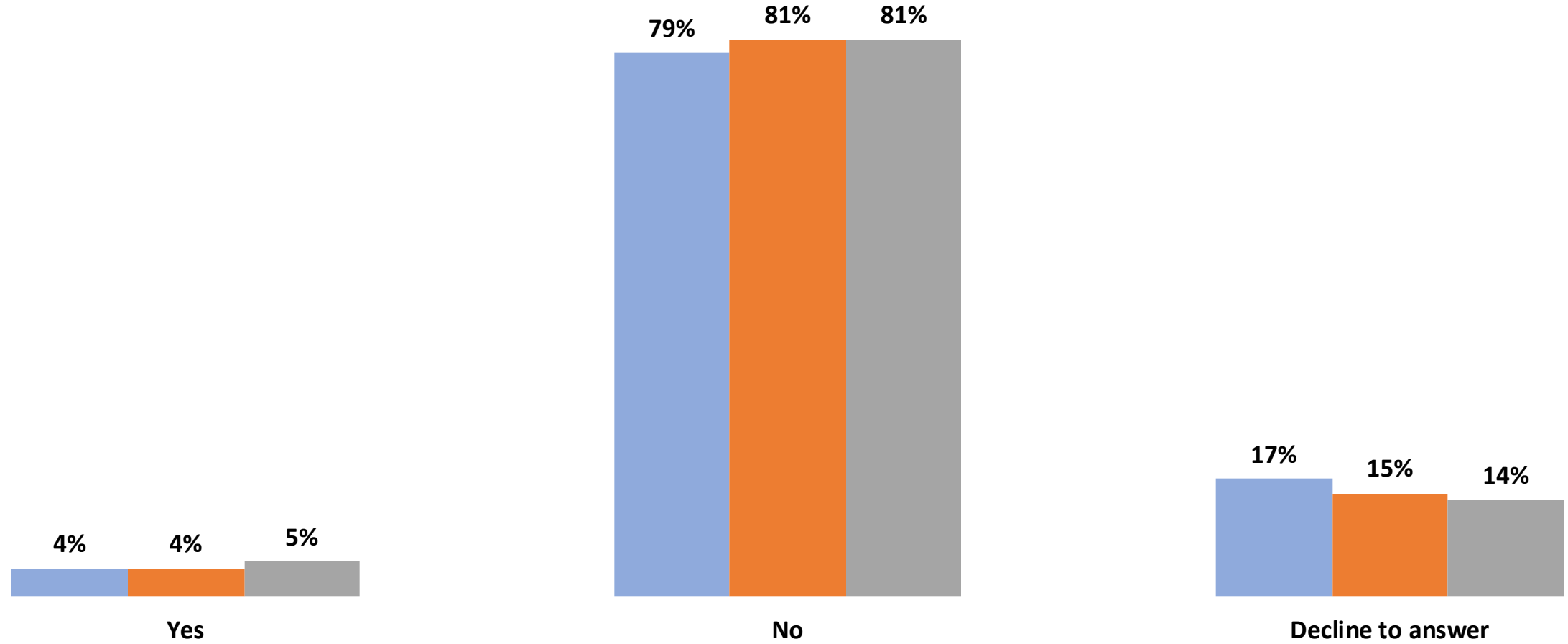




# 5% Identify as LGBTQ

Do you identify as LGBTQ?

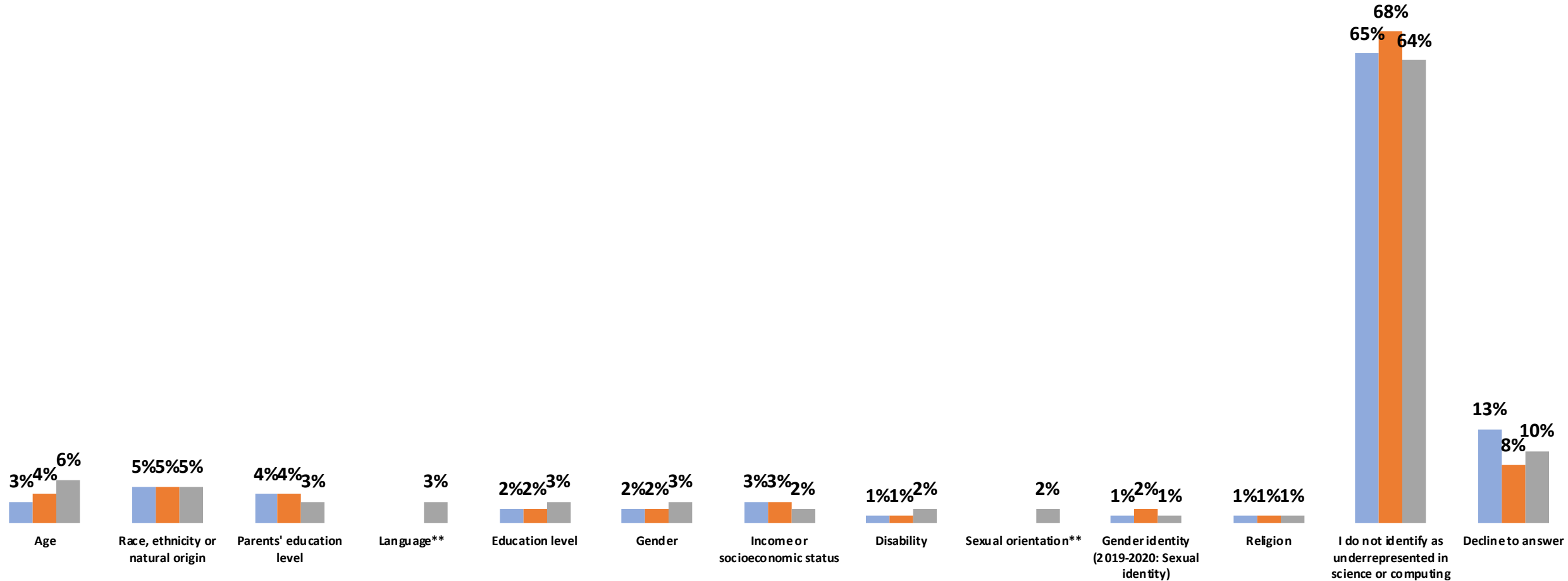
■ 2019 ■ 2020 ■ 2021



# 26% Identify as Underrepresented in Science or Computing

*Do you identify as underrepresented in science or computing because of your:*

■ 2019 ■ 2020 ■ 2021



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