The Bitcoin Brain Drain: A Short Paper on the Use and Abuse of Bitcoin Brain Wallets

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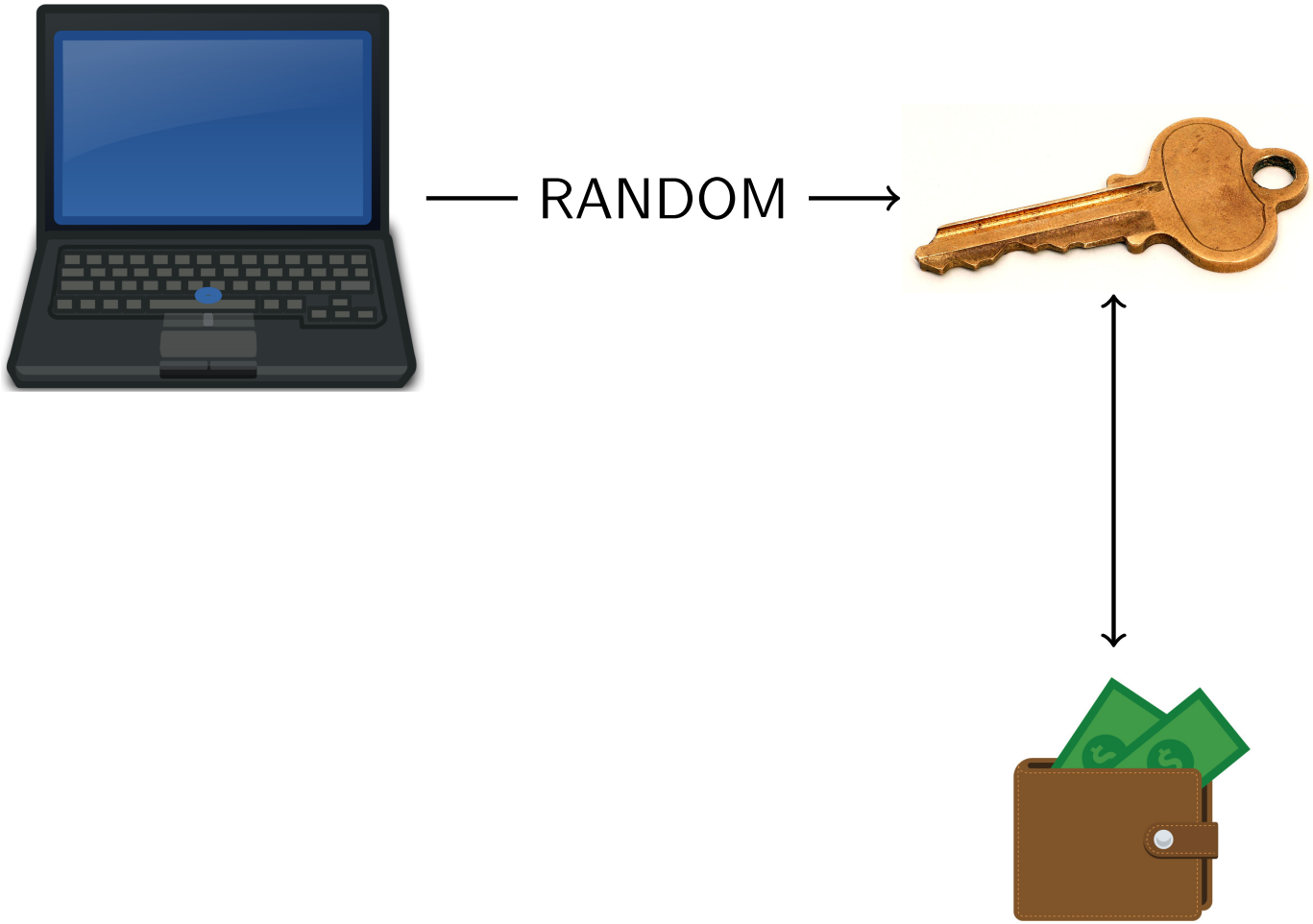
Financial Cryptography
February 25, 2016

What is a Brain Wallet?



What is a Brain Wallet?

— RANDOM?? ⟶

... and why do we care?

Roadmap

- Generating Candidate Brain Wallet Passwords
- Brain Wallet Usage
- Brain Wallet Draining

Password Corpora: 300 Billion Candidate Passwords

Source	# Wallets	(non-empty)	Unique	90% # drains	Total BTC	Total USD
			Word lists			
Urban Dictionary	296	3	2	3.00	561.95	43 120.77
Two Words	13	3	0	4.00	0.79	92.65
Eng/Slang Urban Dict.	63	14	28	2.00	0.90	124.96
Eng. Wikipedia	250	0	0	2.00	505.77	38 833.16
WikiQuotes	35	0	0	12.00	60.96	17 620.50
Phrases	283	0	0	3.00	578.69	57 376.80
xkcd	90	3	3	13.00	97.66	29 140.44
Lyrics	329	4	16	3.00	230.45	26 788.97
Blockchain.info tags	112	0	10	7.00	577.93	31 683.29
Rootkit	123	2	0	6.00	4.50	570.78
MySpace	59	0	0	3.00	1.14	210.44
RockYou	415	3	2	3.00	113.82	33 807.17
LinkedIn	213	0	0	2.00	10.11	738.52
LEET MRL	3	0	0	1.00	0.01	1.49
Prince MRL	295	4	7	3.00	88.93	21 028.02
CrackStation	640	3	37	2.00	396.09	41 326.80
Naxxatoe	388	0	2	2.00	41.56	3 389.31
Skull Security	414	3	3	2.00	71.73	20 756.32
Uniqpass	490	3	0	2.00	134.95	35 266.27

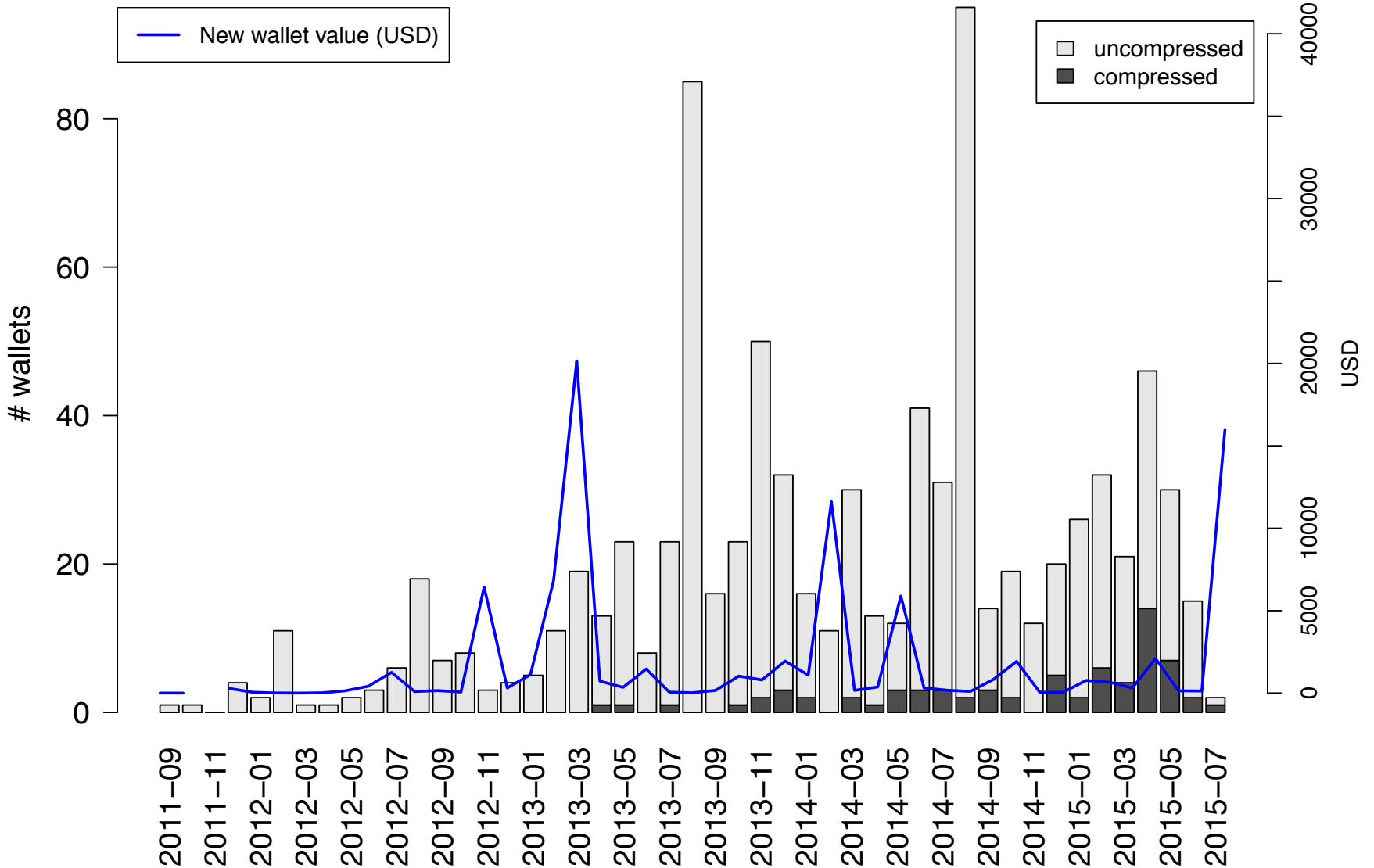
Password Corpora: 300 Billion Candidate Passwords

Source	# Wallets	(non-empty)	Unique	90% # drains	Total BTC	Total USD
			Non-word lists			
Reddit User Challenge	1	0	1	1.00	0.01	2.62
Brute Force	200	3	3	3.00	22.47	3 895.99
Modified BW Passwords	74	1	9	2.00	2.25	209.98
Overall	884	21	139	2.00	1 806.22	103 472.13

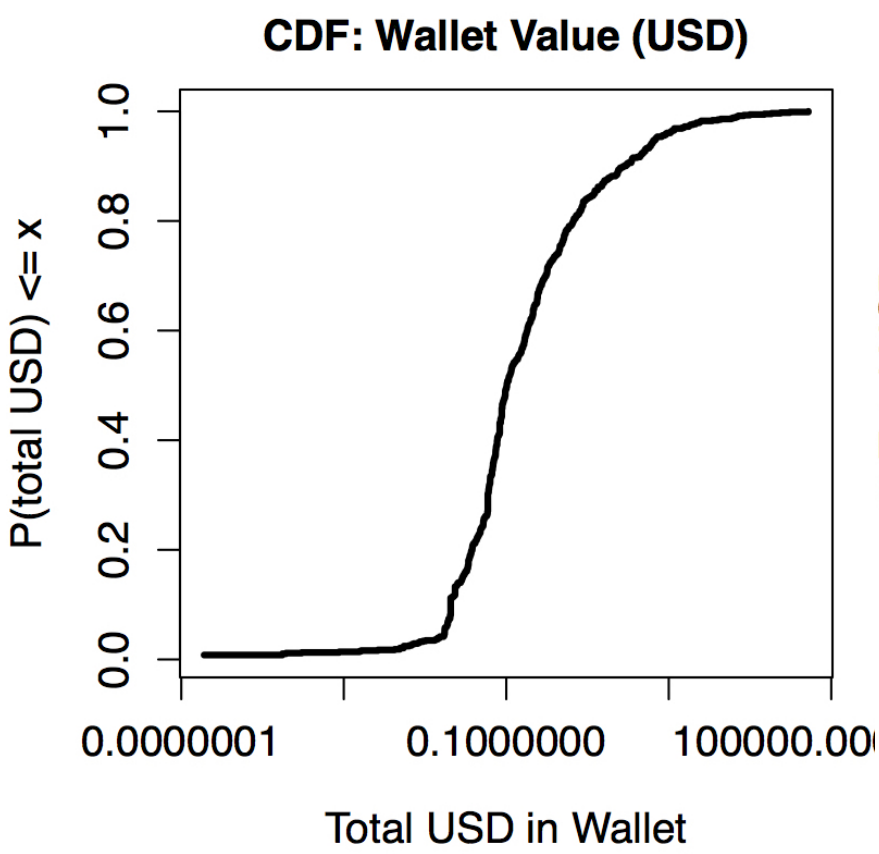
Brain Wallet Usage

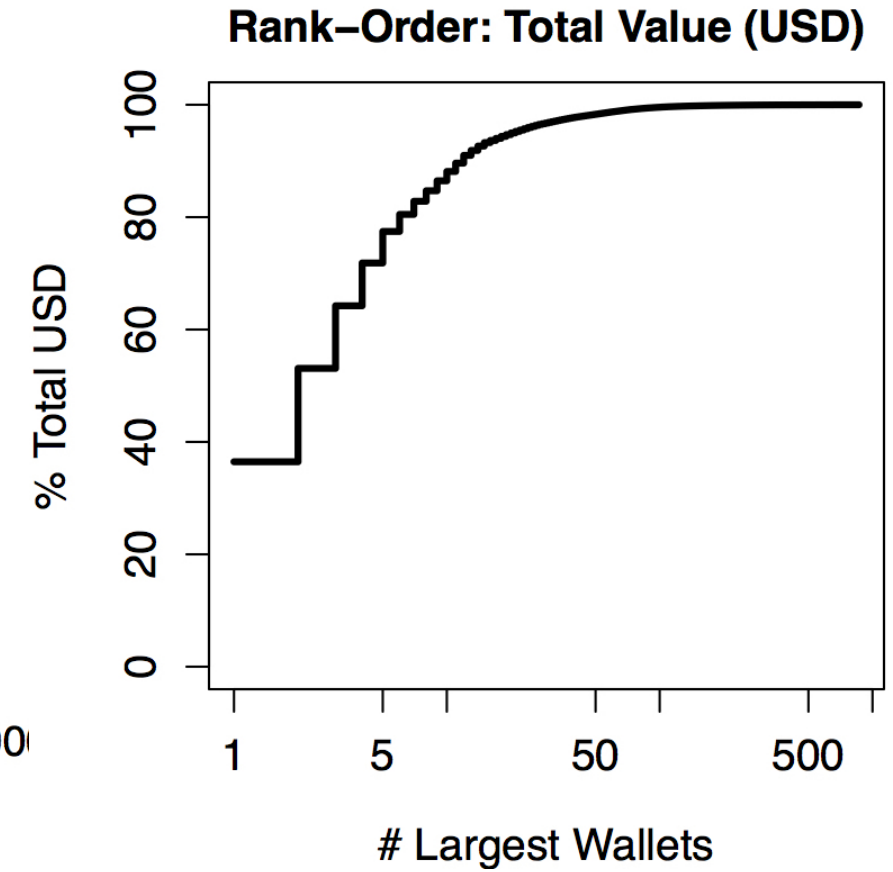
- 884 distinct brain wallets
- 845 different passwords
- 1 806 BTC (approx. 103 000 USD)
- 798 uncompressed and 71 compressed
- Notable Passwords
  - one two three four five six seven
  - ””
  - how much wood could a woodchuck chuck if a woodchuck could chuck wood

New Brain Wallet Usage by Month



Value Stored in Brain Wallets

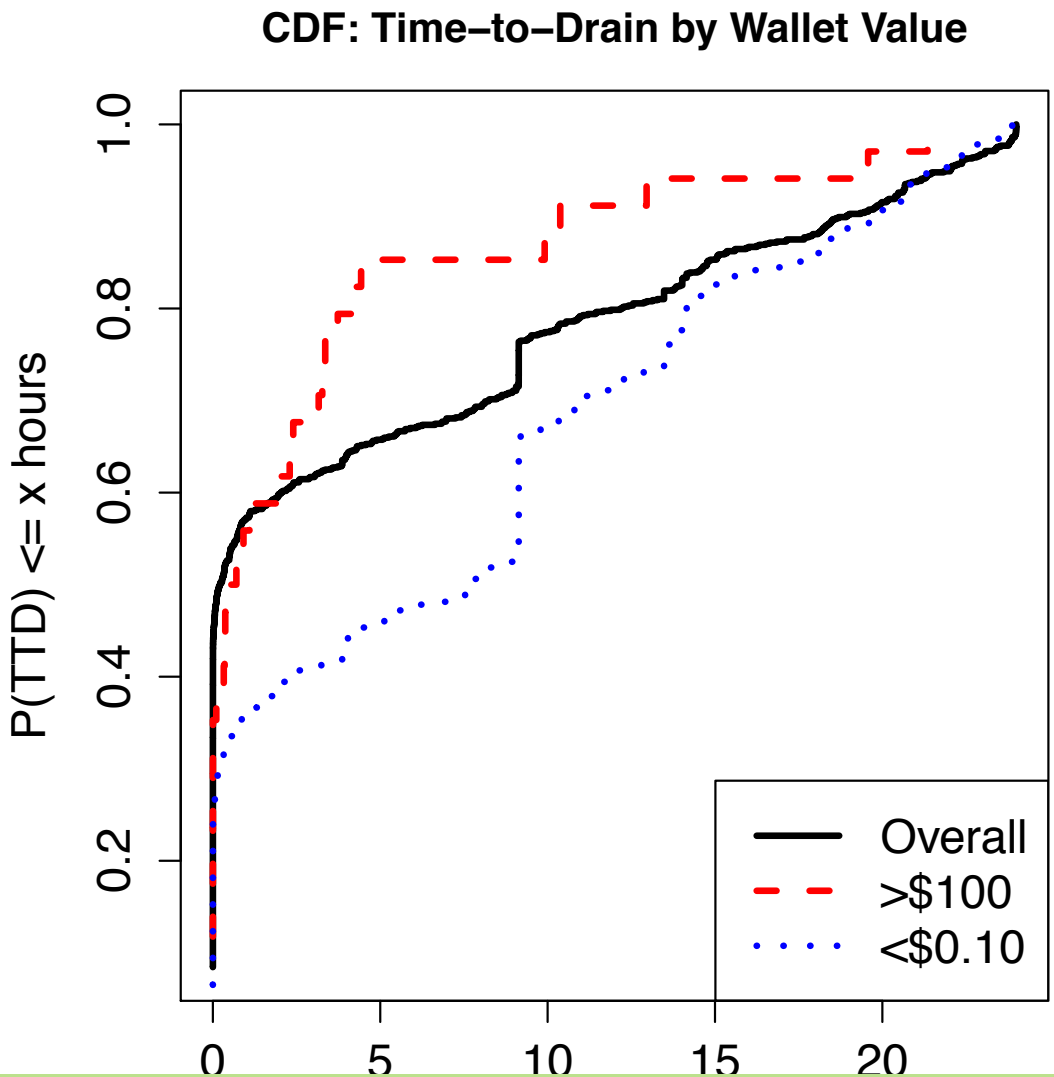




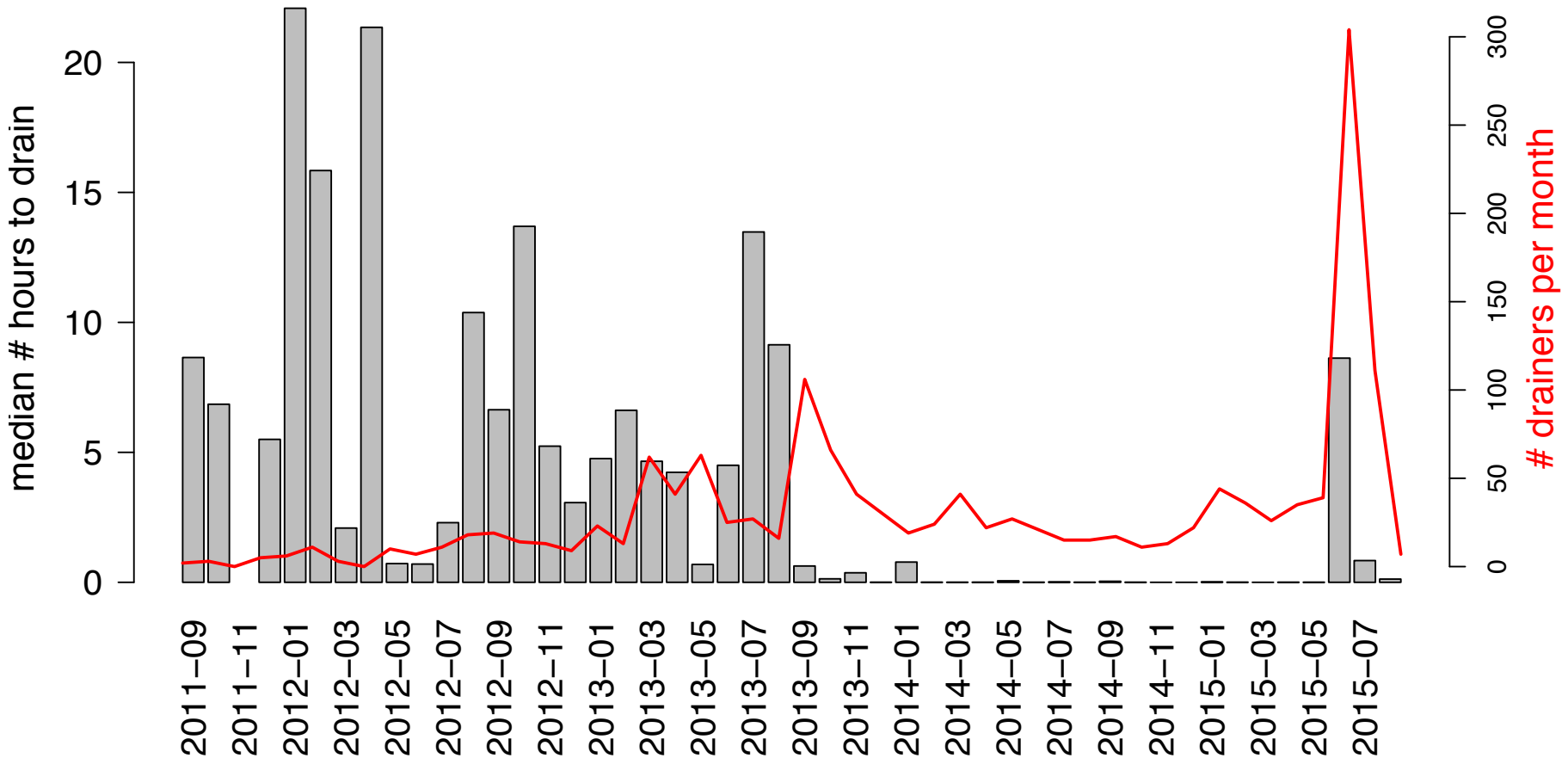
Drainers

- 1 895 drains on 884 wallets
  - 98% drained at least once
  - 69% of wallets are drained exactly once
  - 1.9% are drained more than ten times.
- 14 drainers (at least) targeting multiple brain wallets
  - Top 4 drainers netted $35 000 between them
- $1 – median value of drain among successful drainers

Brain Drain Time



Brain Wallet Drains over Time



Conclusion

- Tested 300 BILLION passwords through BrainFlayer
- Found only 884 used brain wallets worth 1 806.22 BTC or 103 472.13 USD
- 98% drained at least once
  - Most within minutes

Conclusion

"DO NOT USE BRAINWALLETS"

https://en.bitcoin.it/wiki/Brainwallet

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Now... with Science!

Questions?