Serotonin_DataAnalysis_Apr9

```
# Read in data
setwd("~/Desktop/Serotonin_Paper")
Sys.setlocale("LC_ALL", "C")
```

```
## [1] "C/C/C/C/C/en_US.UTF-8"
```

```
x <- read.csv("5-HT_Extract_Results_Apr8.csv", as.is = TRUE)

library(dplyr)
```

```
##
## Attaching package: 'dplyr'
```

```
## The following objects are masked from 'package:stats':
##
##     filter, lag
```

```
## The following objects are masked from 'package:base':
##
##     intersect, setdiff, setequal, union
```

Overall

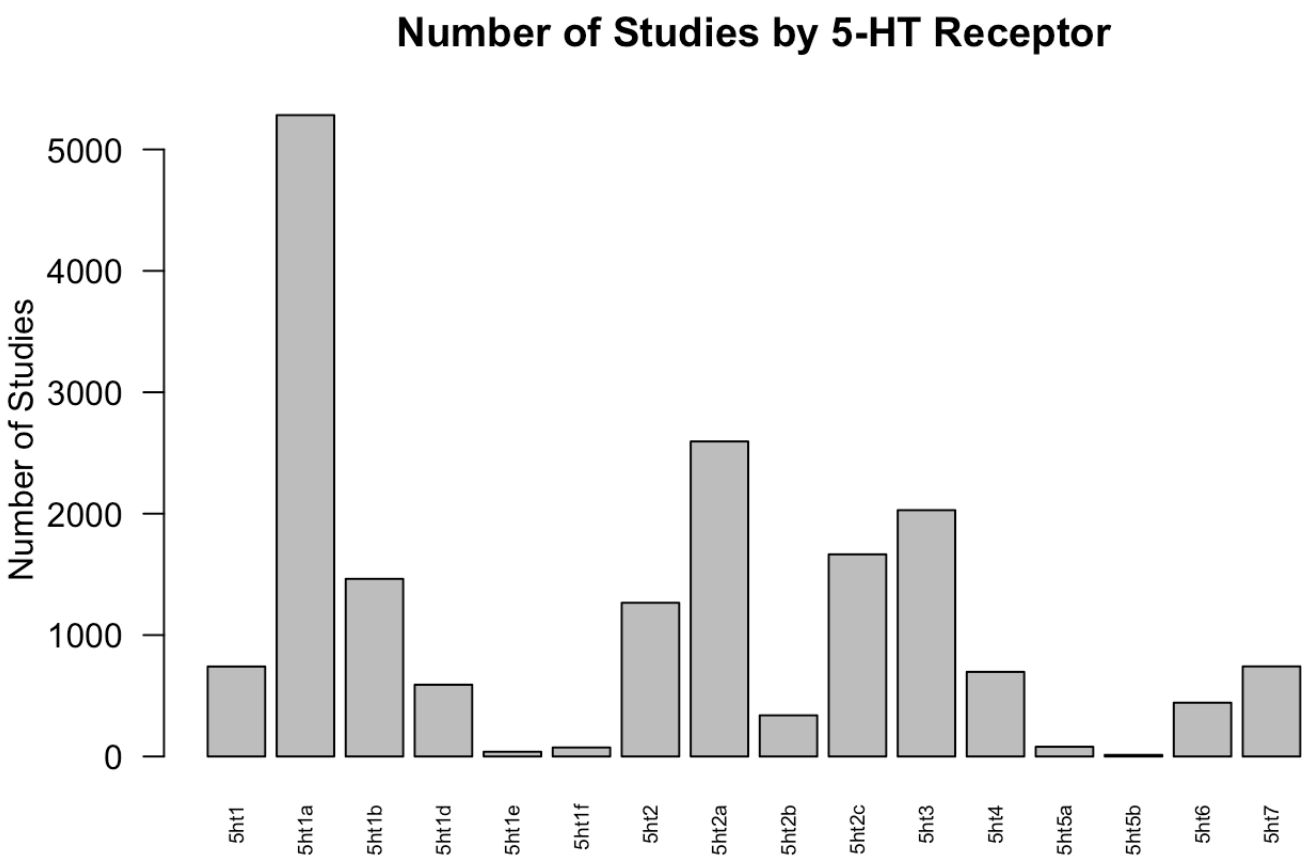
```
nrow(x)
```

```
## [1] 9631
```

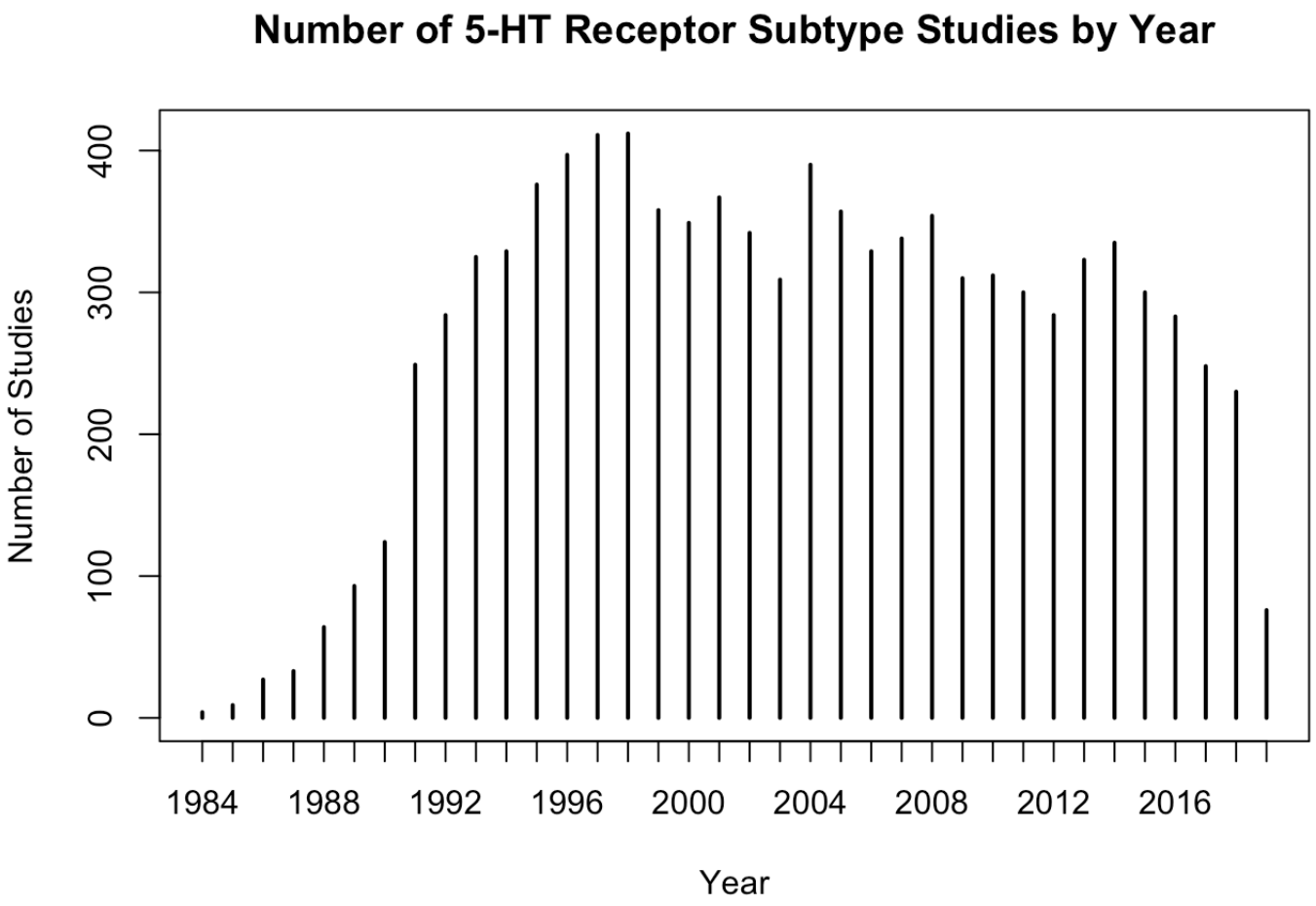
```
Receptors <- strsplit(x$Receptor, ";")

Receptors <- unlist(Receptors)

# 1c is really 2c
Receptors <- gsub("5ht1c","5ht2c", Receptors)

Receptors <- gsub("5ht3a", "5ht3", Receptors)
Receptors <- gsub("5ht3b", "5ht3", Receptors)
Receptors <- gsub("5ht3c", "5ht3", Receptors)
Receptors <- gsub("5ht3d", "5ht3", Receptors)
Receptors <- gsub("5ht3e", "5ht3", Receptors)
Receptors <- gsub("5ht3f", "5ht3", Receptors)

Receptors <- gsub("5ht4a", "5ht4", Receptors)
Receptors <- gsub("5ht4b", "5ht4", Receptors)
Receptors <- gsub("5ht4c", "5ht4", Receptors)
Receptors <- gsub("5ht4d", "5ht4", Receptors)
Receptors <- gsub("5ht4e", "5ht4", Receptors)
Receptors <- gsub("5ht4f", "5ht4", Receptors)

Receptors <- gsub("5ht6a", "5ht6", Receptors)
Receptors <- gsub("5ht6b", "5ht6", Receptors)
Receptors <- gsub("5ht6c", "5ht6", Receptors)
Receptors <- gsub("5ht6d", "5ht6", Receptors)
Receptors <- gsub("5ht6e", "5ht6", Receptors)
Receptors <- gsub("5ht6f", "5ht6", Receptors)

Receptors <- gsub("5ht7a", "5ht7", Receptors)
Receptors <- gsub("5ht7b", "5ht7", Receptors)
Receptors <- gsub("5ht7c", "5ht7", Receptors)
Receptors <- gsub("5ht7d", "5ht7", Receptors)
Receptors <- gsub("5ht7e", "5ht7", Receptors)
Receptors <- gsub("5ht7f", "5ht7", Receptors)

(receptors <- table(Receptors)[c(1:10,14,15,17,18,22,23)])
```

```
## Receptors
##  5ht1 5ht1a 5ht1b 5ht1d 5ht1e 5ht1f  5ht2 5ht2a 5ht2b 5ht2c  5ht3  5ht4
##   741  5283  1463   591    39    74  1266  2595   339  1665  2029   697
## 5ht5a 5ht5b  5ht6  5ht7
##    80    13   443   742
```

```
barplot(receptors, las = 2, cex.names=.6, main = "Number of Studies by 5-HT Receptor"
, ylab = "Number of Studies")
```



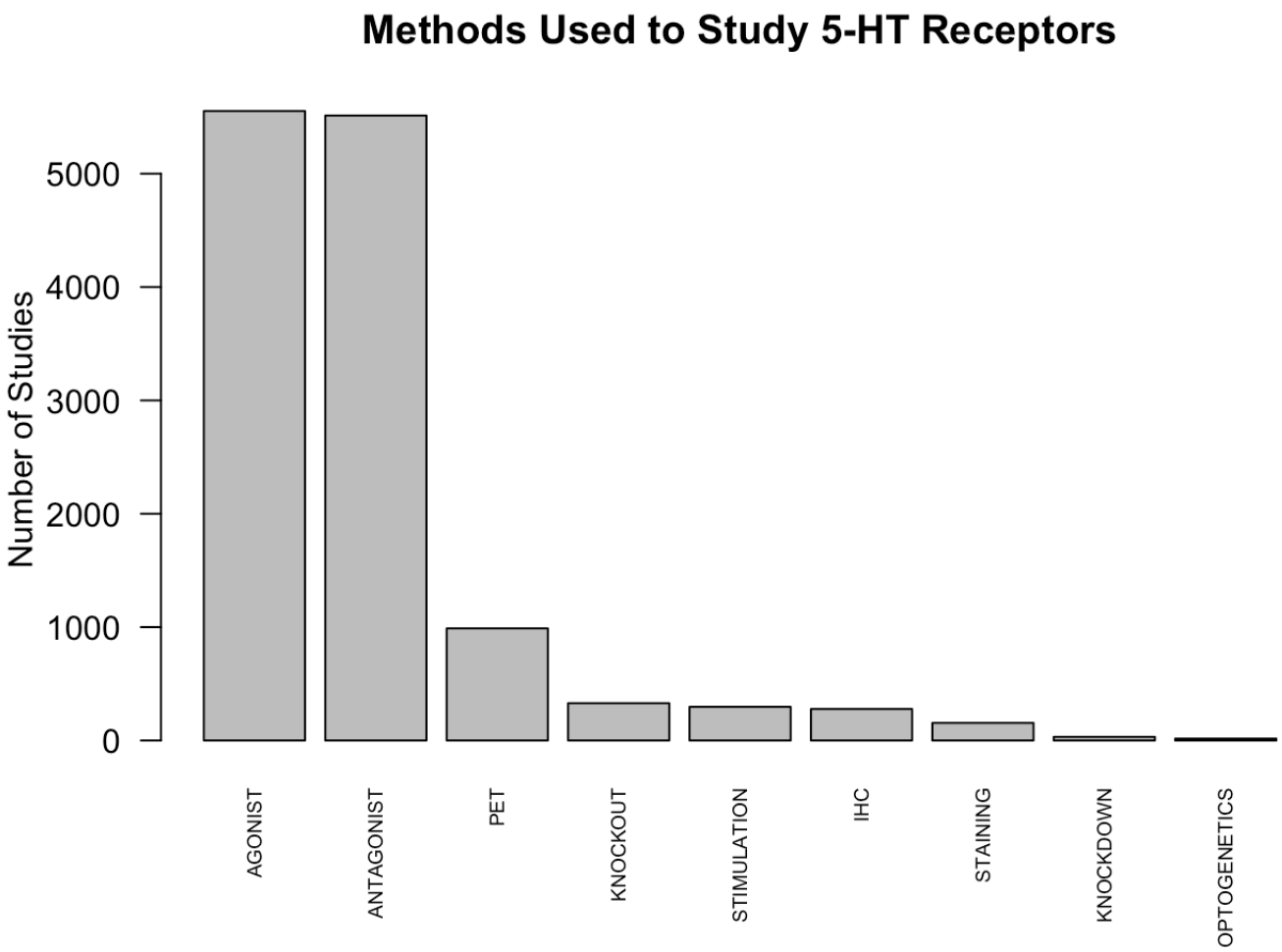

```
plot(table(x$Year), main = "Number of 5-HT Receptor Subtype Studies by Year", xlab =
"Year", ylab = "Number of Studies")
```




```
Methods <- strsplit(x$Methods, ";")

Methods <- unlist(Methods)

Methods <- gsub("Method.","", Methods)
Methods <- gsub("IMMUNOHISTOCHEMISTRY","IHC", Methods)

(methods <- sort(table(Methods), decreasing = TRUE))
```

```
## Methods
##      AGONIST   ANTAGONIST          PET     KNOCKOUT  STIMULATION
##         5553         5513          989          329          297
##          IHC     STAINING    KNOCKDOWN OPTOGENETICS
##          278          155           32           17
```

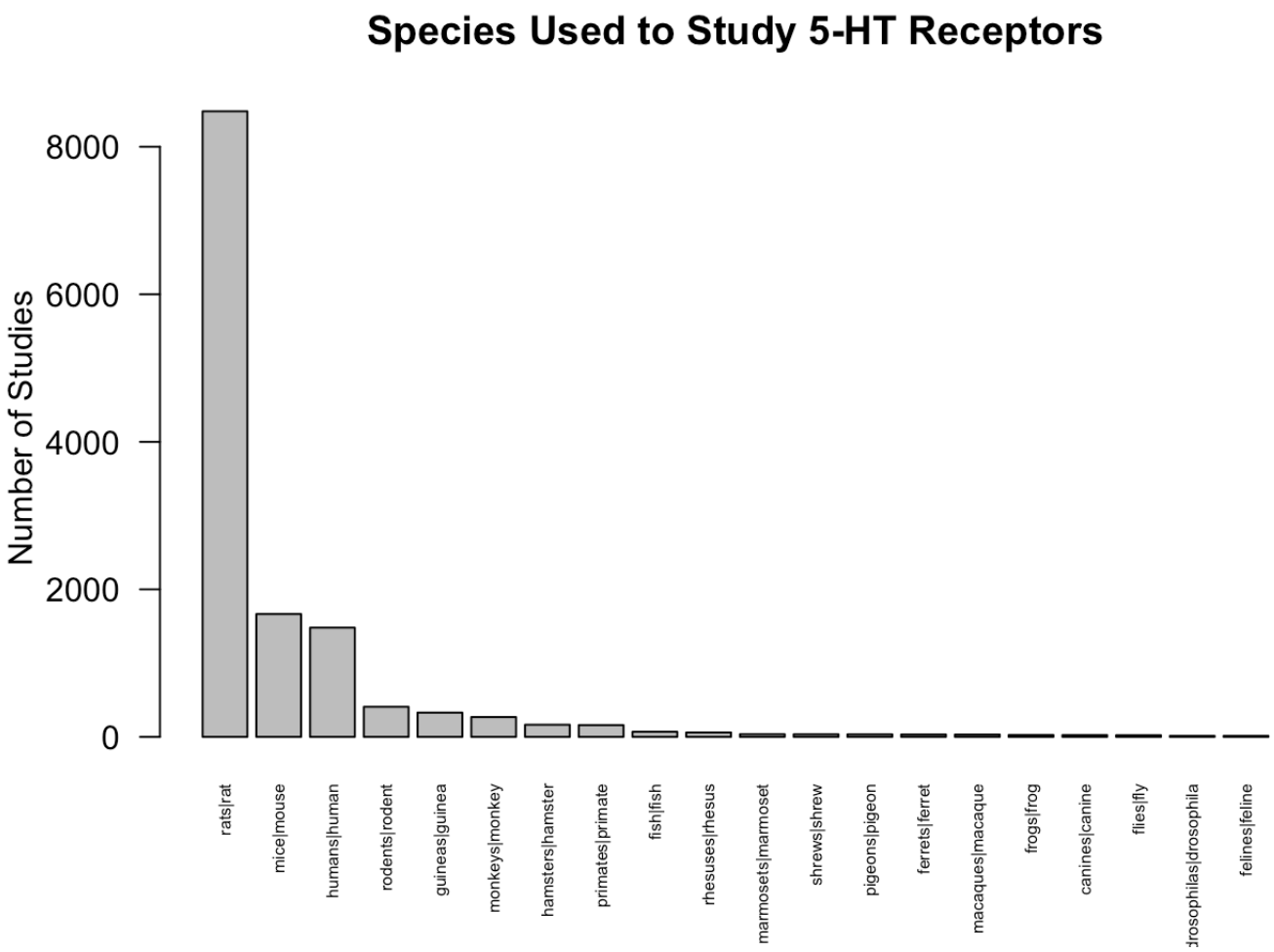
```
barplot(methods, las = 2, cex.names=.6, main = "Methods Used to Study 5-HT Receptors"
, ylab = "Number of Studies")
```




```
Species <- strsplit(x$Species, ";")

Species <- unlist(Species)

Species <- gsub(".*b","", Species)
Species <- gsub('.{2}$', '', Species)
Species <- gsub(".*\\(","", Species)
Species <- gsub('.{1}$', '', Species)

(species <- sort(table(Species), decreasing = TRUE)[c(2,21,27,53,59,64,80,84,112,118,
138,140,142,145,146,154,157,164,191,192)])
```

```
## Species
##                rats|rat               mice|mouse             humans|human
##                    8481                     1666                     1481
##          rodents|rodent          guineas|guinea          monkeys|monkey
##                     408                      329                      269
##        hamsters|hamster        primates|primate              fish|fish
##                     165                      160                       70
##         rhesuses|rhesus      marmosets|marmoset           shrews|shrew
##                      60                       37                       36
##          pigeons|pigeon          ferrets|ferret        macaques|macaque
##                      35                       33                       32
##              frogs|frog          canines|canine              flies|fly
##                      26                       25                       23
## drosophilas|drosophila          felines|feline
##                      14                       14
```

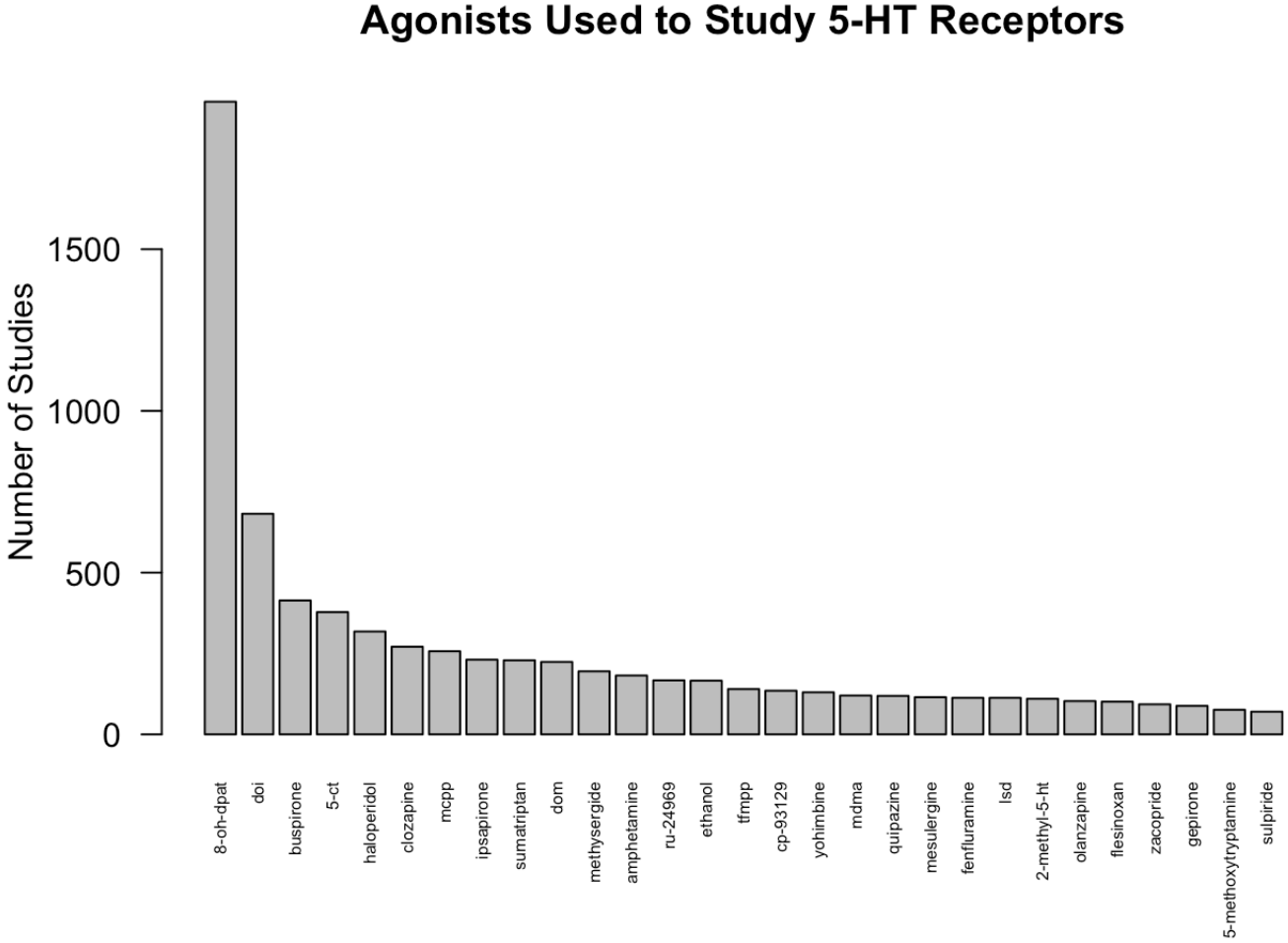
```
barplot(species, las = 2, cex.names=.5, main = "Species Used to Study 5-HT Receptors"
, ylab = "Number of Studies")
```



```
Agonists <- strsplit(x$Agonist, ";")

Agonists <- unlist(Agonists)
Agonists <- gsub(".*\\\\","", Agonists)
Agonists <- substring(Agonists, 2)
Agonists <- gsub('.{2}$', '', Agonists)
Agonists <- gsub("\\?", "-", Agonists)
Agonists <- gsub(" ", "", Agonists)

Agonists <- gsub("5-carboxamidotryptamine", "5-ct", Agonists)

(agonists <- sort(table(Agonists), decreasing = TRUE)[c(1, 3:30)])
```

```
## Agonists
##           8-oh-dpat                 doi           buspirone
##                1956                 682                 414
##                5-ct         haloperidol           clozapine
##                 378                 318                 271
##                mcpp          ipsapirone         sumatriptan
##                 257                 231                 229
##                 dom        methysergide         amphetamine
##                 224                 195                 182
##            ru-24969             ethanol               tfmpp
##                 167                 166                 140
##            cp-93129           yohimbine                mdma
##                 135                 130                 120
##           quipazine         mesulergine        fenfluramine
##                 119                 115                 113
##                 lsd       2-methyl-5-ht          olanzapine
##                 113                 110                 103
##          flesinoxan           zacopride            gepirone
##                 101                  93                  88
## 5-methoxytryptamine           sulpiride
##                  76                  70
```

```
barplot(agonists, las = 2, cex.names=.5, main = "Agonists Used to Study 5-HT Receptor
s", ylab = "Number of Studies")
```




```
Antagonists <- strsplit(x$Antagonist, ";")

Antagonists <- unlist(Antagonists)

Antagonists <- gsub(".*\\\\","", Antagonists)
Antagonists <- substring(Antagonists, 2)
Antagonists <- gsub('.{2}$', '', Antagonists)
Antagonists <- gsub("\\?", "-", Antagonists)
Antagonists <- gsub(" ", "", Antagonists)

#a <- read.csv("Antagonists_List.csv", as.is = TRUE)
#sort(table(a$Antagonist))

(antagonists <- sort(table(Antagonists), decreasing = TRUE))
```

```
## Antagonists
##          ketanserin          way-100635          ritanserin
##                1440                1091                 714
##           clozapine          fluoxetine         ondansetron
```

```
##                 542                 527                 375
##           pindolol         metergoline         haloperidol
##                 324                 320                 318
##         risperidone            nan-190           spiperone
##                 302                 236                 233
##        methiothepin          olanzapine        methysergide
##                 223                 206                 195
##           gr-127935                  m1           sb-242084
##                 189                 188                 183
##          mdl-100907         propranolol           sb-269970
##                 170                 166                 148
##          mianserin               tfmpp          way-100135
##                 141                 140                 138
##         imipramine          yohimbine         tropisetron
##                 130                 130                 129
##        granisetron         mesulergine           zacopride
##                 117                 115                  93
##      cyproheptadine           sb-224289           sb-206553
##                  90                  75                  72
##         quetiapine         aripiprazole            bmy-7378
##                  70                  58                  58
##       cyanopindolol         agomelatine      metoclopramide
##                  57                  51                  51
##          rs-102221                mppf            ly-53857
##                  49                  46                  45
##          gr-113808         spiroxatrine         ziprasidone
##                  44                  42                  40
##      chlorpromazine       amitriptyline         mirtazapine
##                  39                  38                  38
##          alprenolol        clomipramine         eltoprazine
##                  37                  37                  34
##          renzapride           sb-271046          sertindole
##                  34                  34                  34
##          gr-125487           sb-399885          isamoltane
##                  31                  30                  28
##          sb-258585           trazodone           sb-216641
##                  28                  28                  27
##             nad-299          cinanserin           brl-15572
##                  25                  22                  21
##              mefway           sb-243213        vortioxetine
##                  20                  20                  20
##          nefazodone           alosetron            lisuride
##                  19                  18                  18
##          sb-200646           sb-204070          lurasidone
##                  18                  18                  17
##           rs-39604           pindobind           ro04-6790
##                  17                  16                  15
```

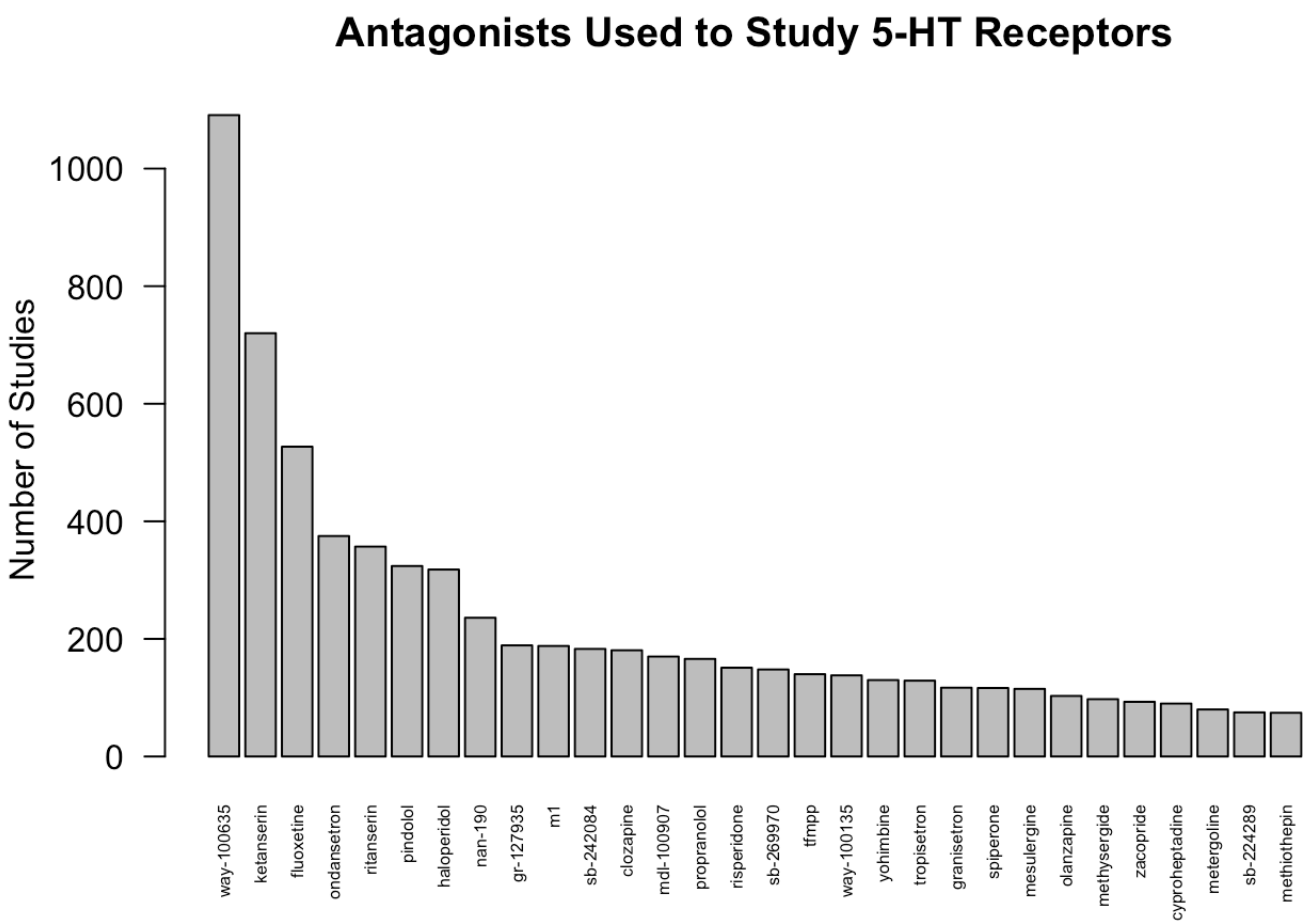
```
##           rs-127445          sdz-216525        fluphenazine
##                  15                  15                  14
##            gr-46611          ergotamine         maprotiline
##                  14                  13                  13
##           memantine        pimavanserin        thioridazine
##                  13                  13                  13
##            tramadol       bromocriptine           sb-258719
##                  13                  12                  12
##            pimozide          sdzser-082           tegaserod
##                  11                  11                  11
##          ar-a000002        idalopirdine         amisulpride
##                  10                  10                   9
##         cariprazine              quinine           sb-204741
##                   9                   9                   9
##           sb-699551          asenapine           luae58054
##                   9                   8                   8
##       norfluoxetine          pizotifen        deramciclane
##                   8                   8                   7
##           mosapride       nortriptyline           sb-215505
##                   7                   7                   7
##         sb-656104-a           sb-742457              uh-301
##                   7                   7                   7
##          xylamidine            zotepine             doxepin
##                   7                   7                   6
##   iodocyanopindolol            loxapine          ro-4368554
##                   6                   6                   6
##          robalzotan           amoxapine        promethazine
##                   6                   5                   5
##           sb-357134        volinanserin             acp-103
##                   5                   5                   4
##        eplivanserin           ici169369        sarpogrelate
##                   4                   4                   4
##           sb-221284           lecozotan           ly-310762
##                   4                   3                   3
##           piboserod           sb-649915     trifluoperazine
##                   3                   3                   3
##            ac-90179            asp-5736         chloroquine
##                   2                   2                   2
##           fr-260010           ly-215840           ly-367265
##                   2                   2                   2
##              ms-245        paliperidone           sb-203186
##                   2                   2                   2
##           sb-236057             apd-125          as-2030680
##                   2                   1                   1
##          as-2674723        cerlapirdine         etoperidone
##                   1                   1                   1
##              fg5983        fluperlapine         hydroxyzine
```

```
##                   1                   1                   1
##         intepirdine         lamotrigine           ly-272015
##                   1                   1                   1
##           ly-367642           ly-456219           ly-456220
##                   1                   1                   1
## o-desmethyltramadol          oxprenolol          rosarugosa
##                   1                   1                   1
##             rvt-101             s-32212           sb-258741
##                   1                   1                   1
```

```
antagonists["metergoline"] <- antagonists["metergoline"]/4
antagonists["methiothepin"] <- antagonists["methiothepin"]/3
antagonists["clozapine"] <- antagonists["clozapine"]/3
antagonists["ziprasidone"] <- antagonists["ziprasidone"]/2
antagonists["vortioxetine"] <- antagonists["vortioxetine"]/2
antagonists["spiperone"] <- antagonists["spiperone"]/2
antagonists["sdzser-082"] <- antagonists["sdzser-082"]/2
antagonists["sb-242,084"] <- antagonists["sb-242,084"]/2
antagonists["sb-288,357"] <- antagonists["sb-288,357"]/2
antagonists["sb-206,553"] <- antagonists["sb-206,553"]/2
antagonists["sb-200,646"] <- antagonists["sb-200,646"]/2
antagonists["ritanserin"] <- antagonists["ritanserin"]/2
antagonists["risperidone"] <- antagonists["risperidone"]/2
antagonists["olanzapine"] <- antagonists["olanzapine"]/2
antagonists["mirtazapine"] <- antagonists["mirtazapine"]/2
antagonists["mianserin"] <- antagonists["mianserin"]/2
antagonists["methysergide"] <- antagonists["methysergide"]/2
antagonists["loxapine"] <- antagonists["loxapine"]/2
antagonists["latmepirdine"] <- antagonists["latmepirdine"]/2
antagonists["ketanserin"] <- antagonists["ketanserin"]/2
antagonists["isamoltane"] <- antagonists["isamoltane"]/2
antagonists["imipramine"] <- antagonists["imipramine"]/2
antagonists["fluphenazine"] <- antagonists["fluphenazine"]/2
antagonists["egis-12233"] <- antagonists["egis-12233"]/2
antagonists["chlorpromazine"] <- antagonists["chlorpromazine"]/2
antagonists["aripiprazole"] <- antagonists["aripiprazole"]/2
antagonists["amoxapine "] <- antagonists["amoxapine "]/2
antagonists["amisulpride "] <- antagonists["amisulpride "]/2
antagonists["ziprasidone"] <- antagonists["ziprasidone"]/2

(antagonists <- sort(antagonists, decreasing = TRUE)[1:30])
```

```
##     way-100635     ketanserin     fluoxetine    ondansetron     ritanserin
##     1091.00000      720.00000      527.00000      375.00000      357.00000
##       pindolol    haloperidol        nan-190      gr-127935             m1
##      324.00000      318.00000      236.00000      189.00000      188.00000
##      sb-242084      clozapine     mdl-100907    propranolol    risperidone
##      183.00000      180.66667      170.00000      166.00000      151.00000
##      sb-269970          tfmpp     way-100135      yohimbine    tropisetron
##      148.00000      140.00000      138.00000      130.00000      129.00000
##    granisetron      spiperone    mesulergine     olanzapine   methysergide
##      117.00000      116.50000      115.00000      103.00000       97.50000
##      zacopride cyproheptadine    metergoline      sb-224289   methiothepin
##       93.00000       90.00000       80.00000       75.00000       74.33333
```

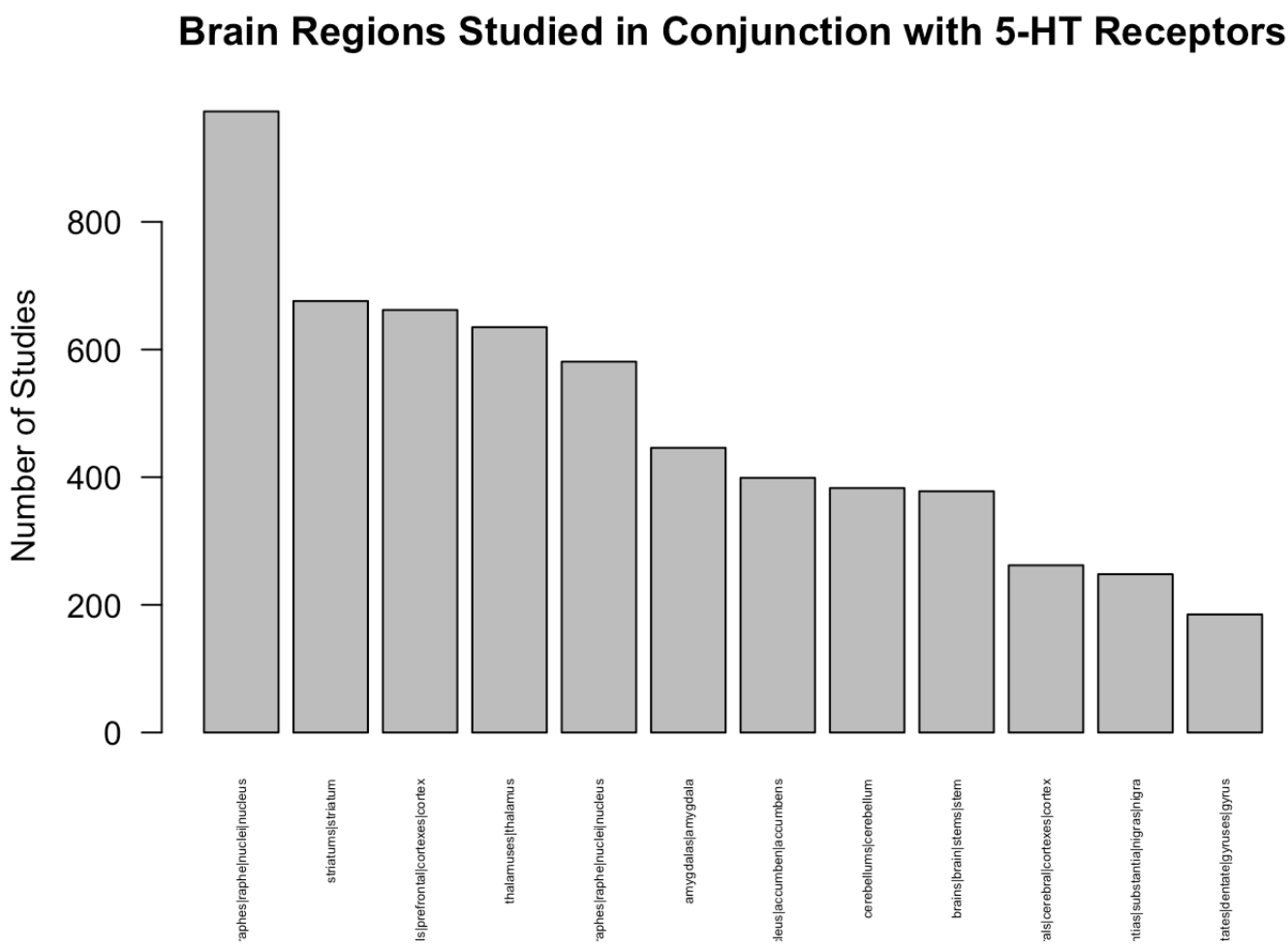
```
antagonists <- as.matrix(antagonists)

barplot(antagonists[,1], las = 2, cex.names=.5, main = "Antagonists Used to Study 5-H
T Receptors", ylab = "Number of Studies")
```



```
Regions <- strsplit(x$Brain_Regions, ";")

Regions <- unlist(Regions)

Regions <- gsub(".*i\\)\\(","", Regions)
Regions <- gsub("\\)\\(-","", Regions)
Regions <- gsub('.{3}$', '', Regions)
Regions <- gsub("\\\\","", Regions)
Regions <- gsub("\\+","", Regions)
Regions <- gsub("s\\)","", Regions)
Regions <- gsub("?\\(","", Regions)
Regions <- gsub("\\?","", Regions)



(regions <- sort(table(Regions), decreasing = TRUE)[c(2,3,5:14)])
```

```
## Regions
##                raphes|raphe|nuclei|nucleus
##                                         973
##                         striatums|striatum
##                                         676
##     prefrontals|prefrontal|cortexes|cortex
##                                         662
##                        thalamuses|thalamus
##                                         635
## dorsals|dorsal|raphes|raphe|nuclei|nucleus
##                                         581
##                          amygdalas|amygdala
##                                         446
##          nuclei|nucleus|accumben|accumbens
##                                         399
##                      cerebellums|cerebellum
##                                         383
##                    brains|brain|stems|stem
##                                         378
##         cerebrals|cerebral|cortexes|cortex
##                                         262
##        substantias|substantia|nigras|nigra
##                                         248
##             dentates|dentate|gyruses|gyrus
##                                         185
```

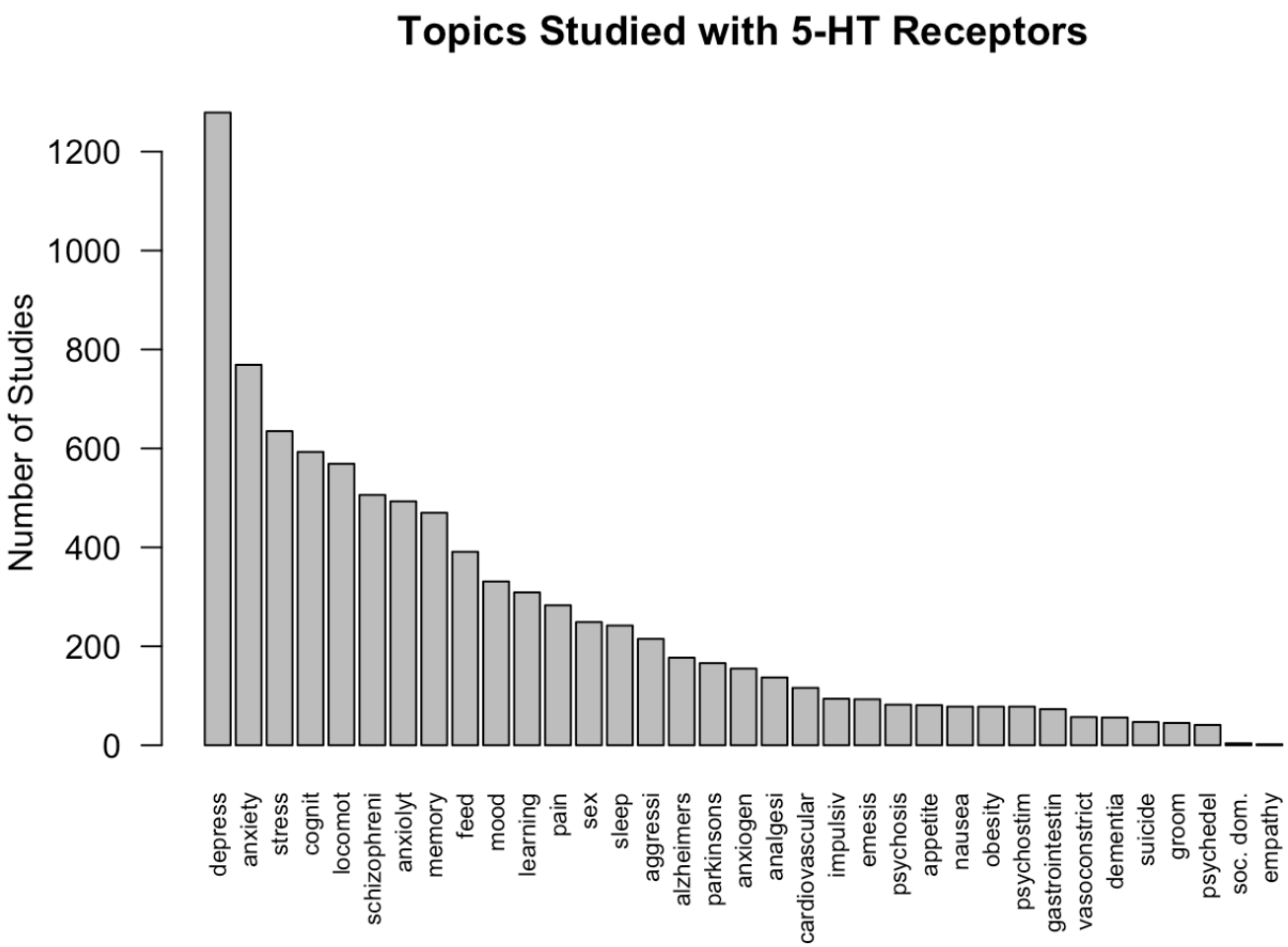
```
barplot(regions, las = 2, cex.names=.4, main = "Brain Regions Studied in Conjunction
with 5-HT Receptors", ylab = "Number of Studies")
```




```
Topics <- strsplit(x$Topic_Spec, ";")

Topics <- unlist(Topics)

Topics <- gsub(".*\\\\","", Topics)
Topics <- substring(Topics, 2)
Topics <- gsub('.{2}$', '', Topics)
Topics <- gsub("social dominance", "soc. dom.", Topics)

(topics <- sort(table(Topics), decreasing = TRUE))
```

```
## Topics
##        depress        anxiety         stress         cognit        locomot
##           1279            769            635            593            569
##   schizophreni       anxiolyt         memory           feed           mood
##            506            493            470            391            331
##       learning           pain            sex          sleep       aggressi
##            309            283            249            242            215
##     alzheimers     parkinsons       anxiogen       analgesi cardiovascular
##            177            166            155            137            116
##       impulsiv        emesis      psychosis       appetite         nausea
##             94             93             82             81             78
##        obesity     psychostim gastrointestin  vasoconstrict       dementia
##             78             78             73             57             56
##        suicide          groom      psychedel      soc. dom.        empathy
##             47             45             41              4              2
```

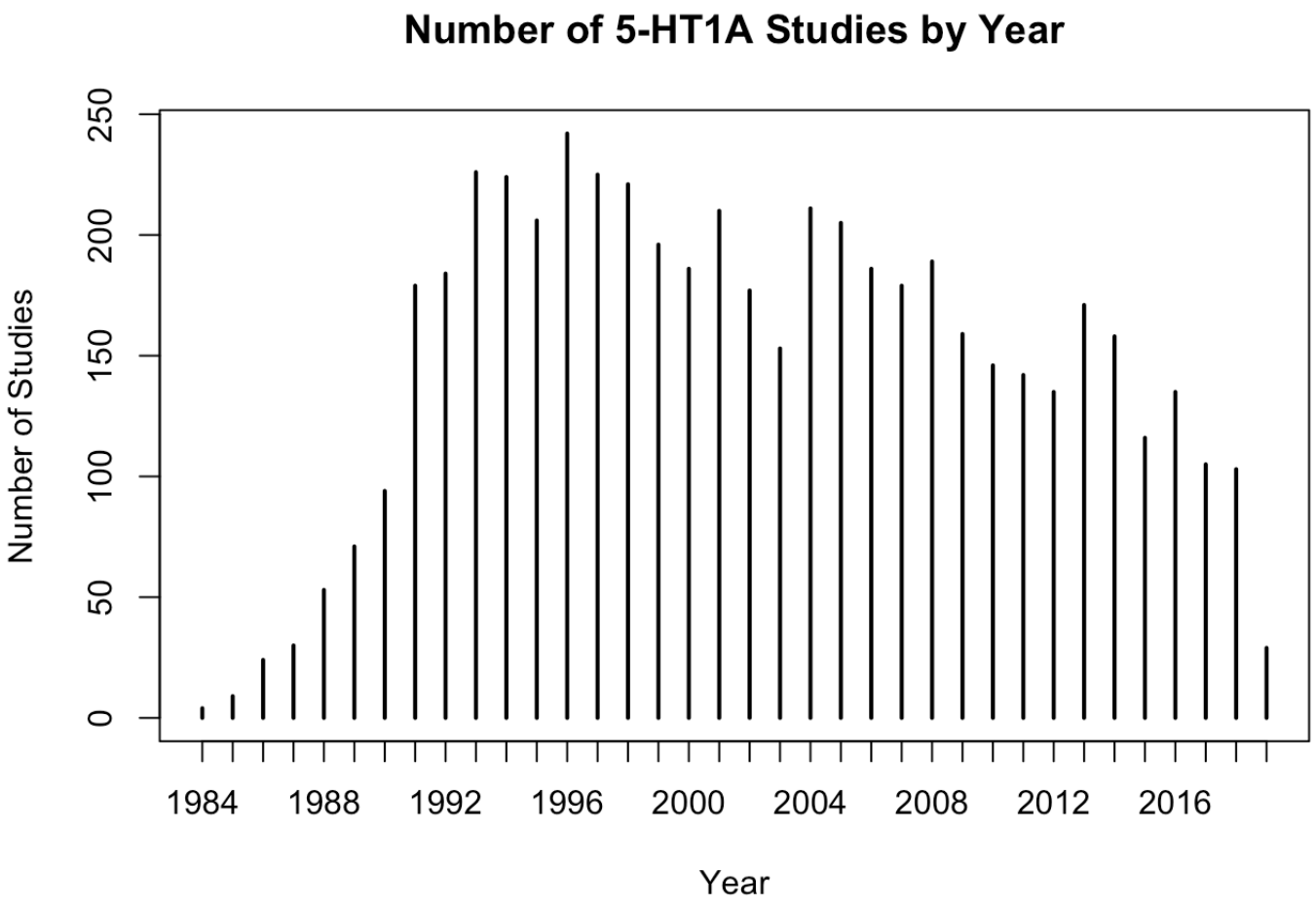
```
barplot(topics, las = 2, cex.names=.7, main = "Topics Studied with 5-HT Receptors", y
lab = "Number of Studies")
```



5-HT1A

```
x1a <- subset(x, grepl("5ht1a", x$Receptor))
```

```
plot(table(x1a$Year), main = "Number of 5-HT1A Studies by Year", xlab = "Year", ylab
= "Number of Studies")
```



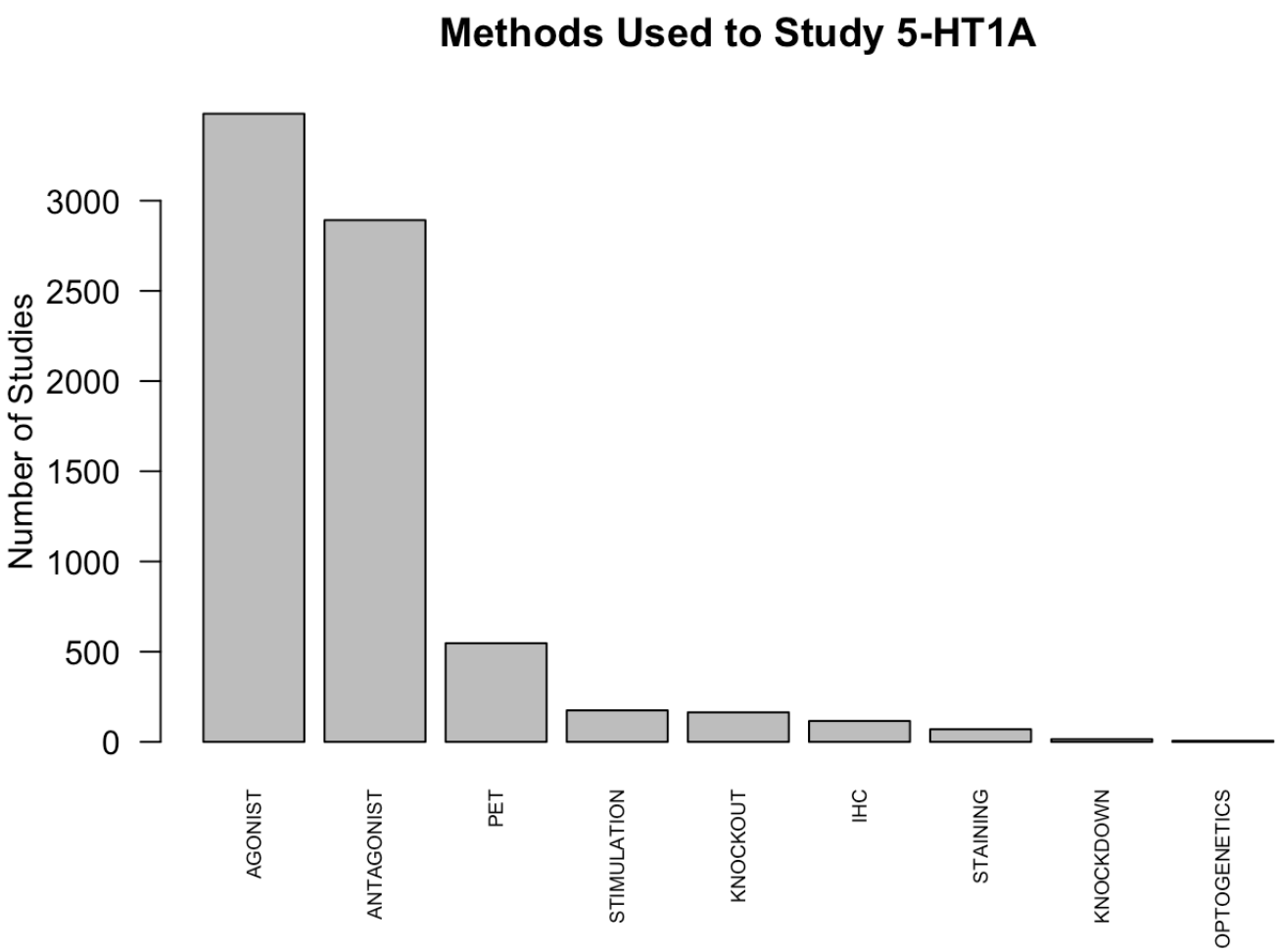

```
sort(table(x1a$Year), decreasing = TRUE)
```

```
##
## 1996 1993 1997 1994 1998 2004 2001 1995 2005 1999 2008 2000 2006 1992 1991
##  242  226  225  224  221  211  210  206  205  196  189  186  186  184  179
## 2007 2002 2013 2009 2014 2003 2010 2011 2012 2016 2015 2017 2018 1990 1989
##  179  177  171  159  158  153  146  142  135  135  116  105  103   94   71
## 1988 1987 2019 1986 1985 1984
##   53   30   29   24    9    4
```

```
Methods1a <- strsplit(x1a$Methods, ";")

Methods1a <- unlist(Methods1a)

Methods1a <- gsub("Method.","", Methods1a)
Methods1a <- gsub("IMMUNOHISTOCHEMISTRY","IHC", Methods1a)

(methods1a <- sort(table(Methods1a), decreasing = TRUE))
```

```
## Methods1a
##       AGONIST    ANTAGONIST           PET   STIMULATION      KNOCKOUT
##          3482          2892           547           175           164
##           IHC      STAINING     KNOCKDOWN OPTOGENETICS
##           116            70            15             6
```

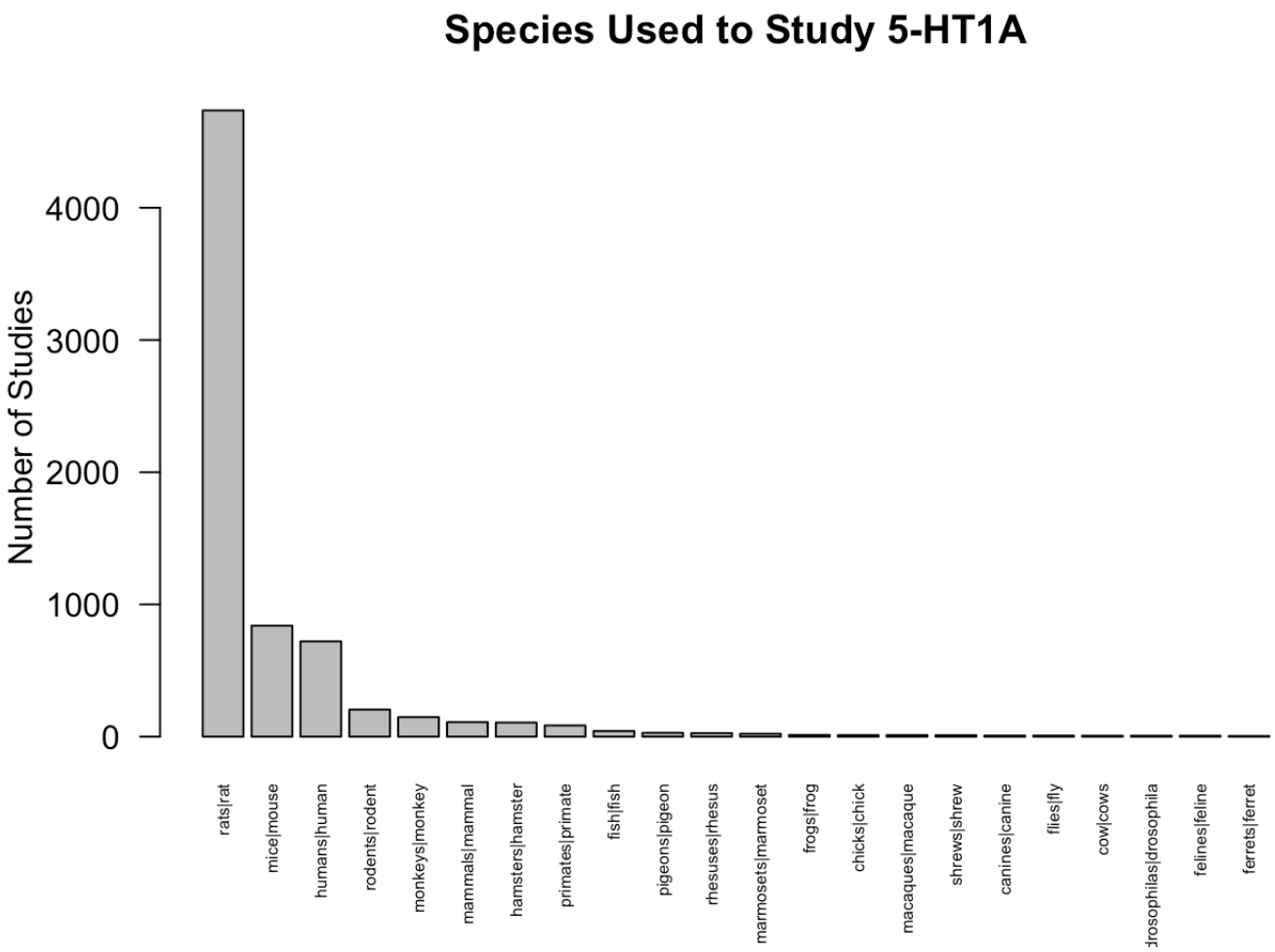
```
barplot(methods1a, las = 2, cex.names=.6, main = "Methods Used to Study 5-HT1A", ylab
= "Number of Studies")
```



```
Species1a <- strsplit(x1a$Species, ";")

Species1a <- unlist(Species1a)

Species1a <- gsub(".*b","", Species1a)
Species1a <- gsub('.{2}$', '', Species1a)
Species1a <- gsub(".*\\(","", Species1a)
Species1a <- gsub('.{1}$', '', Species1a)

#sort(table(Species1a), decreasing = TRUE)

(species1a <- sort(table(Species1a), decreasing = TRUE)[c(1, 24, 31, 54, 62, 71, 73,
83, 108, 120, 124, 133, 154, 163, 166, 168, 181, 185, 190, 191, 192, 207)])
```

```
## Species1a
##               rats|rat             mice|mouse           humans|human
##                   4736                    840                    721
##         rodents|rodent         monkeys|monkey         mammals|mammal
##                    205                    148                    110
##       hamsters|hamster       primates|primate              fish|fish
##                    107                     85                     43
##         pigeons|pigeon        rhesuses|rhesus     marmosets|marmoset
##                     29                     27                     22
##             frogs|frog          chicks|chick       macaques|macaque
##                     13                     12                     12
##           shrews|shrew         canines|canine              flies|fly
##                     11                      8                      8
##               cow|cows drosophilas|drosophila         felines|feline
##                      7                      7                      7
##         ferrets|ferret
##                      5
```

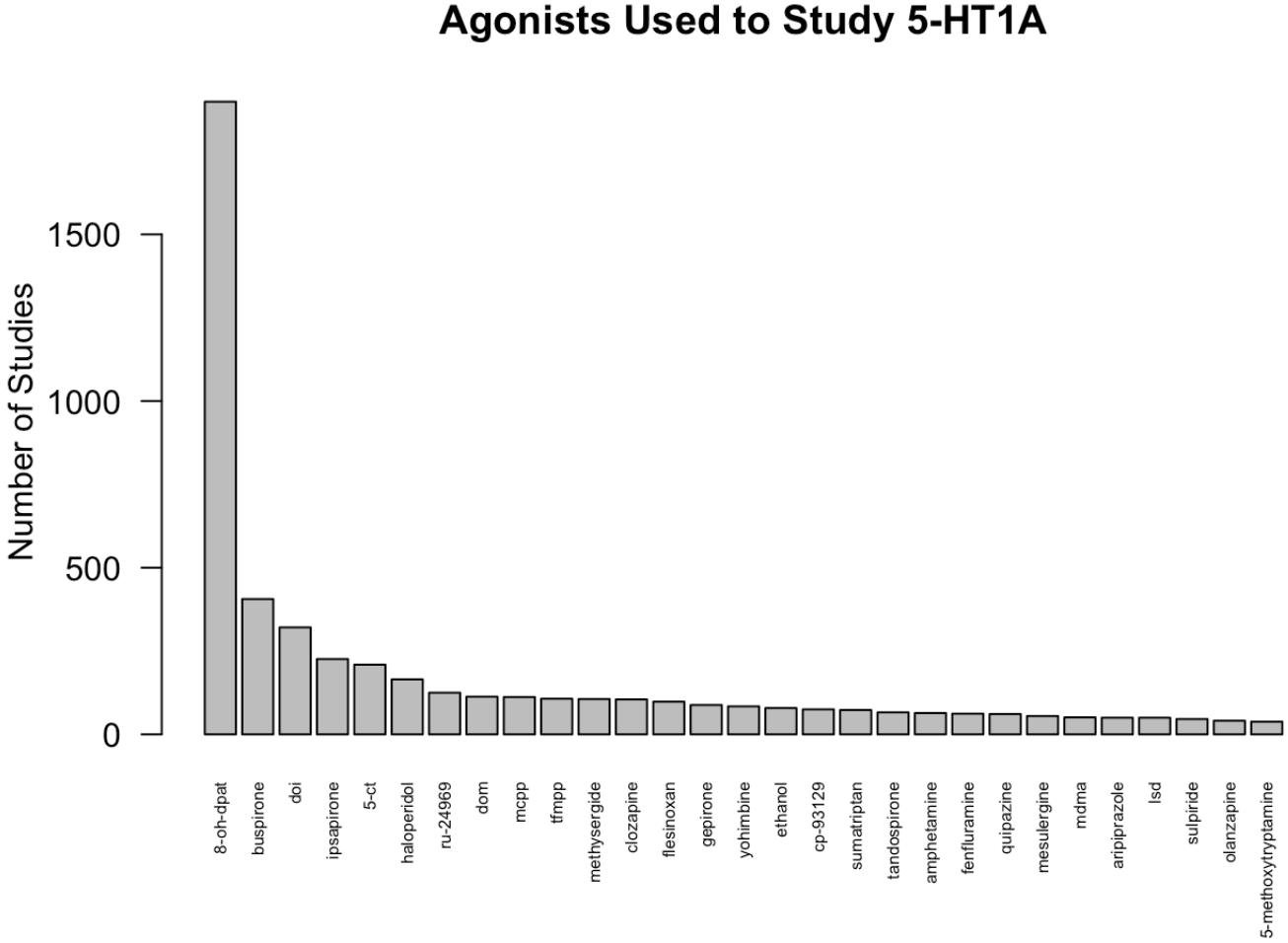
```
barplot(species1a, las = 2, cex.names=.5, main = "Species Used to Study 5-HT1A", ylab
= "Number of Studies")
```




```
Agonists1a <- strsplit(x1a$Agonist, ";")

Agonists1a <- unlist(Agonists1a)
Agonists1a <- gsub(".*\\\\","", Agonists1a)
Agonists1a <- substring(Agonists1a, 2)
Agonists1a <- gsub('.{2}$', '', Agonists1a)
Agonists1a <- gsub("\\?", "-", Agonists1a)
Agonists1a <- gsub(" ", "", Agonists1a)

Agonists1a <- gsub("5-carboxamidotryptamine", "5-ct", Agonists1a)

#sort(table(Agonists1a), decreasing = TRUE)
(agonists1a <- sort(table(Agonists1a), decreasing = TRUE)[c(1, 3:30)])
```

```
## Agonists1a
##           8-oh-dpat           buspirone                 doi
##                1898                 406                 321
##          ipsapirone                5-ct         haloperidol
##                 226                 209                 165
##            ru-24969                 dom                mcpp
##                 125                 113                 112
##               tfmpp        methysergide           clozapine
##                 107                 106                 105
##          flesinoxan            gepirone           yohimbine
##                  98                  88                  84
##             ethanol           cp-93129         sumatriptan
##                  79                  75                  73
##        tandospirone         amphetamine        fenfluramine
##                  66                  64                  62
##           quipazine         mesulergine                mdma
##                  61                  55                  51
##        aripiprazole                 lsd           sulpiride
##                  50                  50                  46
##          olanzapine 5-methoxytryptamine
##                  41                  38
```

```
barplot(agonists1a, las = 2, cex.names=.5, main = "Agonists Used to Study 5-HT1A", yl
ab = "Number of Studies")
```




```
Antagonists1a <- strsplit(x1a$Antagonist, ";")

Antagonists1a <- unlist(Antagonists1a)

Antagonists1a <- gsub(".*\\\\","", Antagonists1a)
Antagonists1a <- substring(Antagonists1a, 2)
Antagonists1a <- gsub('.{2}$', '', Antagonists1a)
Antagonists1a <- gsub("\\?", "-", Antagonists1a)
Antagonists1a <- gsub(" ", "", Antagonists1a)

#sort(table(Antagonists1a), decreasing = TRUE)

(antagonists1a <- sort(table(Antagonists1a), decreasing = TRUE))
```

```
## Antagonists1a
##        way-100635        ketanserin        ritanserin        fluoxetine
##              1083               686               412               358
##          pindolol           nan-190        clozapine       metergoline
##               288               228               210               196
```

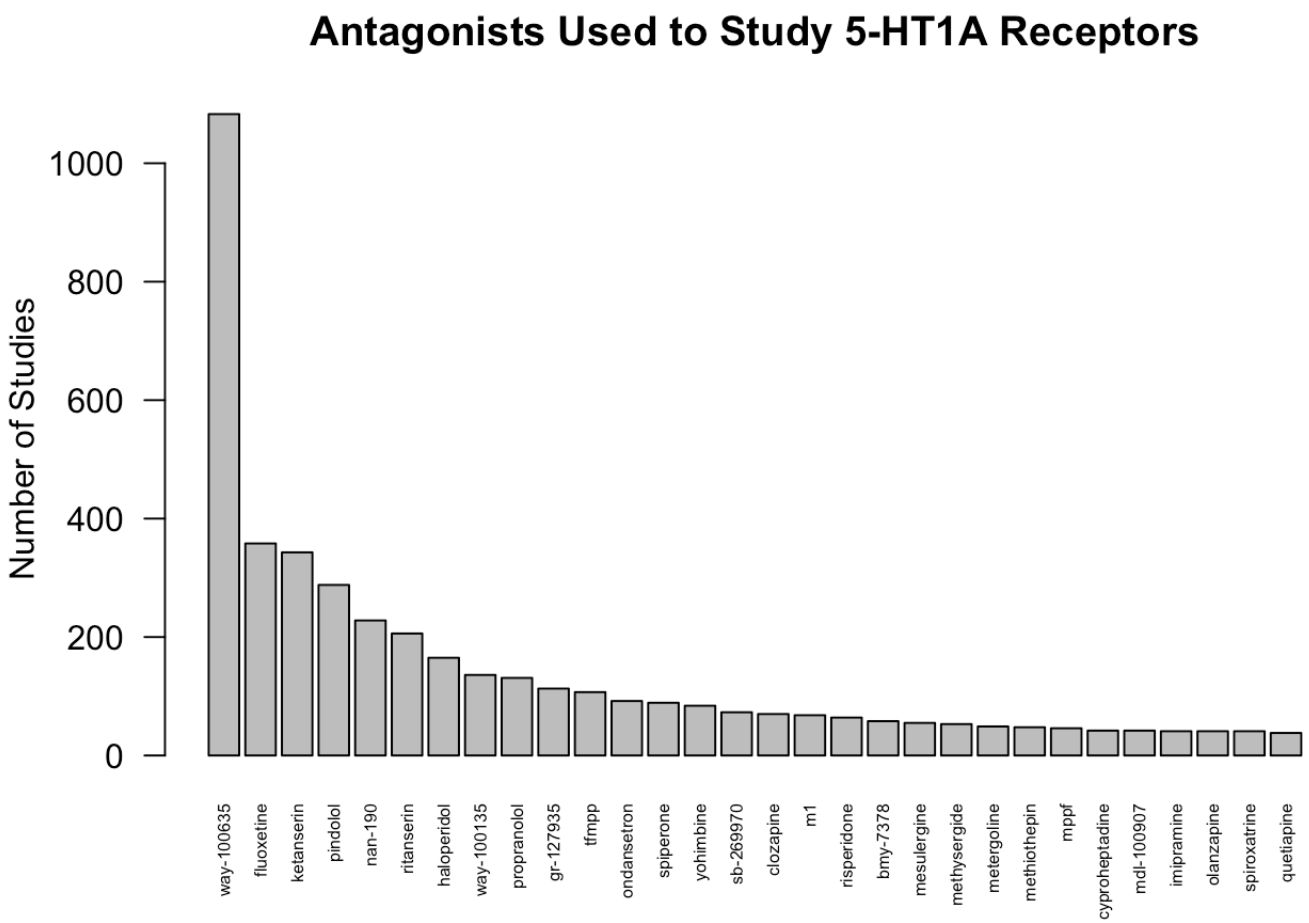
```
##         spiperone       haloperidol      methiothepin        way-100135
##               178               165               143               136
##       propranolol       risperidone         gr-127935             tfmpp
##               131               128               113               107
##      methysergide       ondansetron         yohimbine        imipramine
##               106                92                84                82
##        olanzapine         sb-269970                m1         mianserin
##                82                73                68                59
##          bmy-7378       mesulergine      aripiprazole              mppf
##                58                55                50                46
##    cyproheptadine        mdl-100907      spiroxatrine        quetiapine
##                42                42                41                38
##         sb-242084         sb-224289     cyanopindolol        alprenolol
##                38                37                34                33
##       tropisetron       eltoprazine        ziprasidone         zacopride
##                33                32                31                28
##       granisetron          ly-53857      clomipramine           nad-299
##                27                27                25                25
##             mefway     amitriptyline      vortioxetine    chlorpromazine
##                20                19                18                16
##         pindobind         sb-216641        lurasidone       mirtazapine
##                16                16                15                15
##        sdz-216525         trazodone         brl-15572        isamoltane
##                15                15                14                14
##         sb-206553        cinanserin        renzapride    metoclopramide
##                14                11                11                10
##     bromocriptine       cariprazine         gr-113808         gr-125487
##                 9                 9                 9                 8
##          lisuride        sertindole          gr-46611       maprotiline
##                 8                 8                 7                 7
##         rs-102221         sb-258719      thioridazine          tramadol
##                 7                 7                 7                 7
##            uh-301          pimozide           quinine        robalzotan
##                 7                 6                 6                 6
##          rs-39604         sb-399885         sb-699551         asenapine
##                 6                 6                 6                 5
##        nefazodone         ro04-6790         sb-258585       agomelatine
##                 5                 5                 5                 4
##      fluphenazine     norfluoxetine         rs-127445       sb-656104-a
##                 4                 4                 4                 4
##         amoxapine        ergotamine         lecozotan     nortriptyline
##                 3                 3                 3                 3
##         pizotifen         sb-200646         sb-204070         sb-204741
##                 3                 3                 3                 3
##         sb-649915         sdzser-082        xylamidine          zotepine
##                 3                 3                 3                 3
##       amisulpride      deramciclane           doxepin         ici169369
```

```
##                 2                 2                 2                 2
## iodocyanopindolol          loxapine      paliperidone         sb-215505
##                 2                 2                 2                 2
##         sb-221284         sb-243213         sb-271046         alosetron
##                 2                 2                 2                 1
##        ar-a000002       etoperidone            fg5983      fluperlapine
##                 1                 1                 1                 1
##         fr-260010       hydroxyzine       lamotrigine         ly-215840
##                 1                 1                 1                 1
##         memantine        oxprenolol      pimavanserin      promethazine
##                 1                 1                 1                 1
##        ro-4368554      sarpogrelate         sb-203186         sb-258741
##                 1                 1                 1                 1
##         sb-357134         tegaserod      volinanserin
##                 1                 1                 1
```

```
antagonists1a["metergoline"] <- antagonists1a["metergoline"]/4
antagonists1a["methiothepin"] <- antagonists1a["methiothepin"]/3
antagonists1a["clozapine"] <- antagonists1a["clozapine"]/3
antagonists1a["ziprasidone"] <- antagonists1a["ziprasidone"]/2
antagonists1a["vortioxetine"] <- antagonists1a["vortioxetine"]/2
antagonists1a["spiperone"] <- antagonists1a["spiperone"]/2
antagonists1a["sdzser-082"] <- antagonists1a["sdzser-082"]/2
antagonists1a["sb-242,084"] <- antagonists1a["sb-242,084"]/2
antagonists1a["sb-288,357"] <- antagonists1a["sb-288,357"]/2
antagonists1a["sb-206,553"] <- antagonists1a["sb-206,553"]/2
antagonists1a["sb-200,646"] <- antagonists1a["sb-200,646"]/2
antagonists1a["ritanserin"] <- antagonists1a["ritanserin"]/2
antagonists1a["risperidone"] <- antagonists1a["risperidone"]/2
antagonists1a["olanzapine"] <- antagonists1a["olanzapine"]/2
antagonists1a["mirtazapine"] <- antagonists1a["mirtazapine"]/2
antagonists1a["mianserin"] <- antagonists1a["mianserin"]/2
antagonists1a["methysergide"] <- antagonists1a["methysergide"]/2
antagonists1a["loxapine"] <- antagonists1a["loxapine"]/2
antagonists1a["latmepirdine"] <- antagonists1a["latmepirdine"]/2
antagonists1a["ketanserin"] <- antagonists1a["ketanserin"]/2
antagonists1a["isamoltane"] <- antagonists1a["isamoltane"]/2
antagonists1a["imipramine"] <- antagonists1a["imipramine"]/2
antagonists1a["fluphenazine"] <- antagonists1a["fluphenazine"]/2
antagonists1a["egis-12233"] <- antagonists1a["egis-12233"]/2
antagonists1a["chlorpromazine"] <- antagonists1a["chlorpromazine"]/2
antagonists1a["aripiprazole"] <- antagonists1a["aripiprazole"]/2
antagonists1a["amoxapine "] <- antagonists1a["amoxapine "]/2
antagonists1a["amisulpride "] <- antagonists1a["amisulpride "]/2
antagonists1a["ziprasidone"] <- antagonists1a["ziprasidone"]/2

(antagonists1a <- sort(antagonists1a, decreasing = TRUE)[1:30])
```

```
##     way-100635     fluoxetine     ketanserin       pindolol        nan-190
##     1083.00000      358.00000      343.00000      288.00000      228.00000
##     ritanserin    haloperidol     way-100135    propranolol      gr-127935
##      206.00000      165.00000      136.00000      131.00000      113.00000
##          tfmpp    ondansetron      spiperone      yohimbine      sb-269970
##      107.00000       92.00000       89.00000       84.00000       73.00000
##      clozapine             m1    risperidone       bmy-7378    mesulergine
##       70.00000       68.00000       64.00000       58.00000       55.00000
##   methysergide    metergoline   methiothepin           mppf cyproheptadine
##       53.00000       49.00000       47.66667       46.00000       42.00000
##     mdl-100907     imipramine     olanzapine   spiroxatrine     quetiapine
##       42.00000       41.00000       41.00000       41.00000       38.00000
```

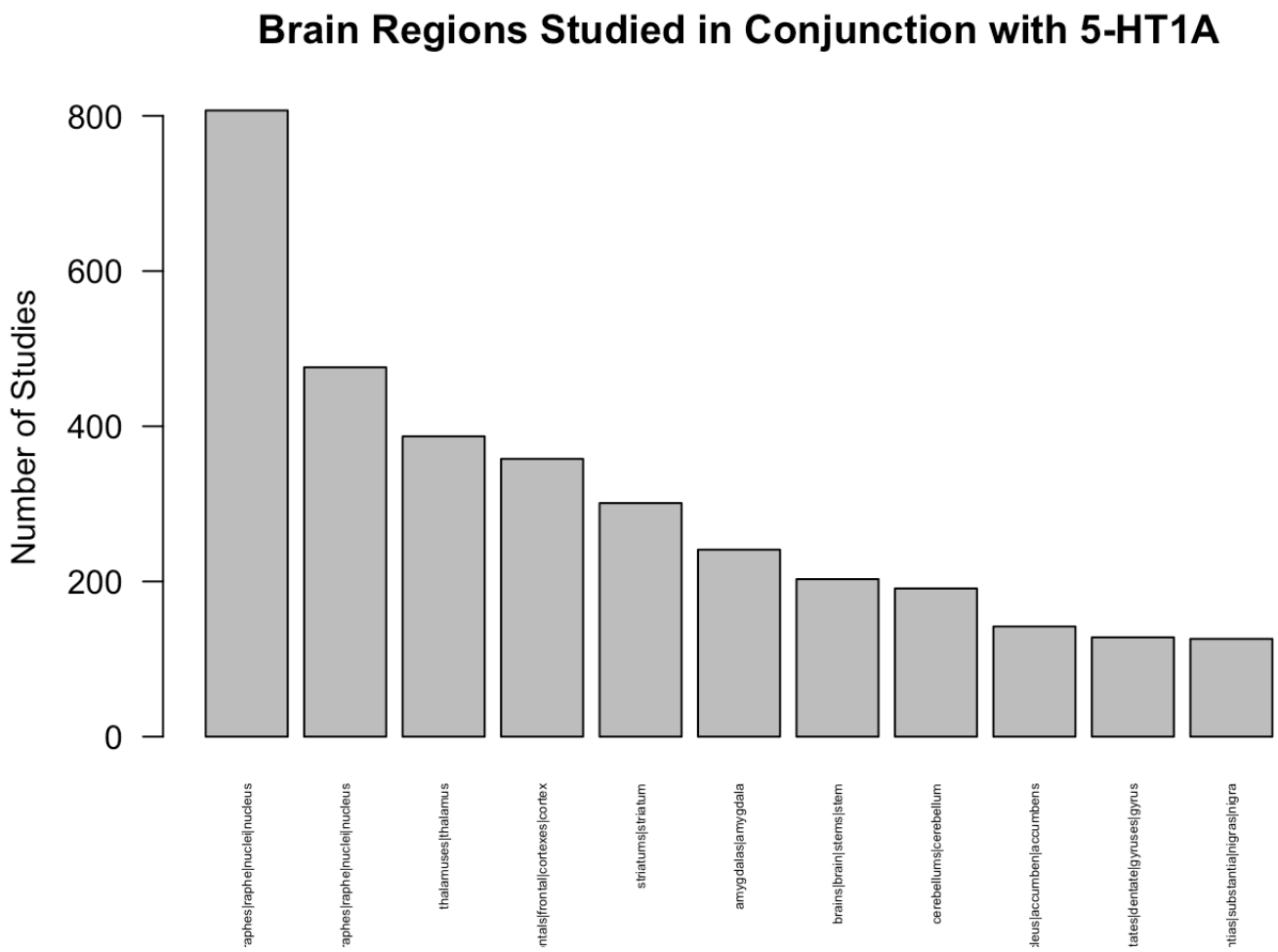
```
antagonists1a <- as.matrix(antagonists1a)

barplot(antagonists1a[,1], las = 2, cex.names=.5, main = "Antagonists Used to Study 5
-HT1A Receptors", ylab = "Number of Studies")
```



```
Regions1a <- strsplit(x1a$Brain_Regions, ";")

Regions1a <- unlist(Regions1a)

Regions1a <- gsub(".*i\\)\\(","", Regions1a)
Regions1a <- gsub("\\)\\(-","", Regions1a)
Regions1a <- gsub('.{3}$', '', Regions1a)
Regions1a <- gsub("\\\\","", Regions1a)
Regions1a <- gsub("\\+","", Regions1a)
Regions1a <- gsub("s\\)","", Regions1a)
Regions1a <- gsub("?\\(","", Regions1a)
Regions1a <- gsub("\\?","", Regions1a)



#sort(table(Regions1a), decreasing = TRUE)
(regions1a <- sort(table(Regions1a), decreasing = TRUE)[c(2:4,6:13)])
```

```
## Regions1a
##                raphes|raphe|nuclei|nucleus
##                                         807
## dorsals|dorsal|raphes|raphe|nuclei|nucleus
##                                         476
##                        thalamuses|thalamus
##                                         387
##  pres|pre|frontals|frontal|cortexes|cortex
##                                         358
##                         striatums|striatum
##                                         301
##                         amygdalas|amygdala
##                                         241
##                    brains|brain|stems|stem
##                                         203
##                     cerebellums|cerebellum
##                                         191
##          nuclei|nucleus|accumben|accumbens
##                                         142
##             dentates|dentate|gyruses|gyrus
##                                         128
##        substantias|substantia|nigras|nigra
##                                         126
```

```
barplot(regions1a, las = 2, cex.names=.4, main = "Brain Regions Studied in Conjunctio
n with 5-HT1A", ylab = "Number of Studies")
```




```
Topics1a <- strsplit(x1a$Topic_Spec, ";")

Topics1a <- unlist(Topics1a)

Topics1a <- gsub(".*\\\\","", Topics1a)
Topics1a <- substring(Topics1a, 2)
Topics1a <- gsub('.{2}$', '', Topics1a)
Topics1a <- gsub("social dominance", "soc. dom.", Topics1a)

(topics1a <- sort(table(Topics1a), decreasing = TRUE))
```

```
## Topics1a
##        depress        anxiety         stress       anxiolyt        locomot
##            821            486            401            365            299
##         cognit           feed   schizophreni         memory           mood
##            256            229            218            215            192
##            sex       learning          sleep       aggressi           pain
##            178            140            140            128            106
##       anxiogen     parkinsons cardiovascular       analgesi     alzheimers
##             94             94             71             66             53
##       impulsiv       dementia        suicide      psychosis     psychostim
##             35             34             33             28             27
##          groom       appetite  vasoconstrict         nausea gastrointestin
##             24             22             19             15             13
##        obesity      psychedel         emesis      soc. dom.
##             11              7              6              1
```

```
barplot(topics1a, las = 2, cex.names=.7, main = "Topics Studied with 5-HT1A", ylab =
"Number of Studies")
```