do you PGP?

(pretty good privacy)

@corcra
Stephanie Hyland

22/7/16, NYC Resistor 🇨🇭

12/4/16, NYC Resistor

27/4/15, CryptoHarlem

Jonathan Zdziarski
@JZdziarski

PKI / PGP Primer:

🔑 Public Key

🗝 Private Key

📝 Message

📝 + 🔑 = 🔒✉️ Encrypted

🔒✉️ + 🗝 = 🔓📝 Decrypted

📝 + 🗝 = ✒️✉️ Signed

✒️✉️ + 🔑 = 👤 Authenticated

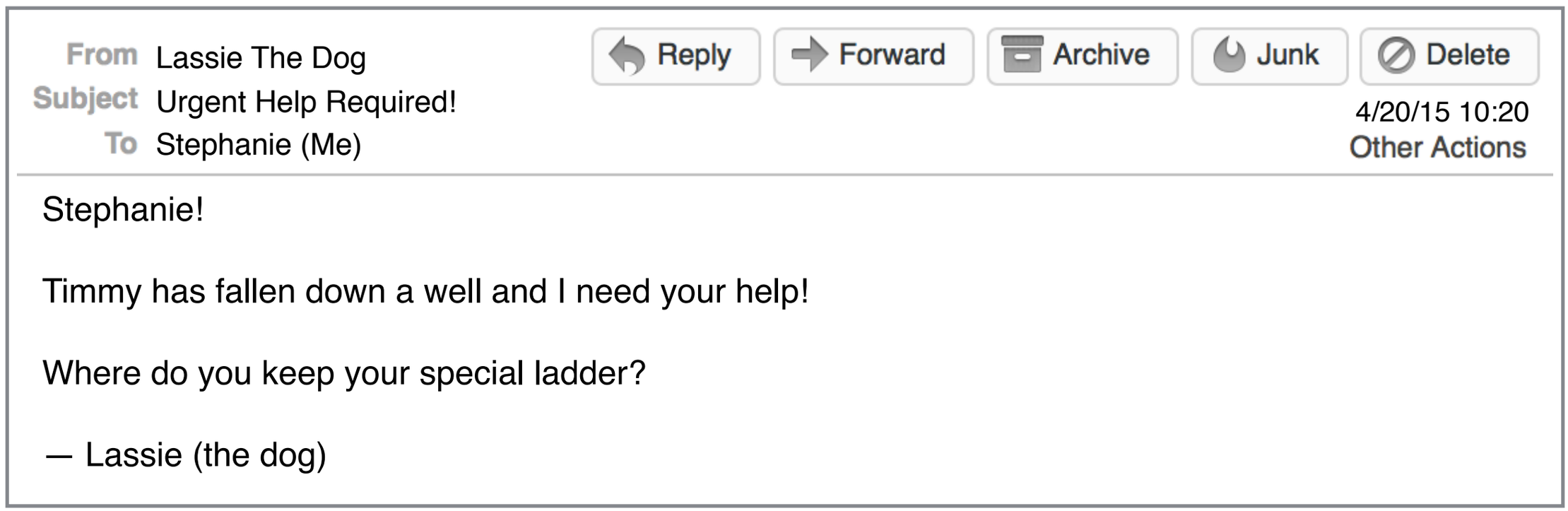
RETWEETS 3,266 LIKES 3,855

2:44 PM - 13 Jul 2016

3.3K 3.9K

the end

suppose you receive an important message…



DANGER!

From Stephanie (Me)
Subject Re: Urgent Help Required!
To Lassie The Dog

Reply | Forward | Archive | Junk | Delete

4/20/15 10:30
Other Actions

Of course I'll help, Lassie!

The special ladder is hidden behind the t
but don't tell anyone!

— Stephanie

On 20 Apr, Lassie The Dog wrote:

> Stephanie!
>
> Timmy has fallen down a well and I need y
>
> Where do you keep your special ladder?
>
> — Lassie (the dog)

is this message confidential?

is the Lassie the true sender?

did the message change in transit?

with PGP…

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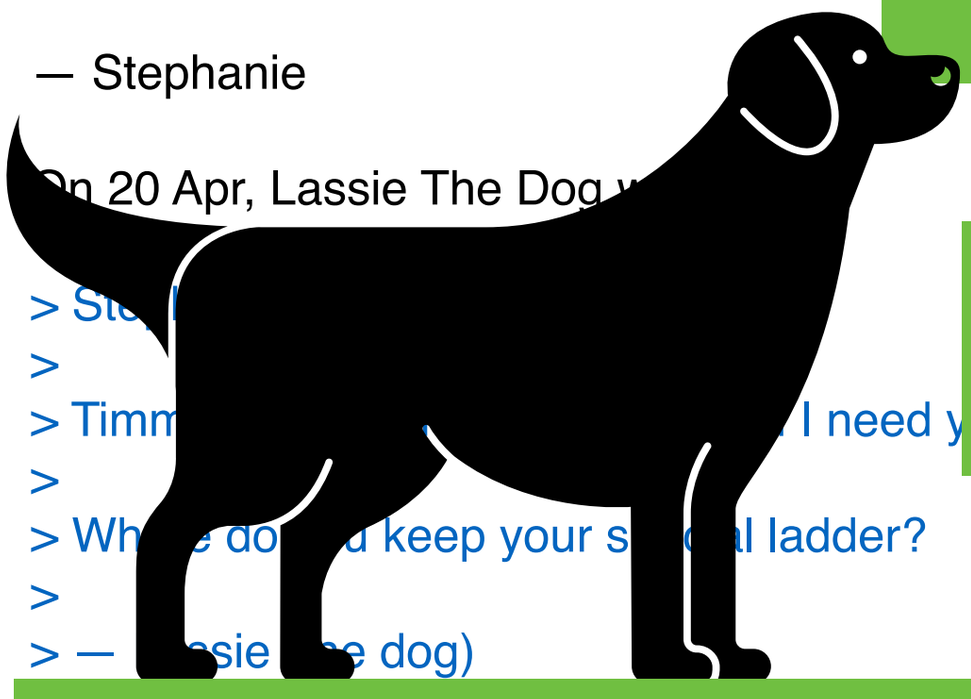
>
> Wh do d keep your s l ladder?
>
> — sie e dog)



this message is confidential

we can confirm the identity of the sender

we know if the message has been tampered with

with PGP…

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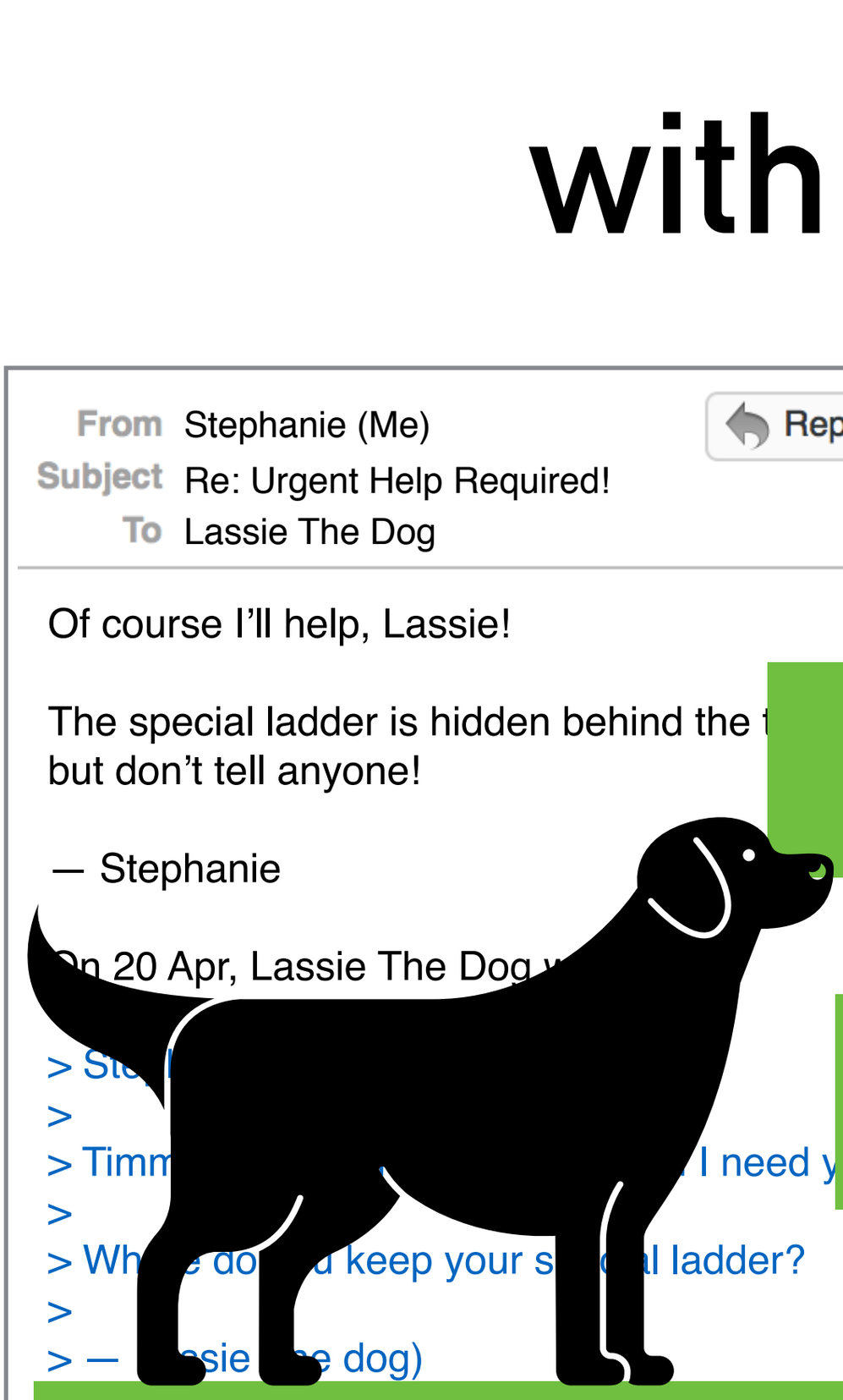


confidentiality

authenticity

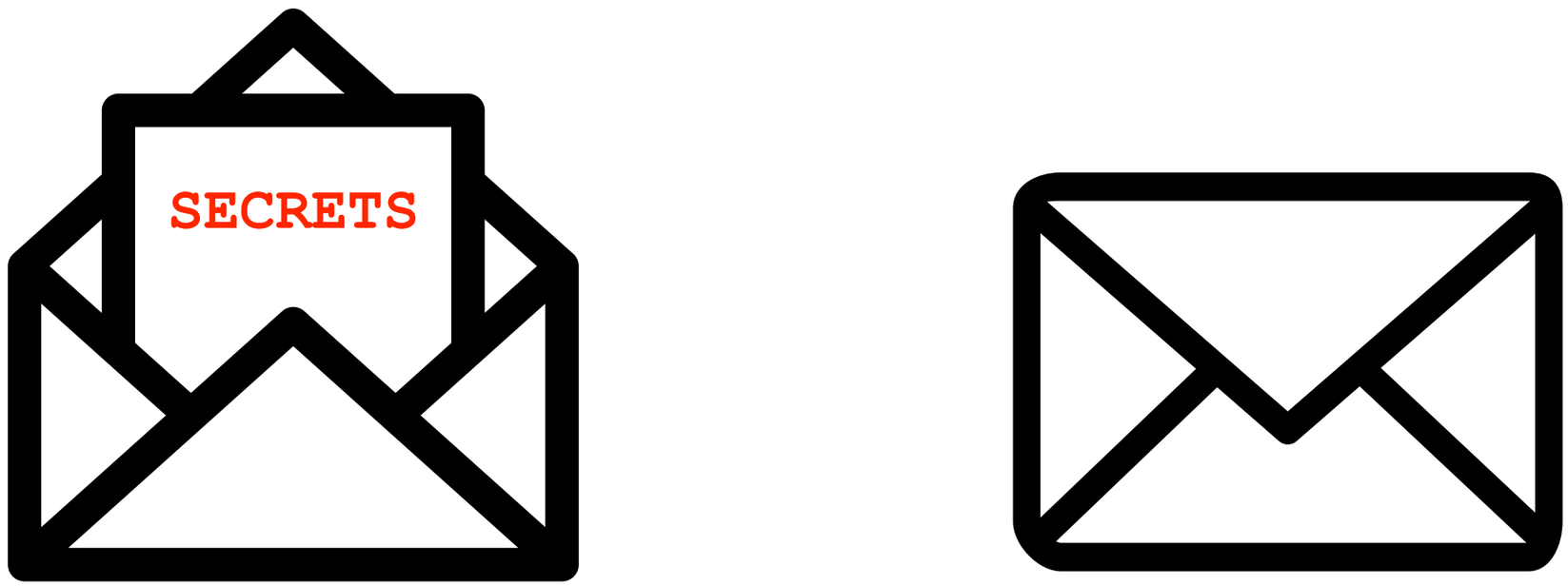
integrity

confidentiality

(preventing information disclosure to an unauthorized third party)

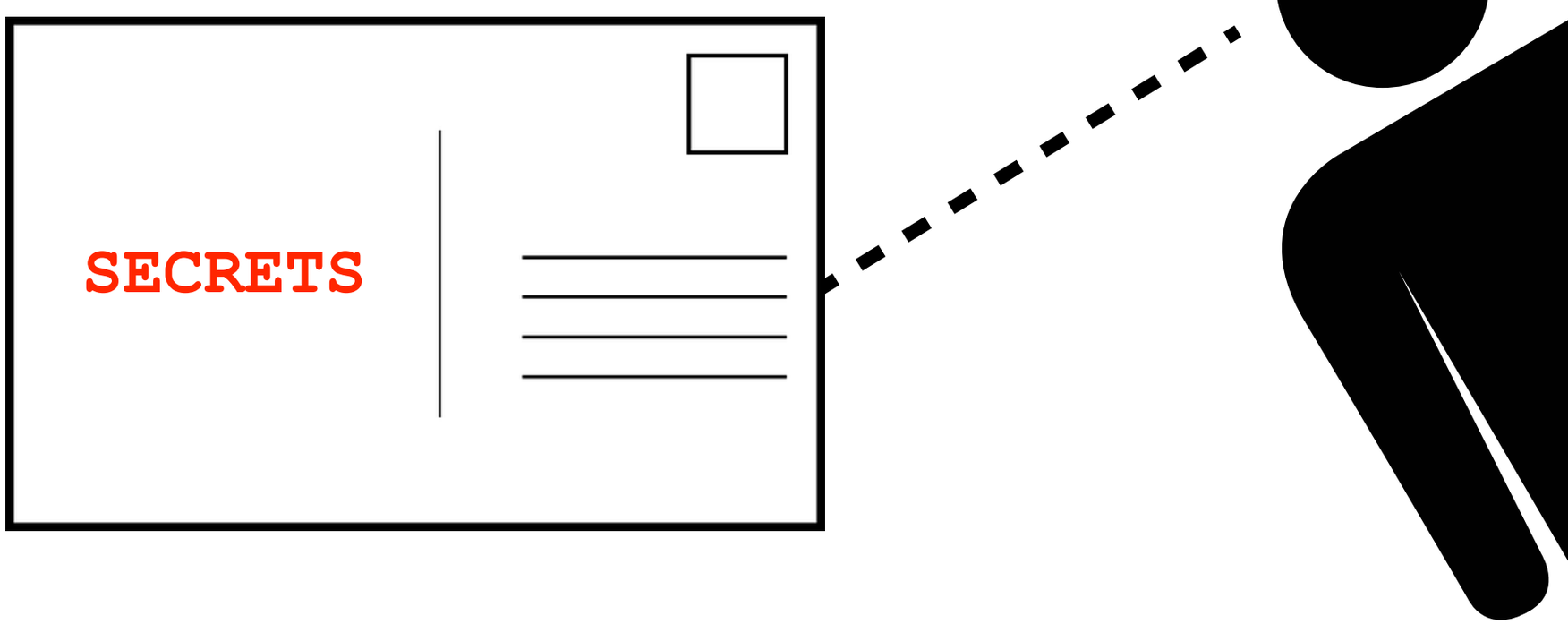
→ encrypt messages

a problem with email



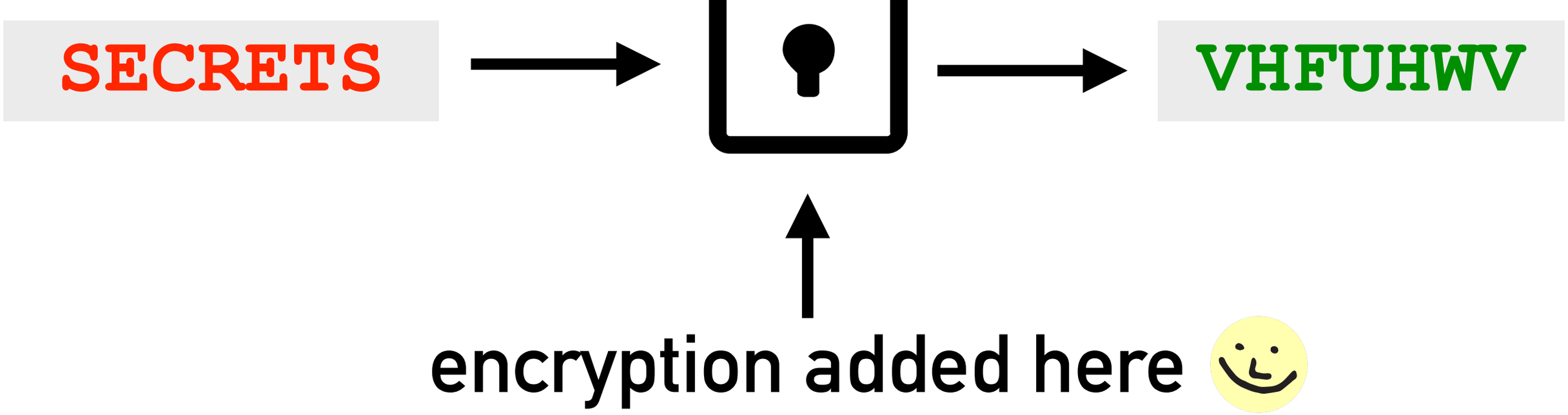
what you expect

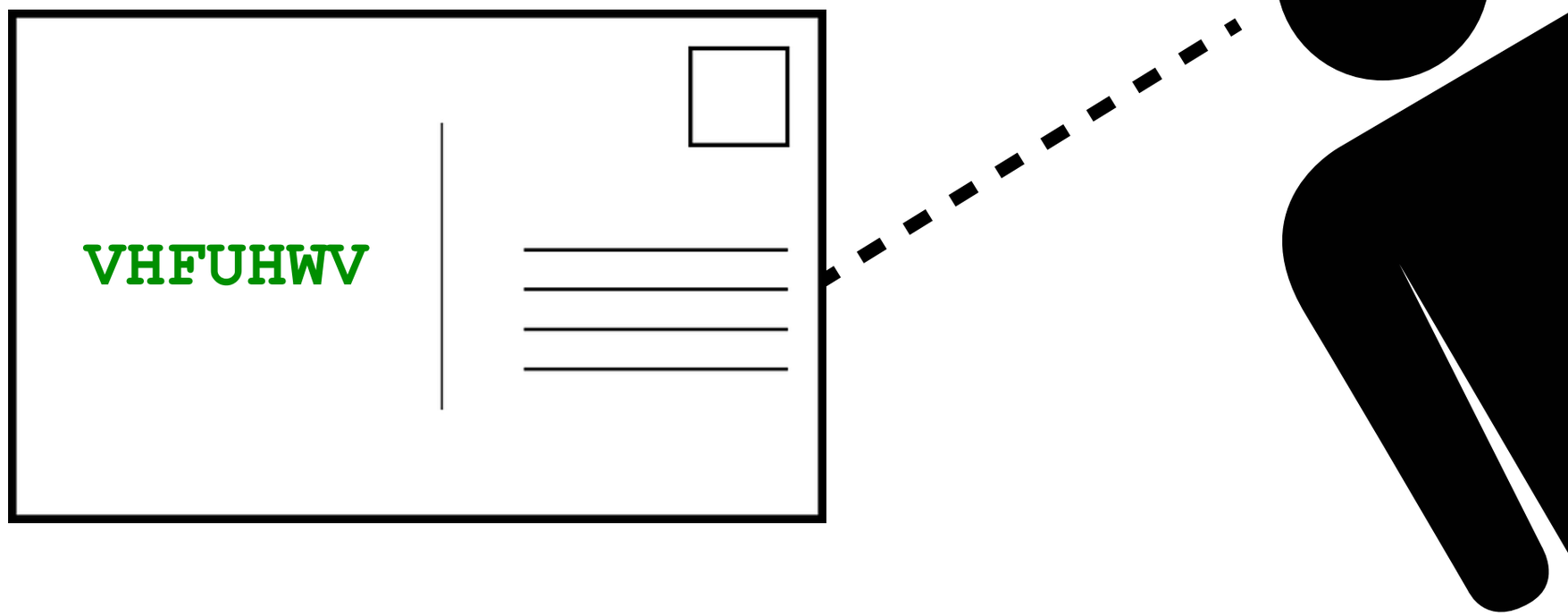
a problem with email



what you get

encryption to the rescue




?
VHFUHWV

(shift/Caesar cipher)

a simple example

SECRETS → 🔒 → VHFUHWV

ABCDEFGHIJKLMNOPQRSTUVWXYZ

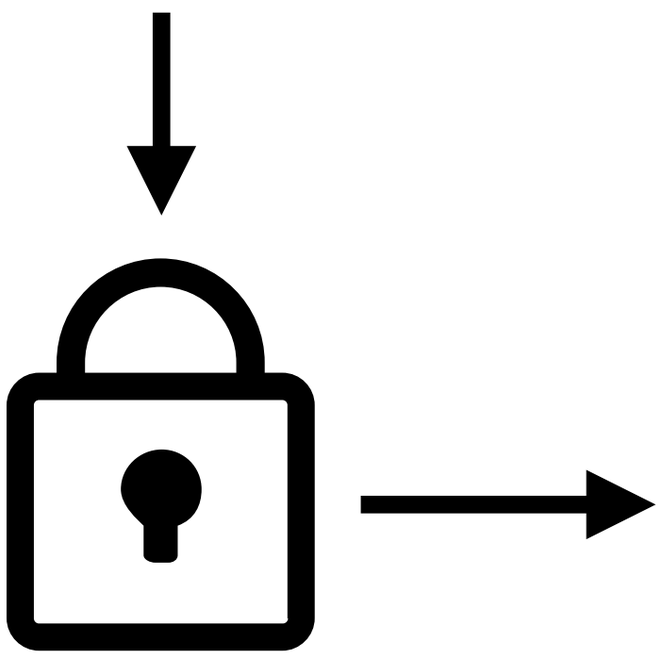
↓

DEFGHIJKLMNOPQRSTUVWXYZABC

Both parties must know the key (+3 letters)

a less simple example

SECRETS



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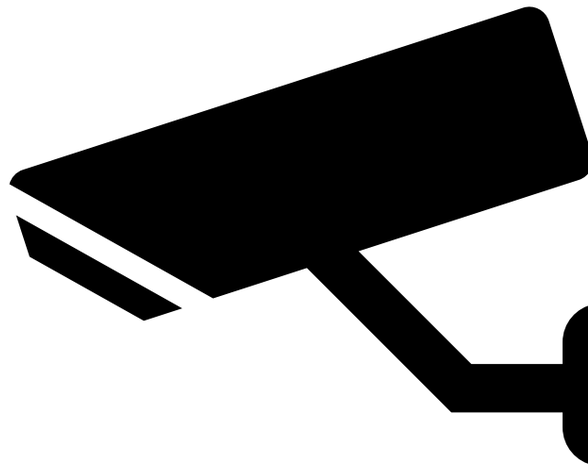
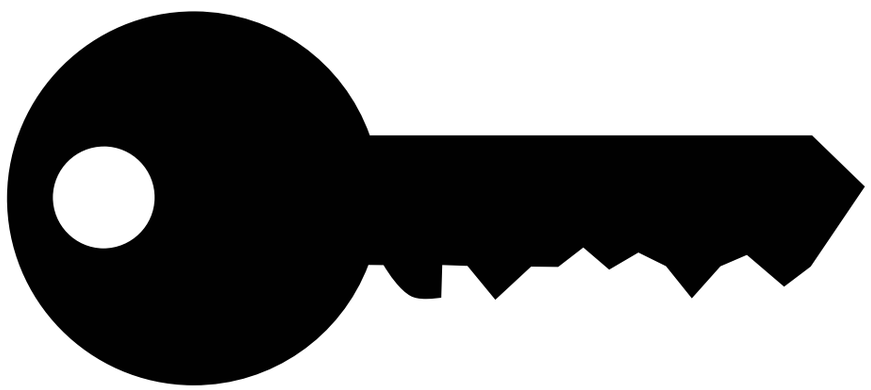
IMIY/CXRr7kL0t/xXdjpeRsj5nRlFZinOxCMNzVv+A==
=l6hy
-----END PGP MESSAGE-----
```

Without the right key,
this is extremely difficult to decrypt.

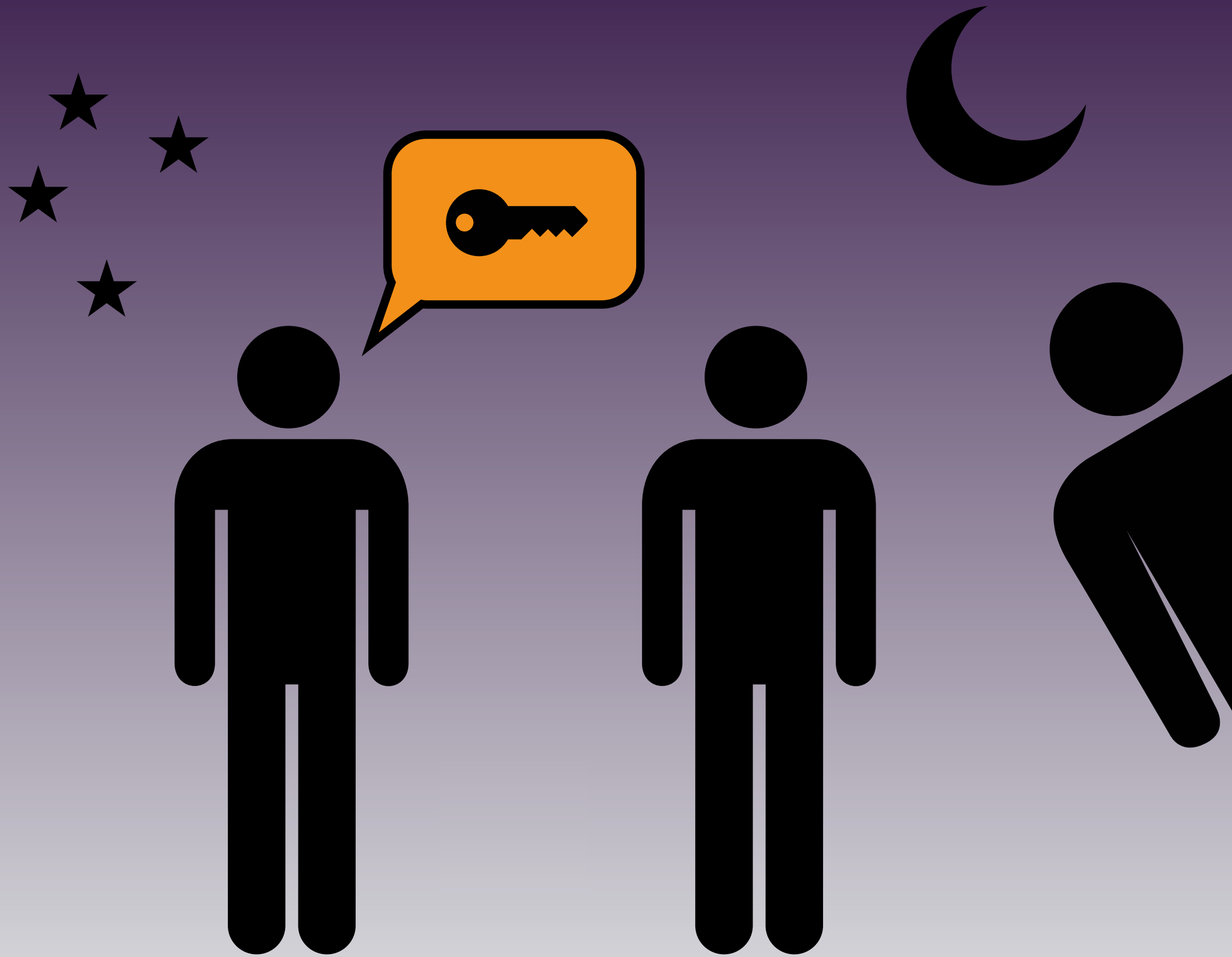
problem solved…?



unfortunately…



sharing secret
information is hard



PGP uses public key cryptography

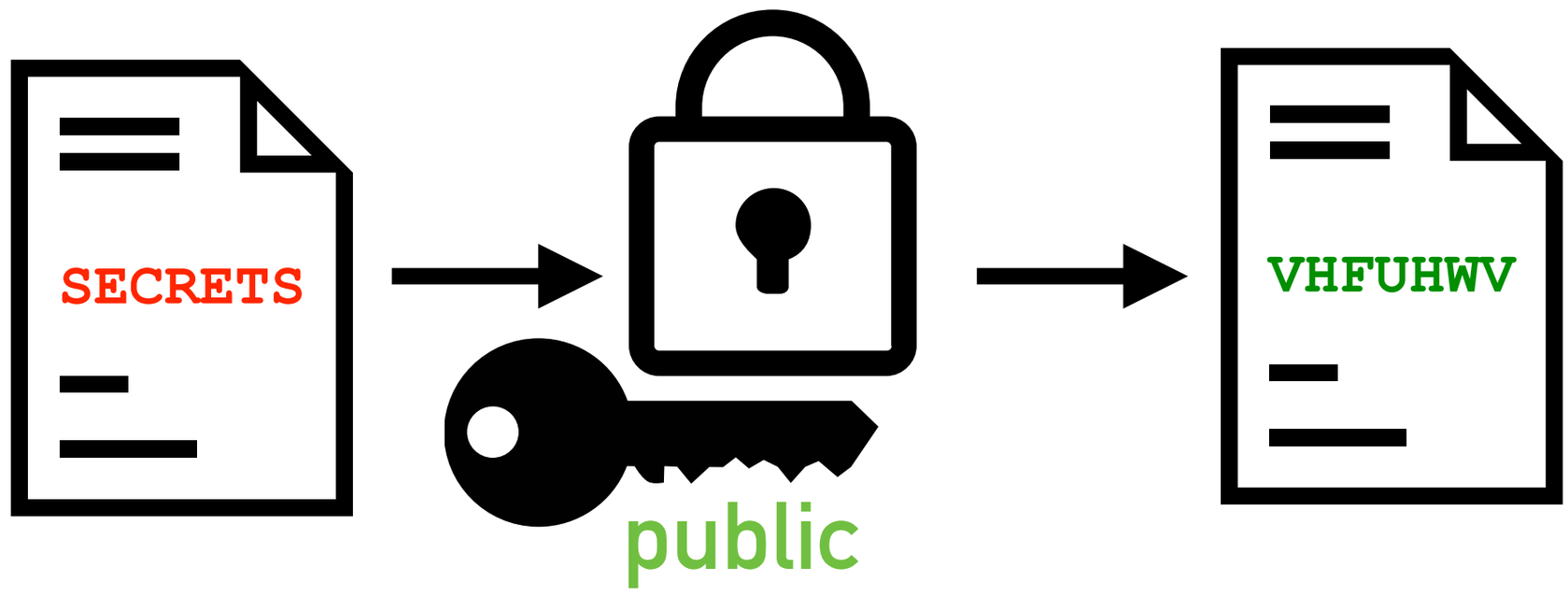
private key

public key

not secret,
easy to share!

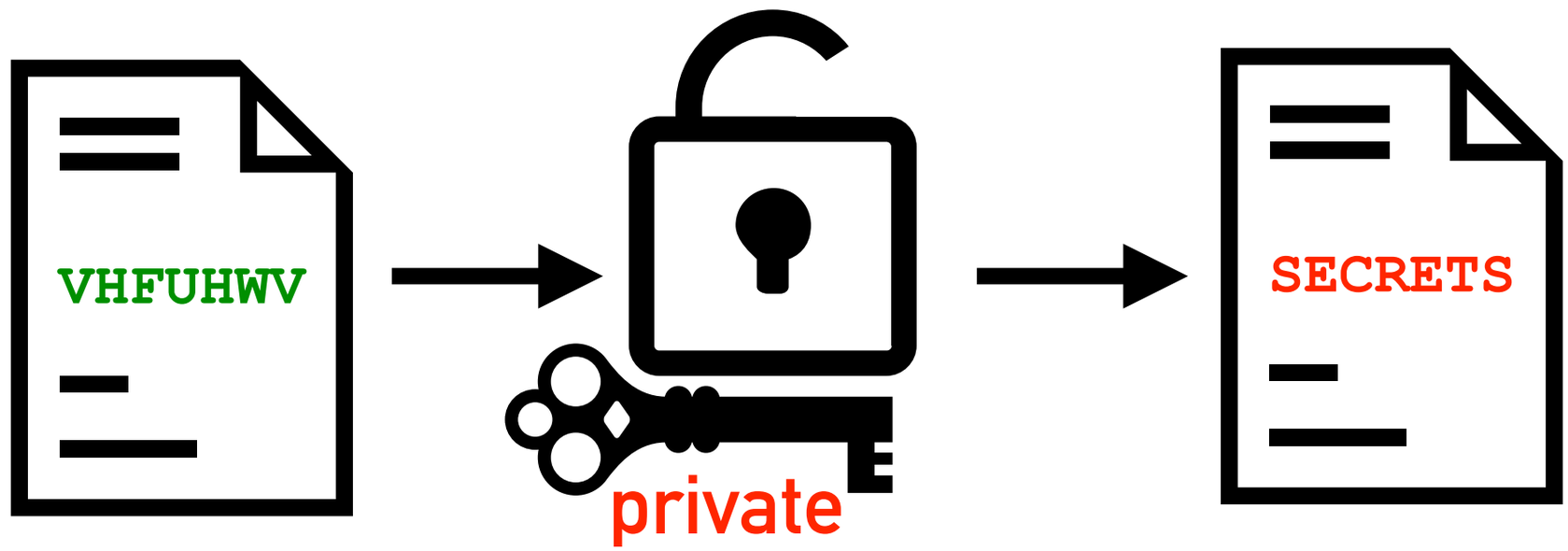
PGP uses public key cryptography

If someone knows my public key,
they can encrypt a message only I can read.



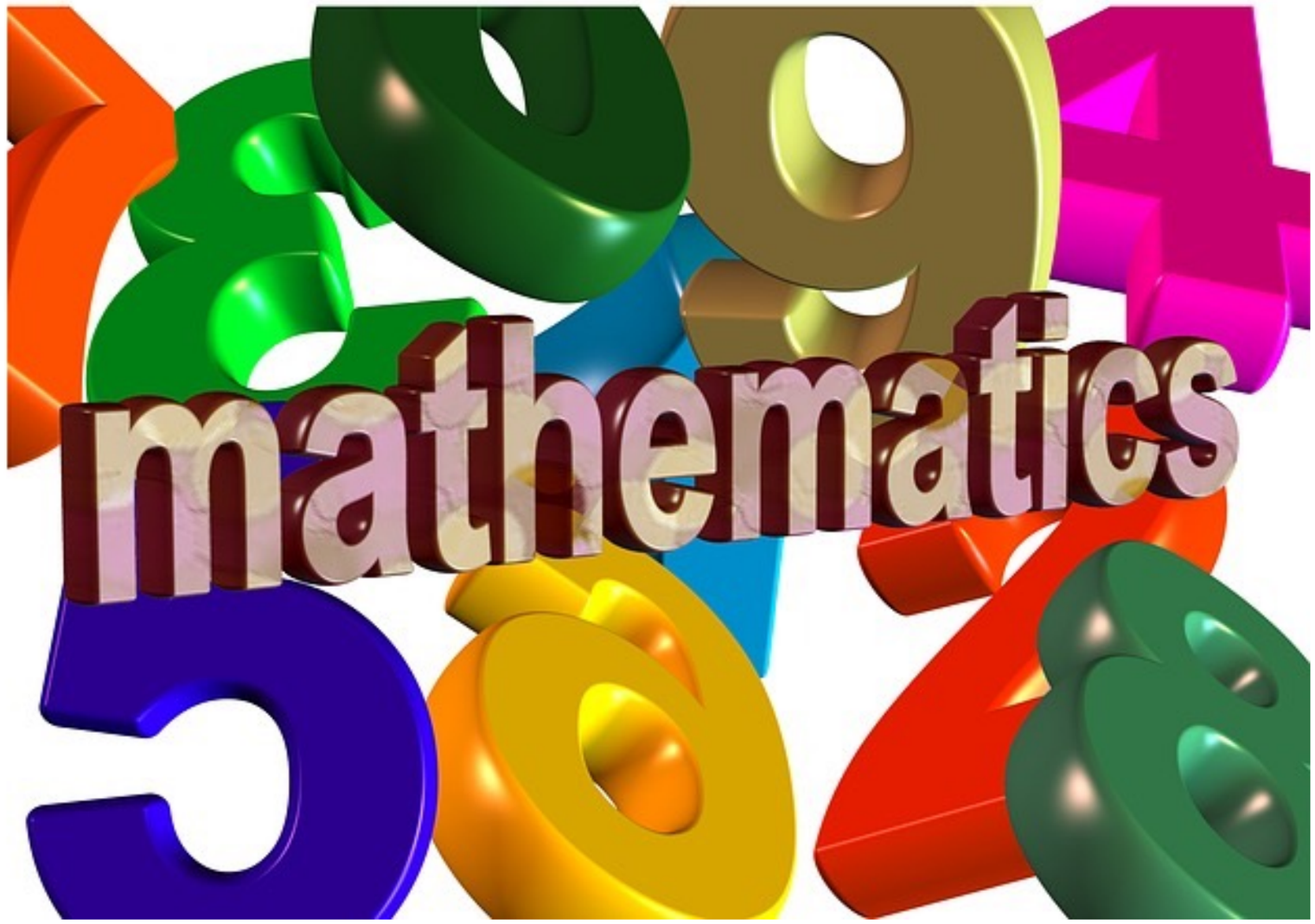
PGP uses public key cryptography

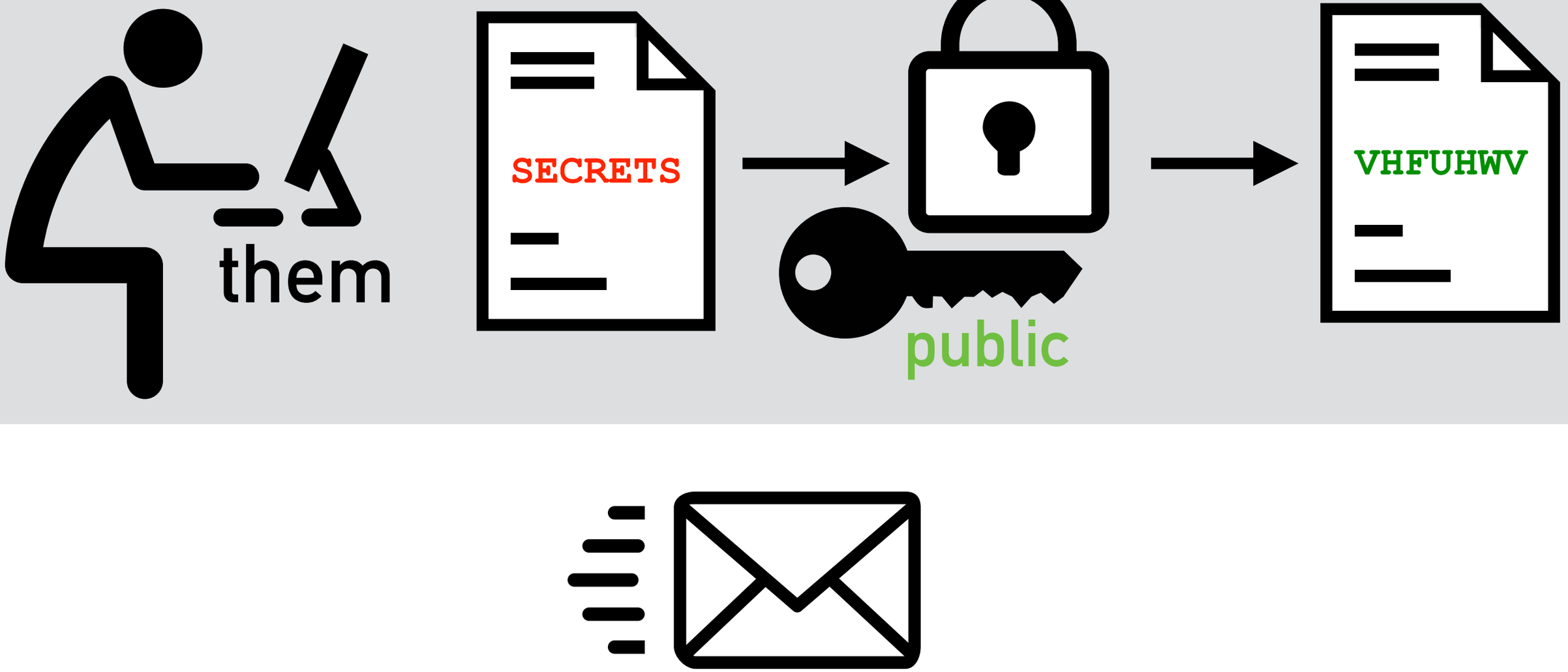
If I know my private key,
I can decrypt the message.

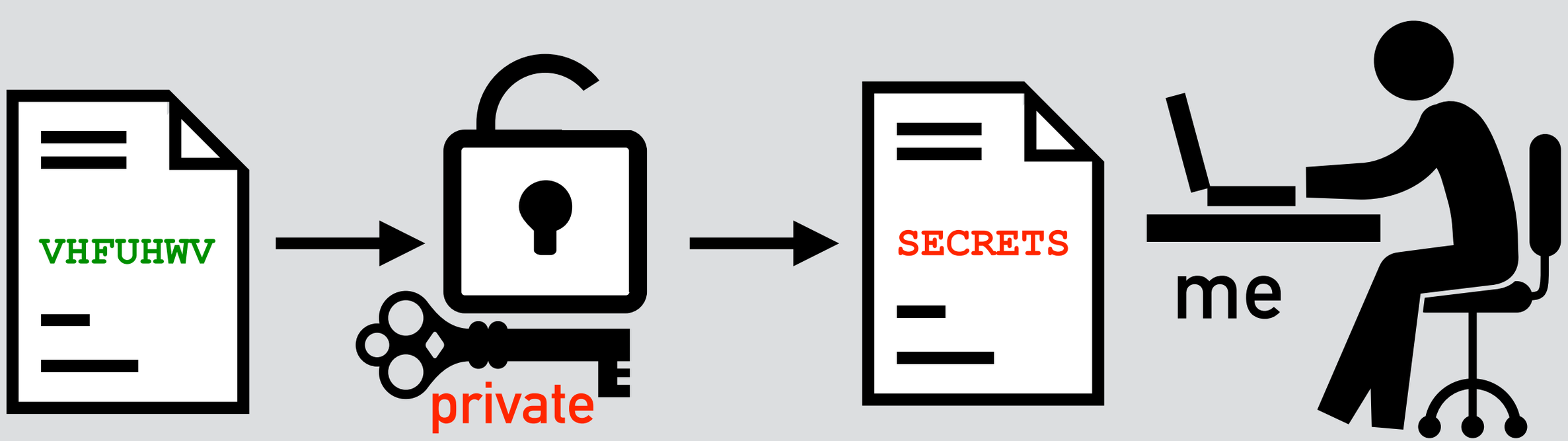


(anyone with my private key can decrypt the message!)

how is this possible?!

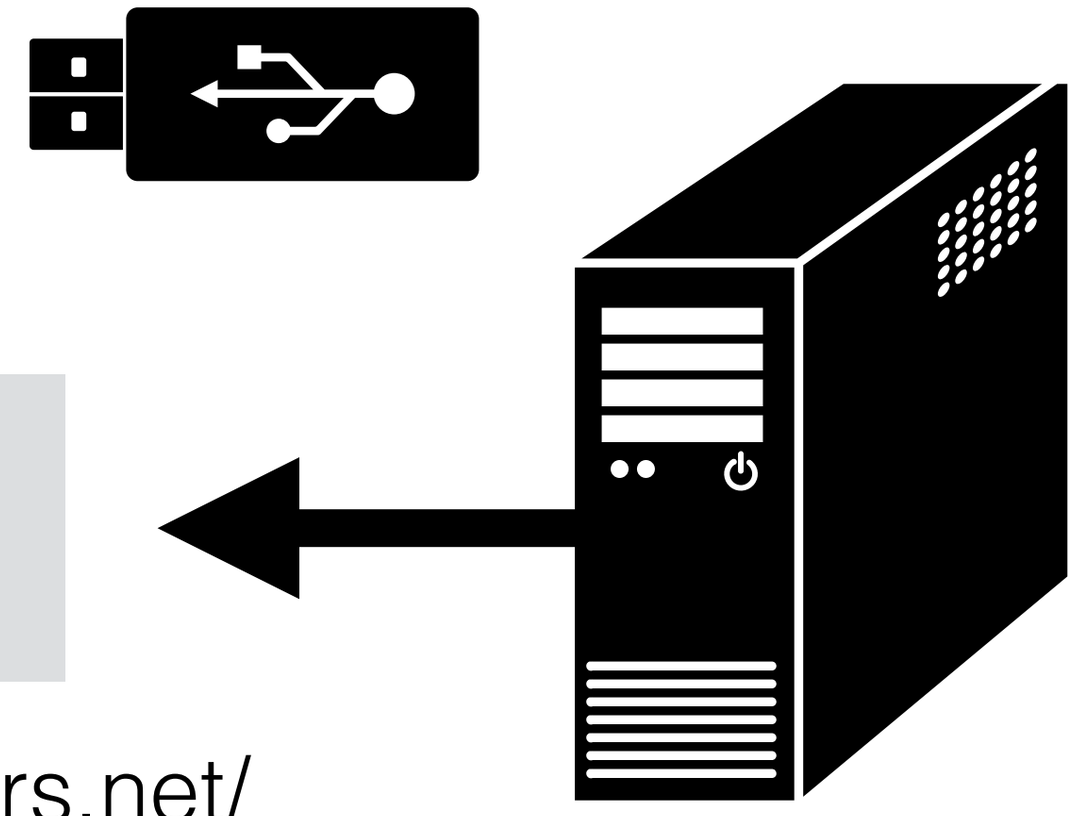



them
SECRETS
public
VHFUHWV


VHFUHWV
private
SECRETS
me

how does someone get my public key?

I give it to them



They download it from a key server

e.g. https://sks-keyservers.net/

(usually done through the PGP program)

(it is not practical to tell someone your public key)

Public Key Server -- Get "0xe1ca1868408b52d5 "

-----BEGIN PGP PUBLIC KEY BLOCK-----
Version: SKS 1.1.5
Comment: Hostname: zimmermann.mayfirst.org

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-----END PGP PUBLIC KEY BLOCK-----

DANGER!

Anyone can upload a key to a key server, claiming to be anyone!

Found Keys - Select to Import

…	Account / User ID	Created	Key ID
☐	Glenn Greenwald <Glenn.Greenwald@riseup.net>	2013-10-27	0DE83F50
☐ ▶	Glenn Greenwald <Glenn.Greenwald@riseup.net>	2015-01-06	69CD6E44
☐	Glenn Greenwald <Glenn.Greenwald@riseup.net>	2013-11-06	198D40E5
☐ ▶	*Glenn Greenwald <glenn.greenwald@riseup.net>*	*2014-01-19*	*F48D6144*
☐	Glenn Greenwald <glenn.greenwald@riseup.net>	2013-11-01	58E6E873
☐ ▶	*Glenn Greenwald <glenn.greenwald@riseup.net>*	*2013-10-19*	*EB3B0427*
☐	Glenn Greenwald <glenn.greenwald@theintercept.com>	2014-05-22	54A5D9A0
☐	Glenn Greenwald <glenn@silent1.net>	2013-07-23	CC604FF1

Which key belongs to the person I want?

trusting keys

(important for preventing impersonation)

fingerprints are key identifiers

```
Public Key Server -- Get "0xe1ca1868408b52d5 "

-----BEGIN PGP PUBLIC KEY BLOCK-----
Version: SKS 1.1.5
Comment: Hostname: zimmermann.mayfirst.org

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WzGW0mHbBhvwexj9gTPZgKtMPHBJwe1H3ZJApFWgif1dm92oiv8RIsJftX9uuY7kwhHX/VrD
Yi8bI52unUKaGbZWA+91axaPuLN89ix+dzVMVqs95I5DF4M6lKITcsfNh/VKpjdvNGYwvv6U
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Xb6qloVzDKAEV2LRqZC2lP8fhDEr09pJqhgP/RL2hAyo6oQGVFcs6VP86T7ONnqzufJfIfP+
mRmjrOZydZv4kM3kSI8NPeylRqeT4bo5EcA7xi7I1ZKakIU5CMZBcBKziEzj6M2ubOdm+BEz
5r9lv8O0U360rSqiuO2BDClmVYKny+a6E5XpmsBnUK2AhypLDwKsSaeJh3F81pNMDli6HPoH
4bmFoA/votZHnHe2GKhOJHEgmbVONMR9Blk44lSbPad2bj0sIwHjxj4BV0cchBDwJSTsnUxK
hHNmV7DqqrWrka/6Ss7walwI+HvOBE1SmX6TyGIp80Ms4vgZGFZk4pn3N0Yy4zhUUWa17j+t
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O4Pc5+nKZPCXilCH+TDwtfCdqadGvAmo0xJuBd9lsF3eUydKIadGAT6lYEoz4UNb0E0McRAM
wyqKpN9dcGwLsGX2mtNzW3XMiXBjFMkng2BMAwglGRv39uNHKikanvSTKzPP7OSTqlNFFuHP
oaaghnQHmC+pzQXlVE6NEZfcjGae+h2RvK7JizP2w6Ue1n9ghabqM2ygAmLFEso0I5vJsh5U
c5M8LM3YqqEKwMhlPxh2QGfgM5rPKg69I0pwgeqDolGLw6iRVqZqCyAxRXbjjOk69nSOv2sN
=WfbU
-----END PGP PUBLIC KEY BLOCK-----
```

0F1D 8FA1
929F F077

→

7458 1191
E1CA 1868
408B 52D5

finding two keys with the same fingerprint is extremely difficult

two reasons to trust a key

1: A public declaration of ownership

PrivacyInternational
@privacyint

Committed to fighting for the right to #privacy across the world.
Info@privacy.org PGP: 1F23 97A9 CD8E 91EF 06A1 0F94 5E1F 166E C067 3D7D

keybase.io/corcra

E1CA 1868 408B 52D5

corcra tweet

corcra gist

sarah jeong
@sarahjeong

Following

PGP public key here: keybase.io/sarahjeong/key…
Fingerprint: 09E0 D1A7 5A67 57B9 B8D8 5485 7484 3790 352F 2B60
Email: sarahjeong@riseup.net

glenn.greenwald@theintercept.com

SecureDrop

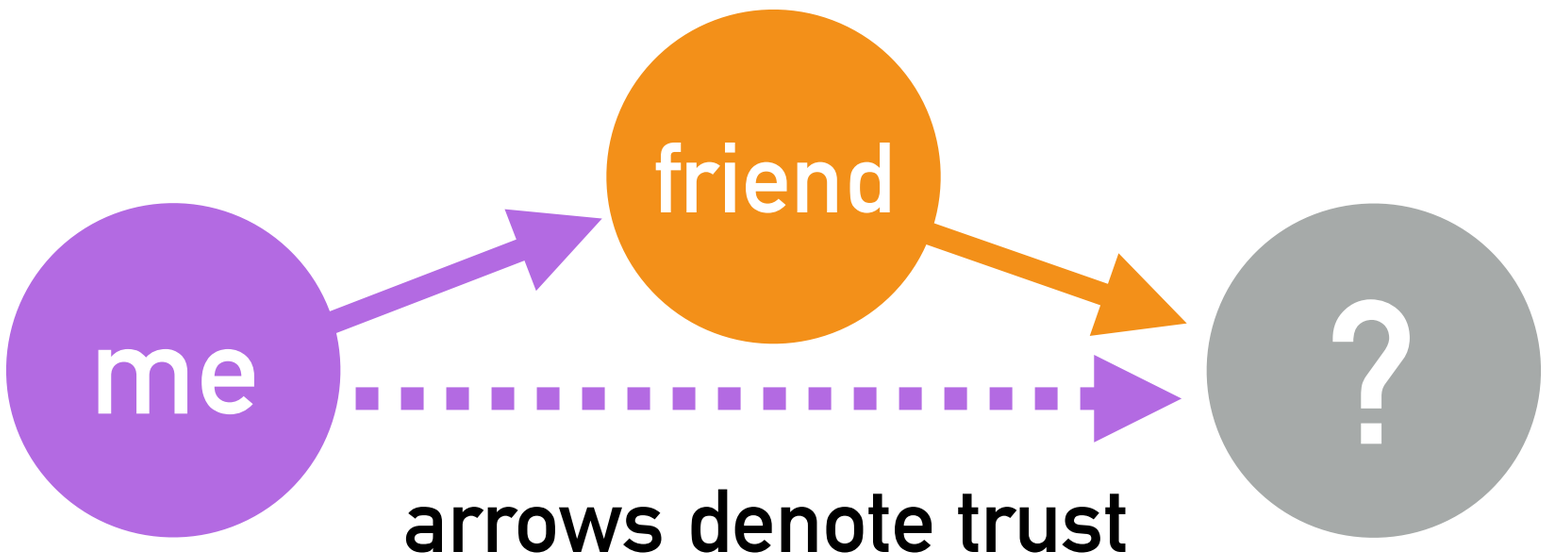
PGP Public Key and Fingerprint

734A 3680 A438 DD45 AF6F 5B99 A4A9 28C7 69CD 6E44

Glenn Greenwald Public Key

two reasons to trust a key

2: Confirmation from a trusted third party



PGP enables building a web of trust

(for more, see “keysigning”)

example: finding the right key

Glenn Greenwald
@ggreenwald

Journalist with @The_Intercept - author, No Place to Hide - dog/animal fanatic - email/PGP public key (firstlook.org /theintercept/s…)

glenn.greenwald@theintercept.com

SecureDrop

PGP Public Key and Fingerprint

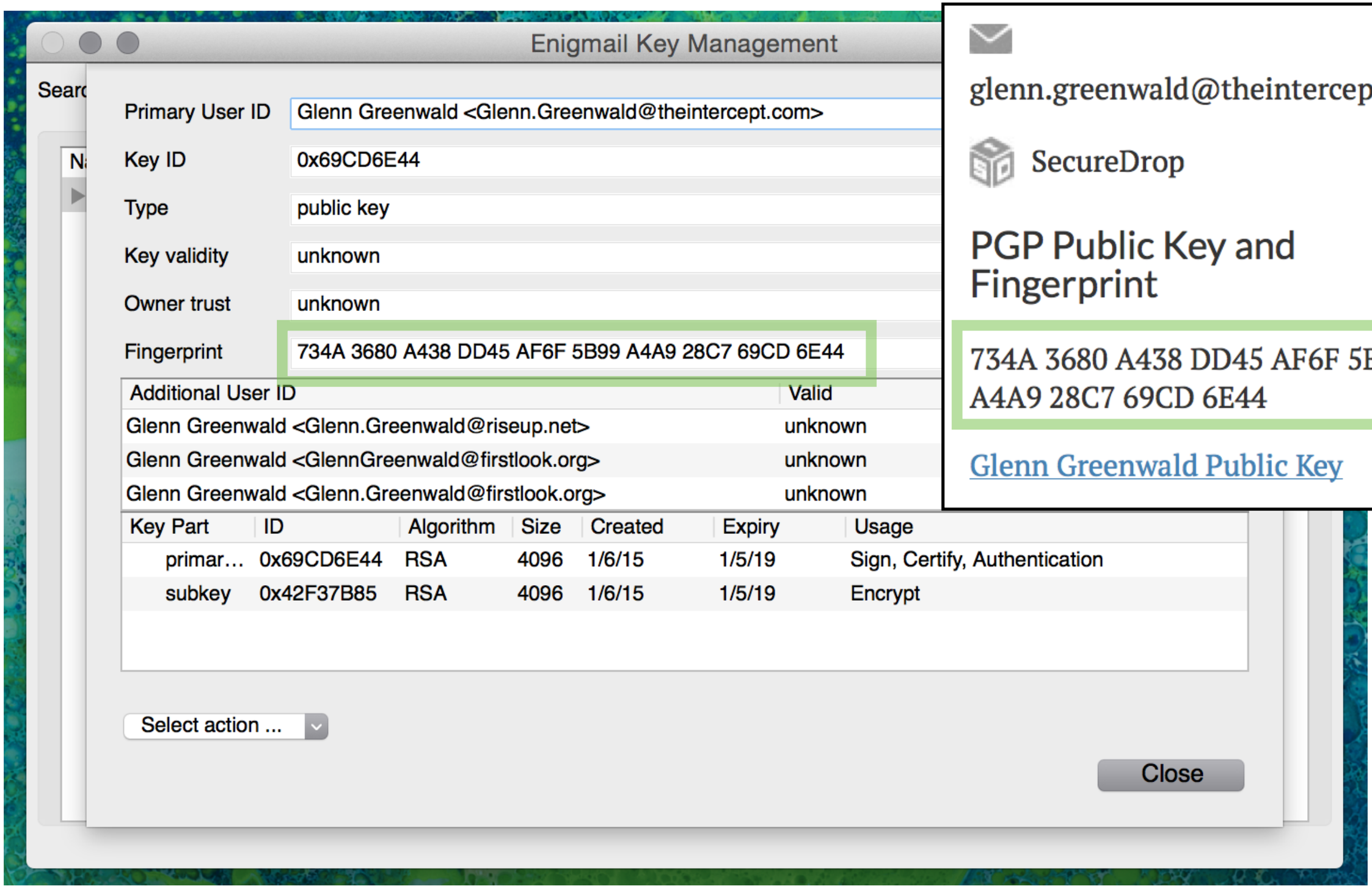
734A 3680 A438 DD45 AF6F 5B99 A4A9 28C7 69CD 6E44

Glenn Greenwald Public Key

Found Keys - Select to Import

…	Account / User ID		
☐	Glenn Greenwald <Glenn.Greenwald@riseup.net>	2015-10-27	0DE83F50
☐ ▶	Glenn Greenwald <Glenn.Greenwald@riseup.net>	2015-01-06	69CD6E44
☐	Glenn Greenwald <Glenn.Greenwald@riseup.net>	2013-11-06	198D40E5
☐ ▶	*Glenn Greenwald <glenn.greenwald@riseup.net>*	*2014-01-19*	*F48D6144*
☐	Glenn Greenwald <glenn.greenwald@riseup.net>	2013-11-01	58E6E873
☐ ▶	*Glenn Greenwald <glenn.greenwald@riseup.net>*	*2013-10-19*	*EB3B0427*
☐	Glenn Greenwald <glenn.greenwald@theintercept.com>	2014-05-22	54A5D9A0
☐	Glenn Greenwald <glenn@silent1.net>	2013-07-23	CC604FF1

example: finding the right key



authenticity

(confirming the identity of the purported sender)

&

integrity

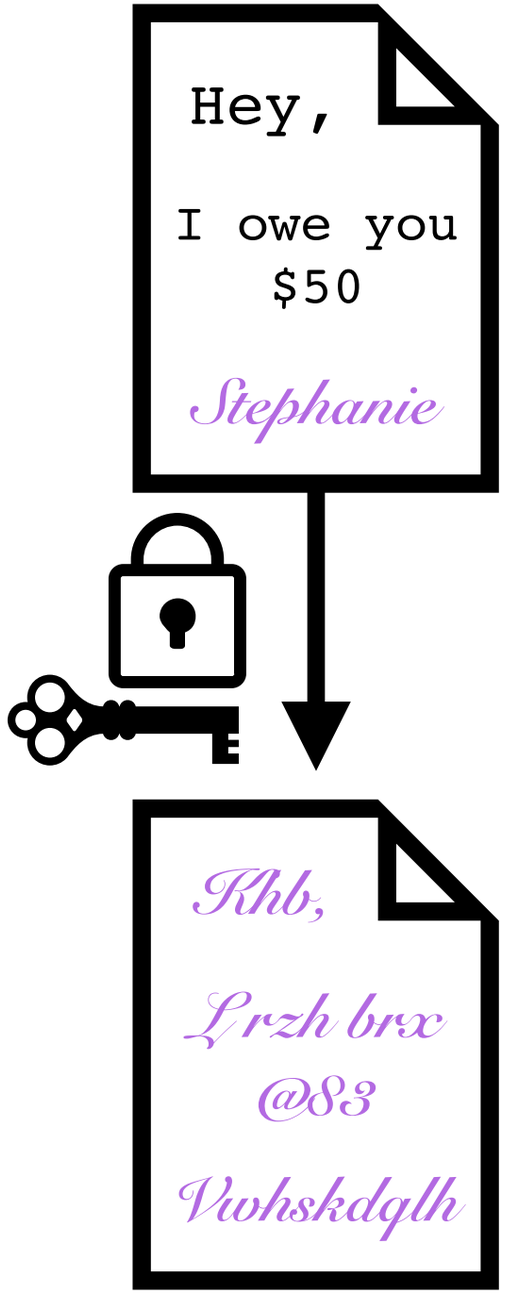
(ensuring the message was not altered in transit)

→ sign messages

signing a message

My private key is unique to me

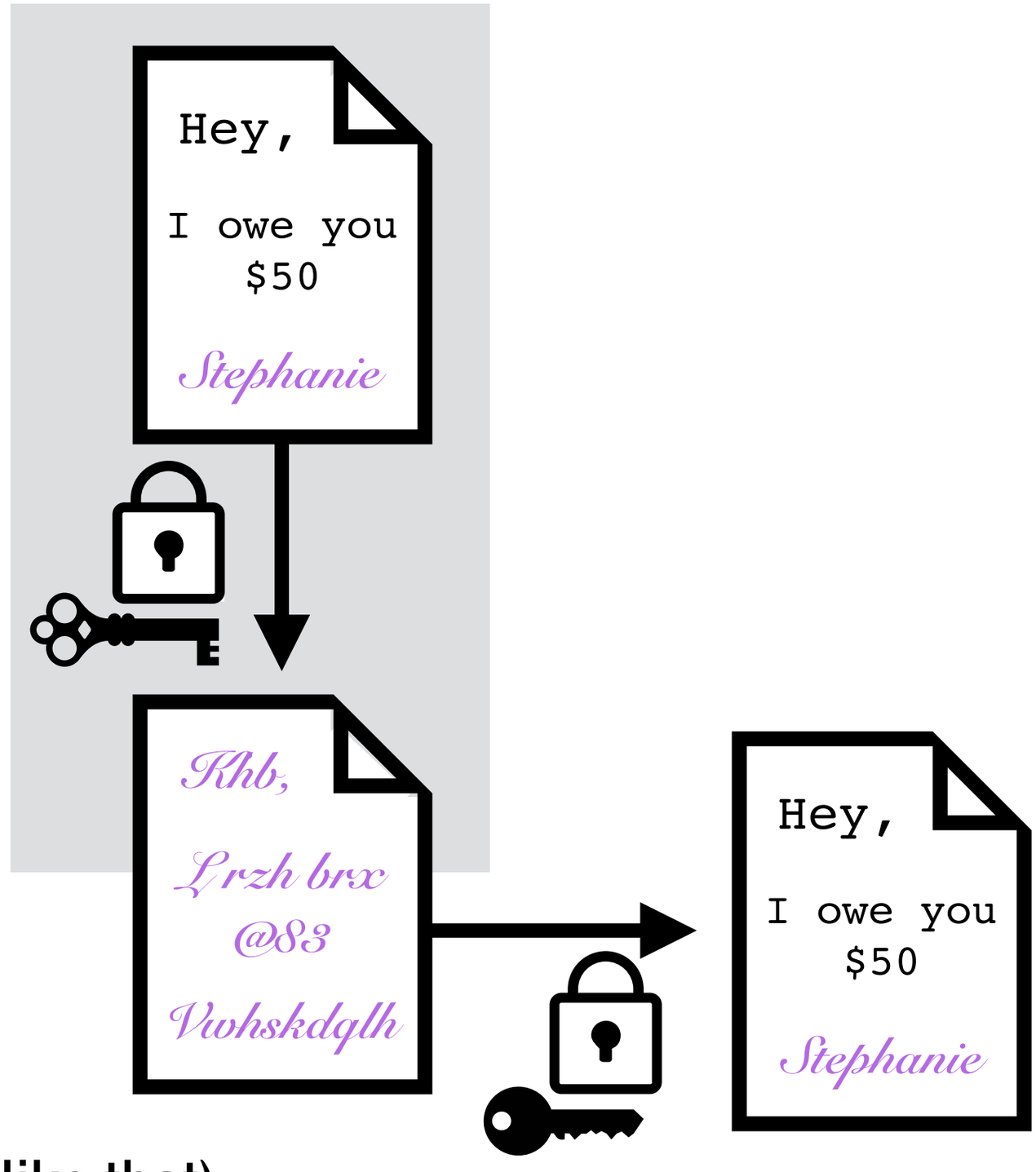
A message encrypted with my private key was encrypted by me.



signing a message

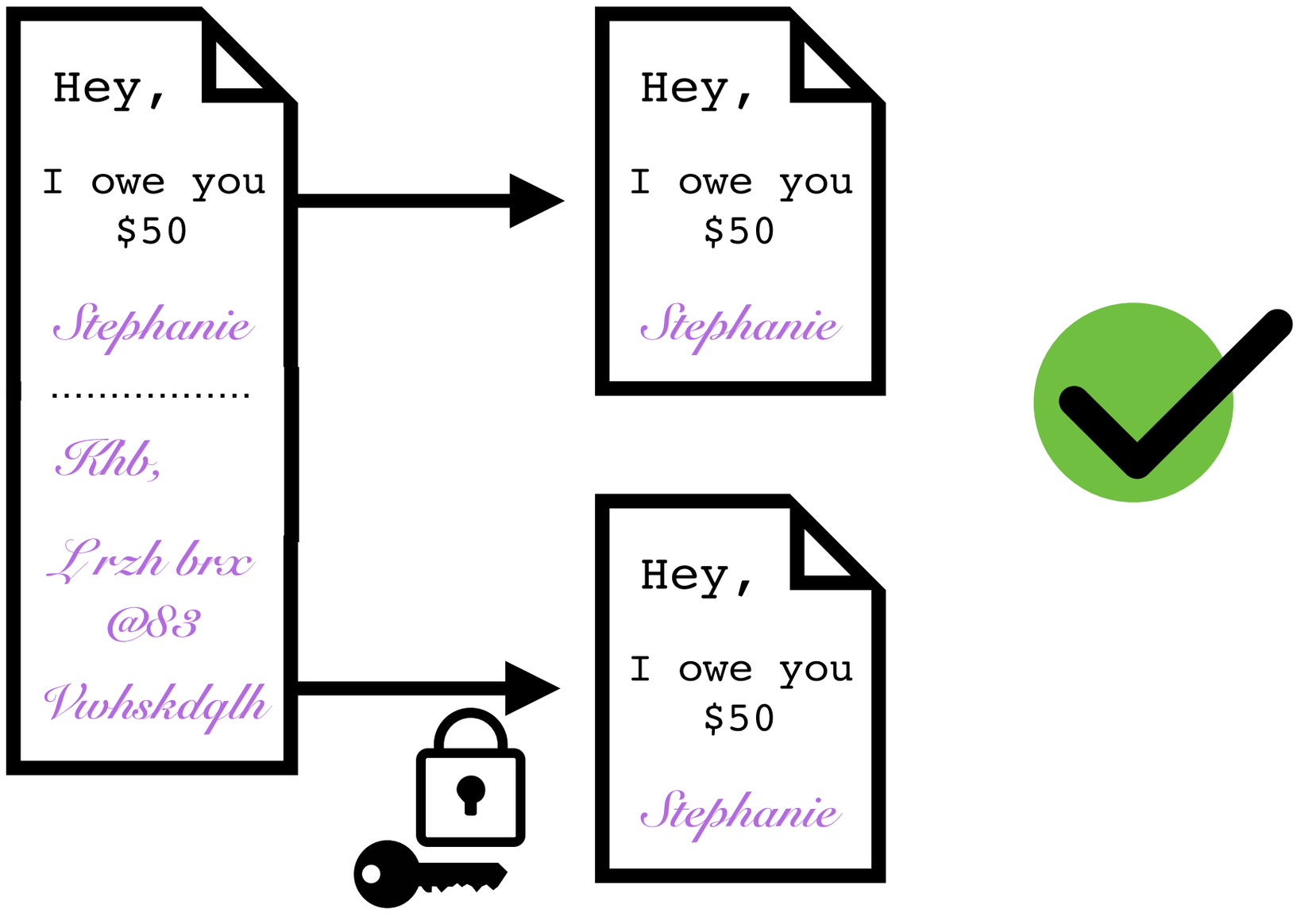
To prove a message was encrypted with my **private** key…

Decrypt it with my **public** key!



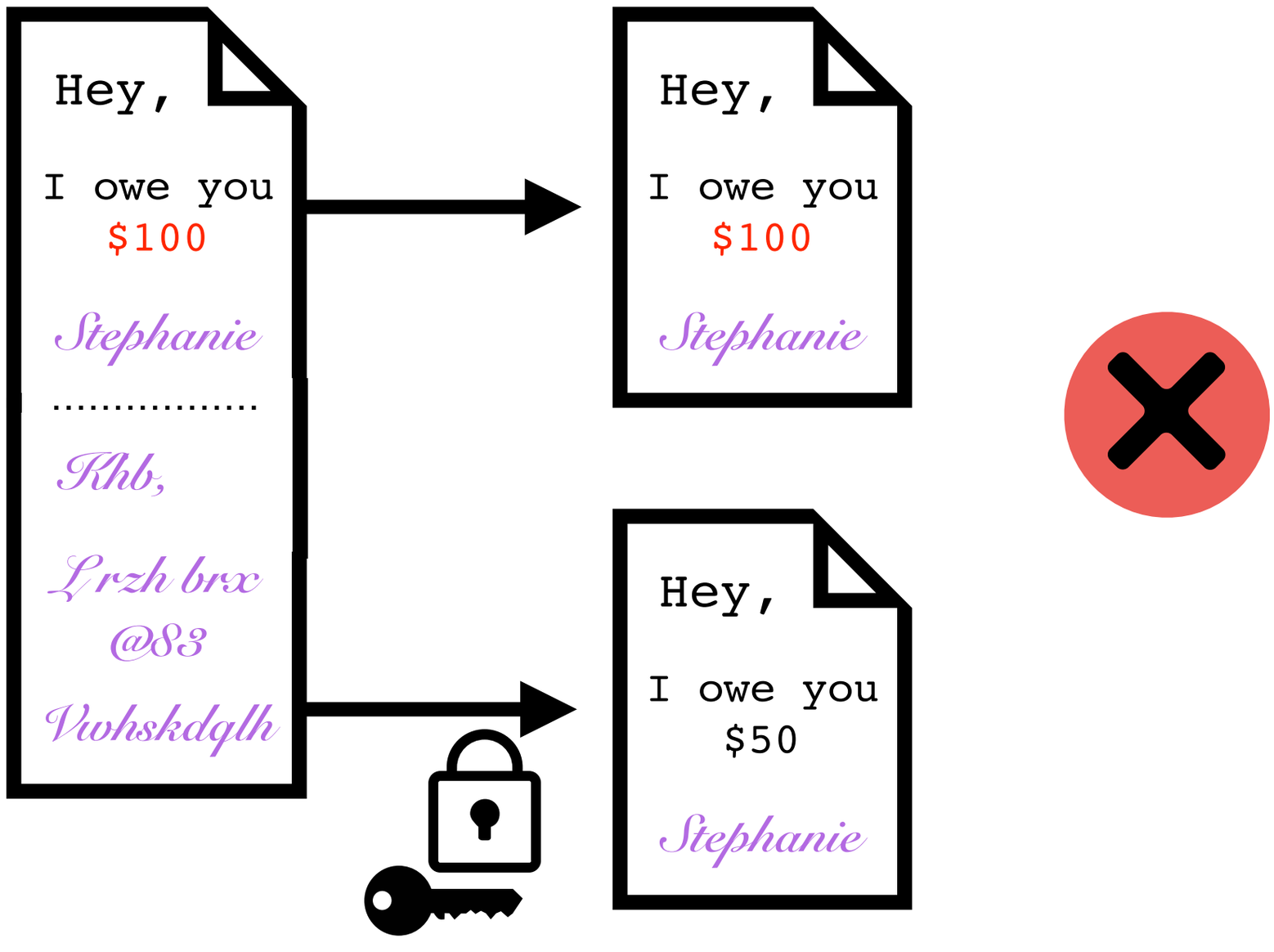
(public key cryptography is cool like that)

checking integrity



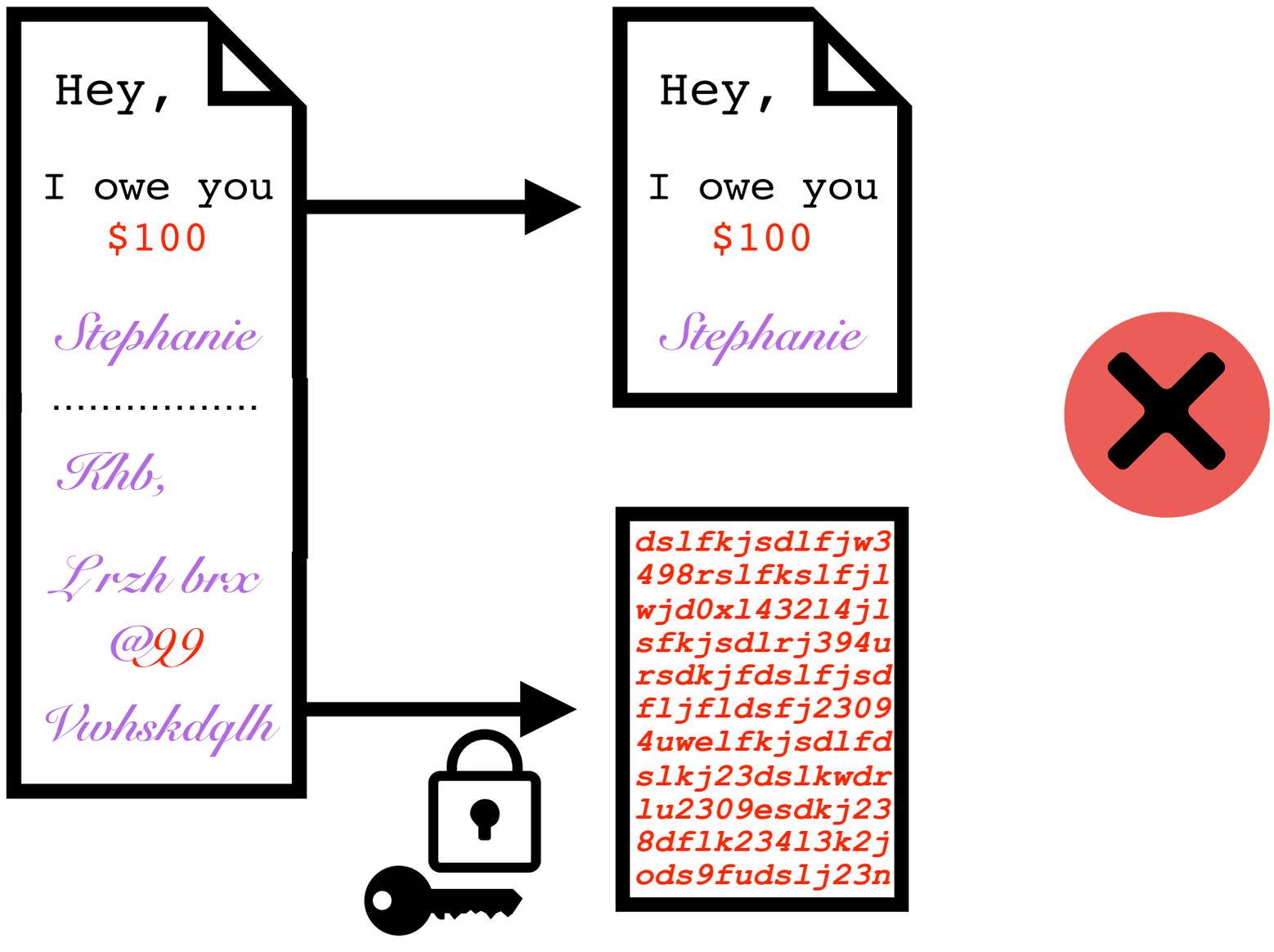
checking integrity

without my private key, this cannot be meaningfully modified

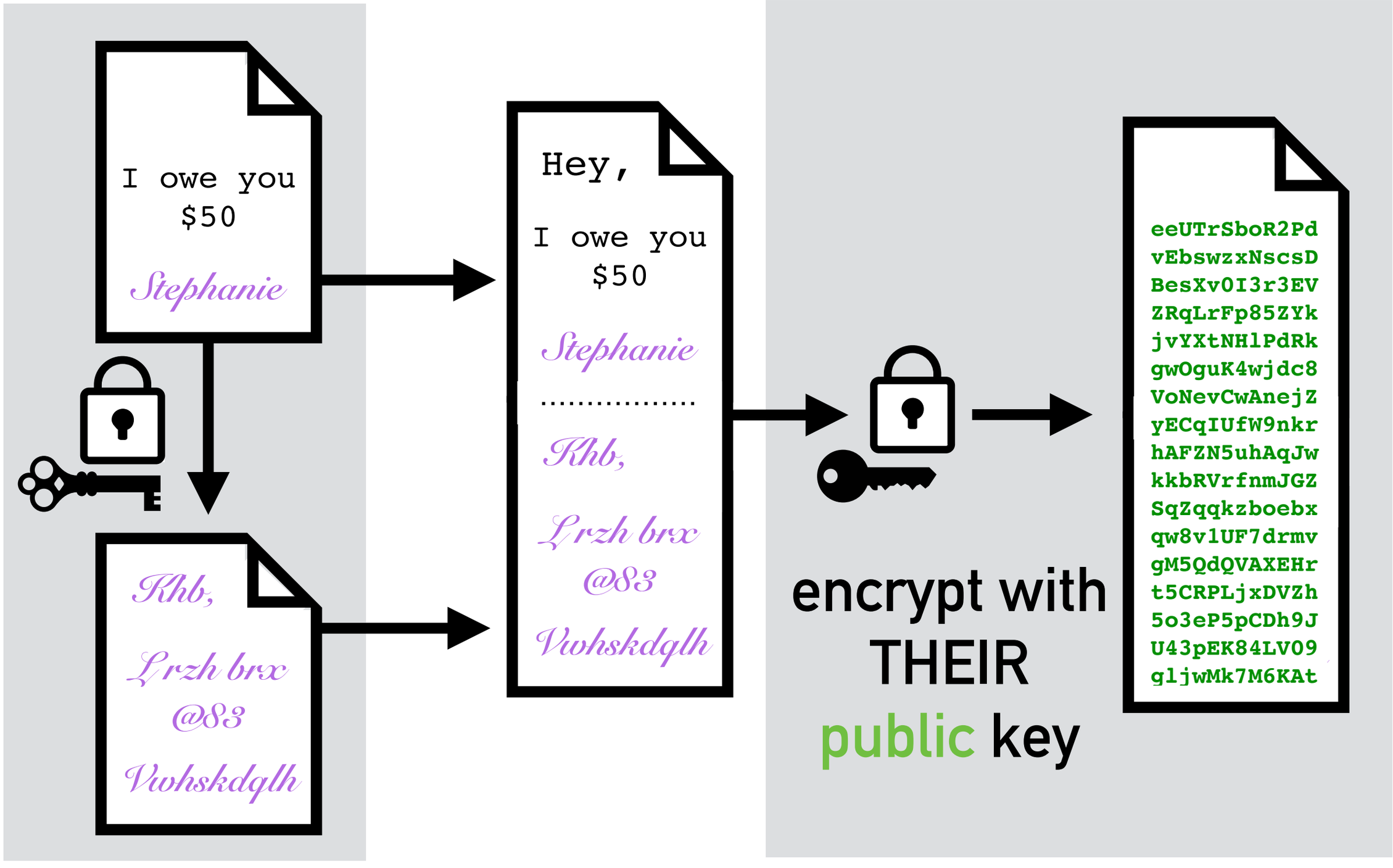


checking integrity

trying to change the ciphertext results in garbage



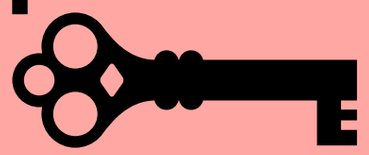
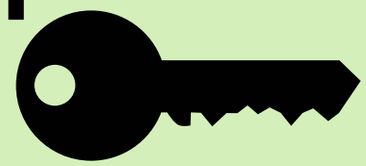
signing with encryption



overview of key usage

	private	public
encryption	<u>decrypt a message</u> encrypted with the corresponding public key	<u>encrypt a message</u> that can be decrypted by the corresponding private key
authentication (+ free integrity check)	<u>assert ownership</u>/ authorship of a message	<u>verify ownership</u> of a message signed by the corresponding private key

overview of key usage

	private 	public 
encryption	I use my private key	I use their public key
authentication (+ free integrity check)	I use my private key	I use their public key

PGP gives us

confidentiality & authenticity integrity

using

encryption & signatures

(now we understand its awesomeness)

getting & using PGP

Mozilla Thunderbird + ENIGMAIL

Apple Mail + GPGTools

Outlook + GPG4WiN

many options :)

(https://en.wikipedia.org/wiki/Comparison_of_email_clients#General_features)

Mozilla Thunderbird + ENIGMAIL

Step 0: Get GNU Privacy Guard

(also known as GPG)

GnuPG

This step is platform-specific…

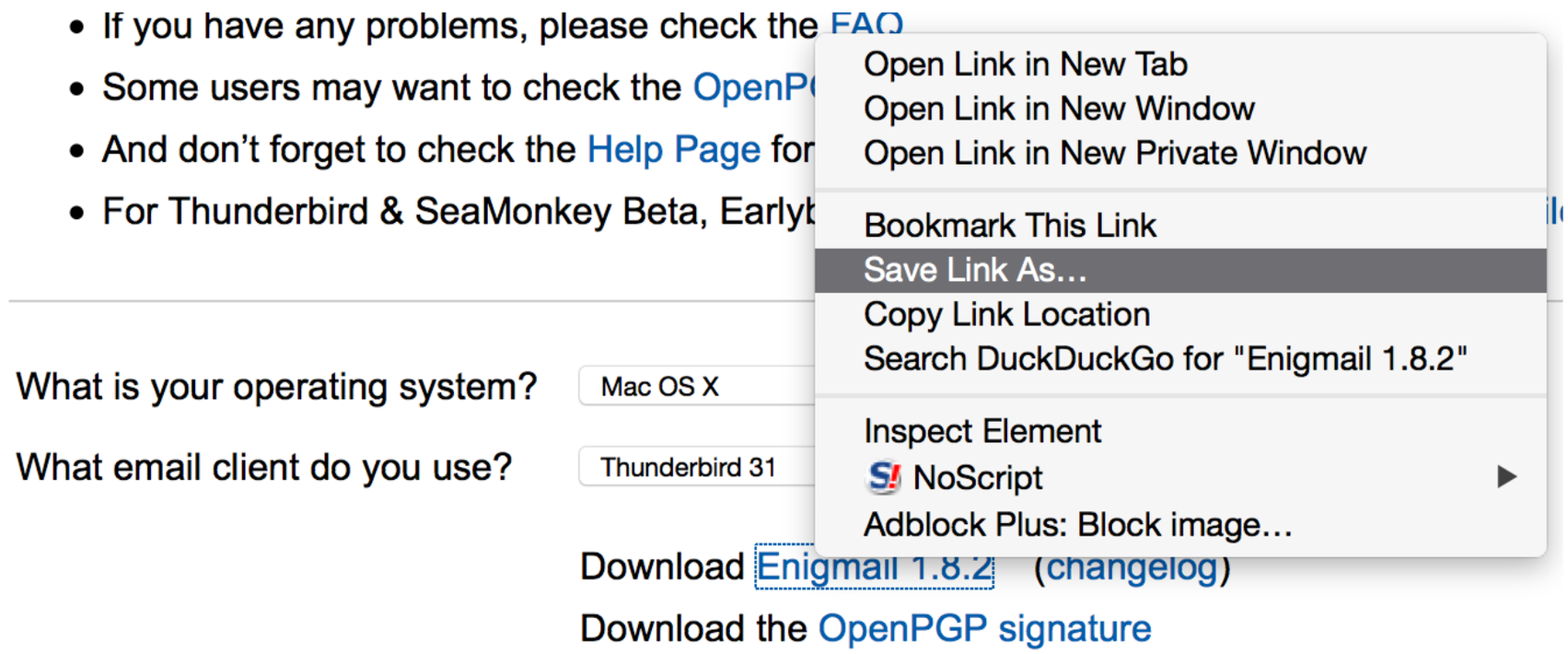
OS	Where	Description
Windows	**Gpg4win**	Installers for *GnuPG stable*
	download sig	Simple installer for *GnuPG modern*
	download sig	Simple installer for *GnuPG classic*
OS X	**Mac GPG**	Installer from the gpgtools project
	GnuPG for OS X	Installer for *GnuPG modern*
Debian	**Debian site**	GnuPG stable and classic are part of Debian

https://www.gnupg.org/download/

Mozilla Thunderbird + ENIGMAIL

Step 1:

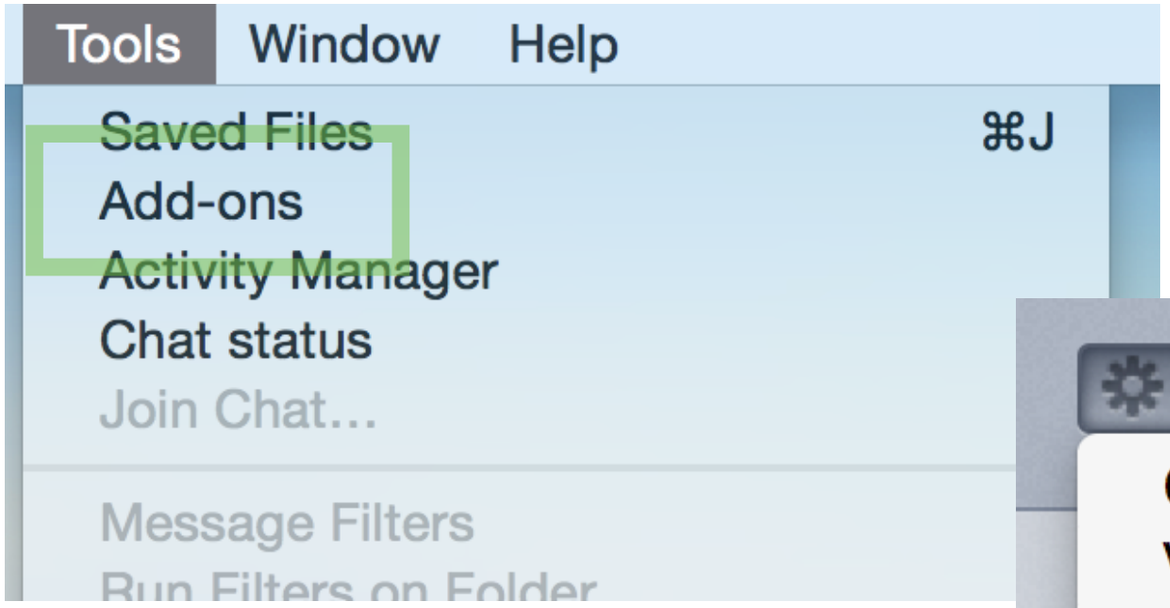
Download Enigmail

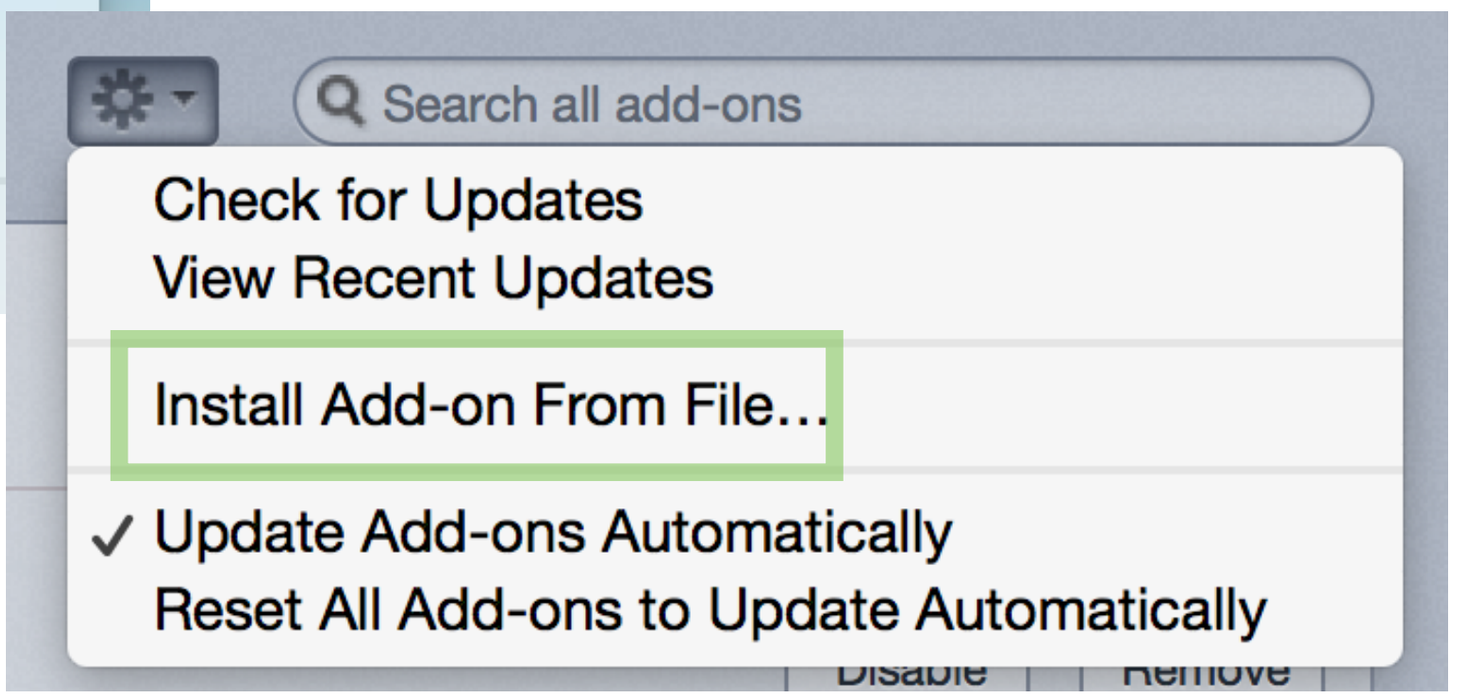


https://www.enigmail.net/download/

Mozilla Thunderbird + ENIGMAIL

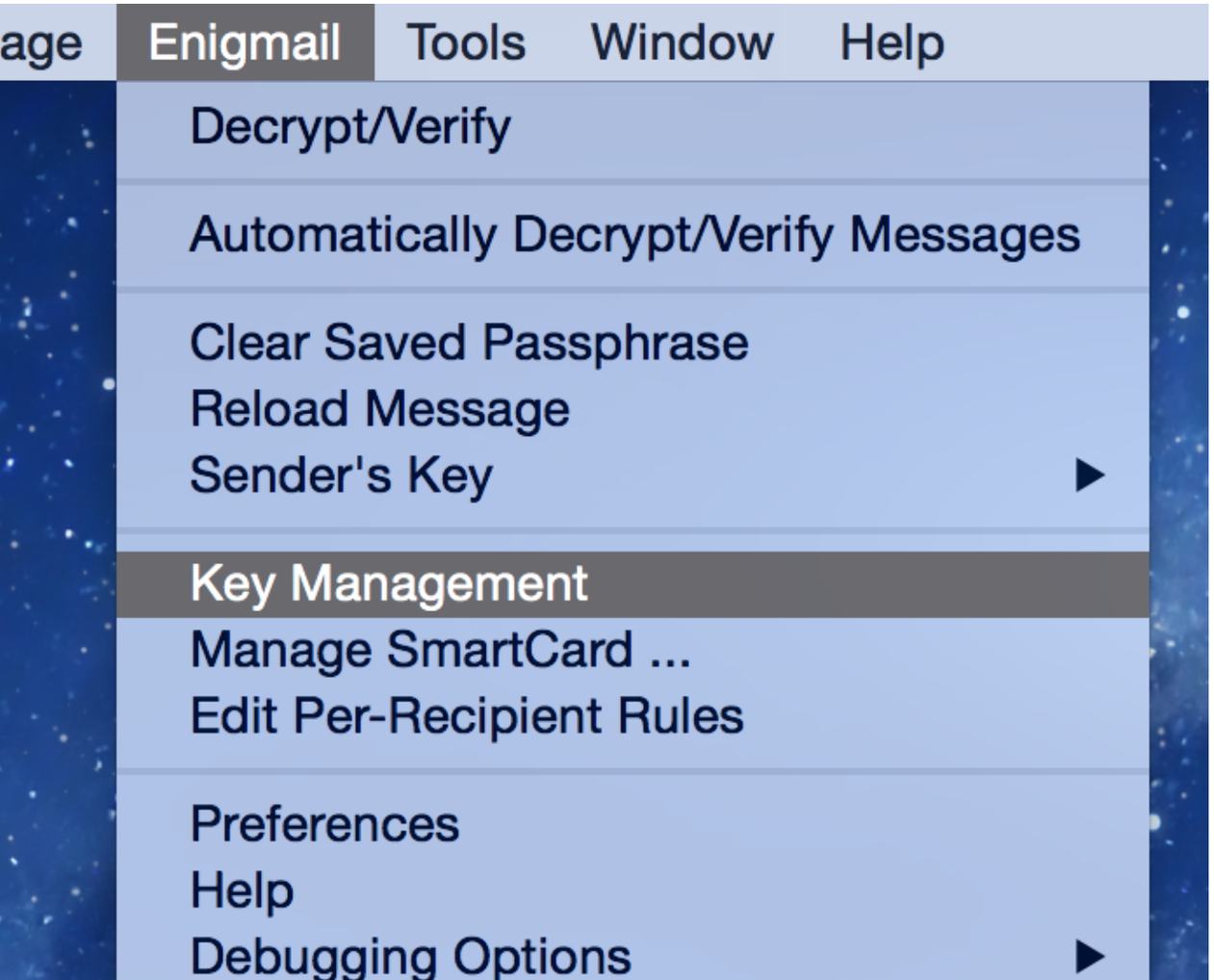
Step 1.5: Add Enigmail to Thunderbird

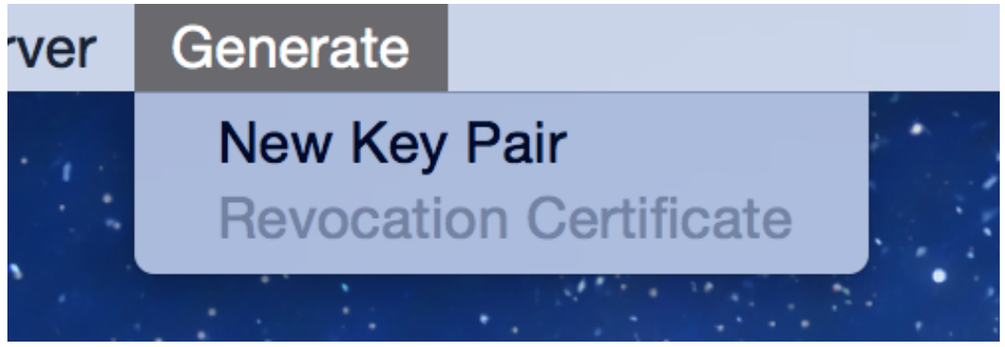




Mozilla Thunderbird + ENIGMAIL

Step 2: Create a key pair using Enigmail





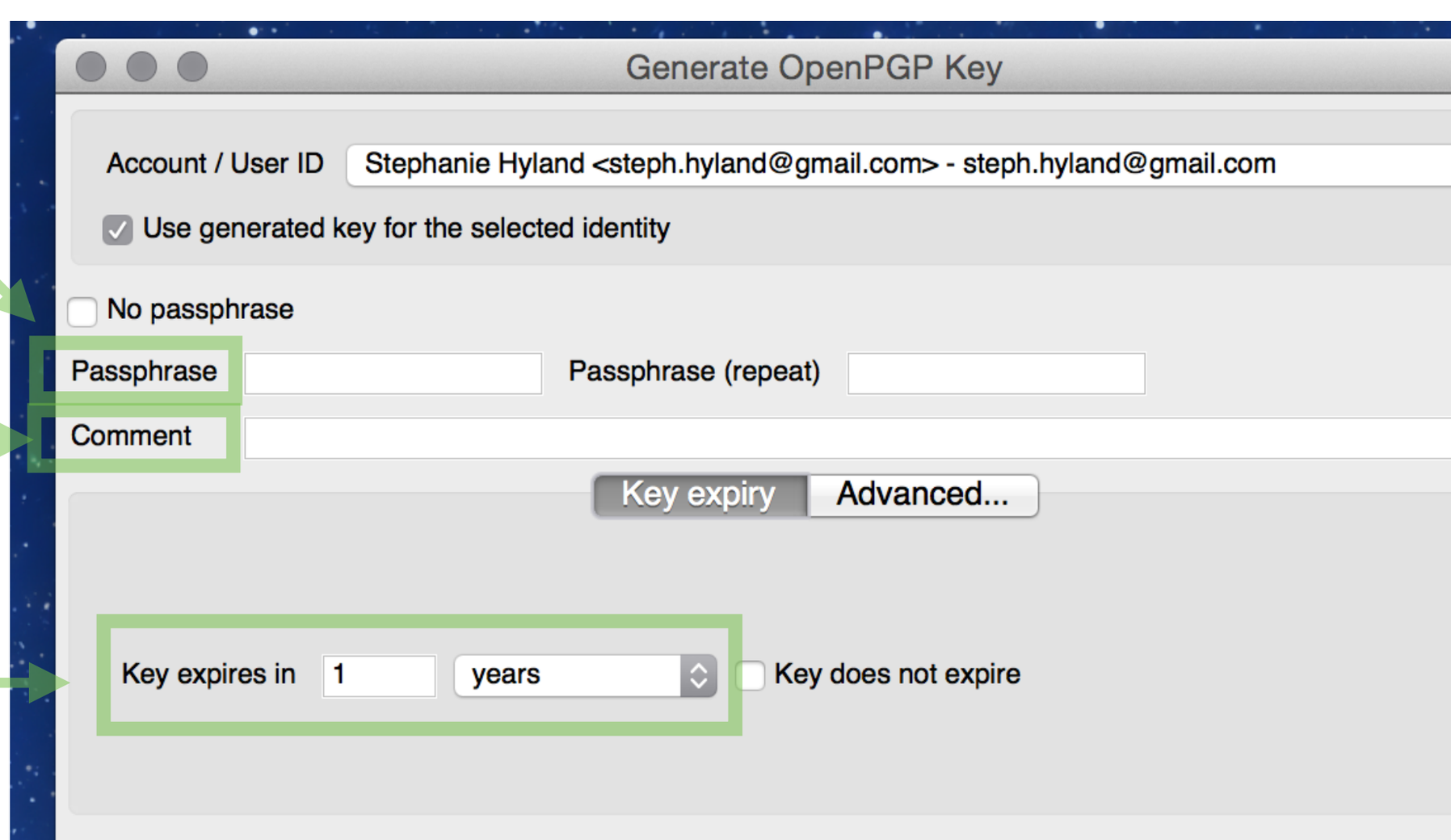
Mozilla Thunderbird + ENIGMAIL

Step 2: Create a key pair using Enigmail

a nonsense sentence is a good passphrase

no comment required

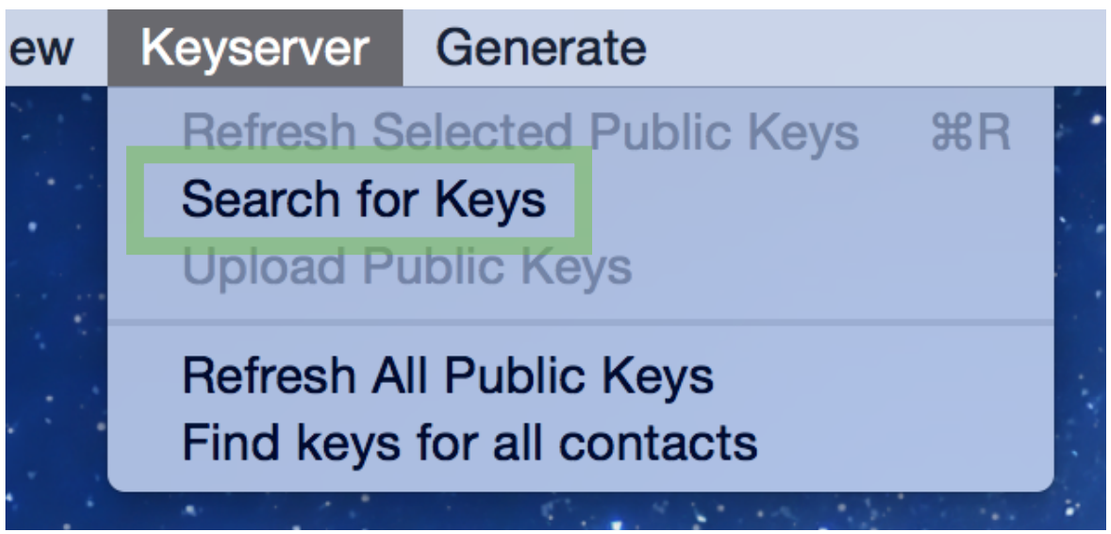
1 year is a good expiration time

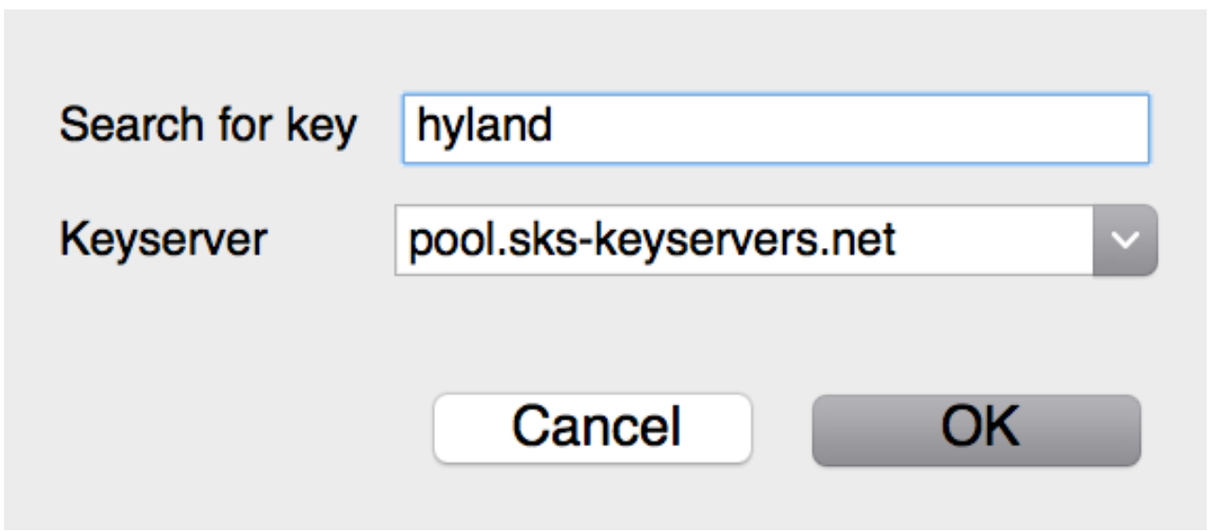


Mozilla Thunderbird + ENIGMAIL

Step 3: Import someone else's public key.

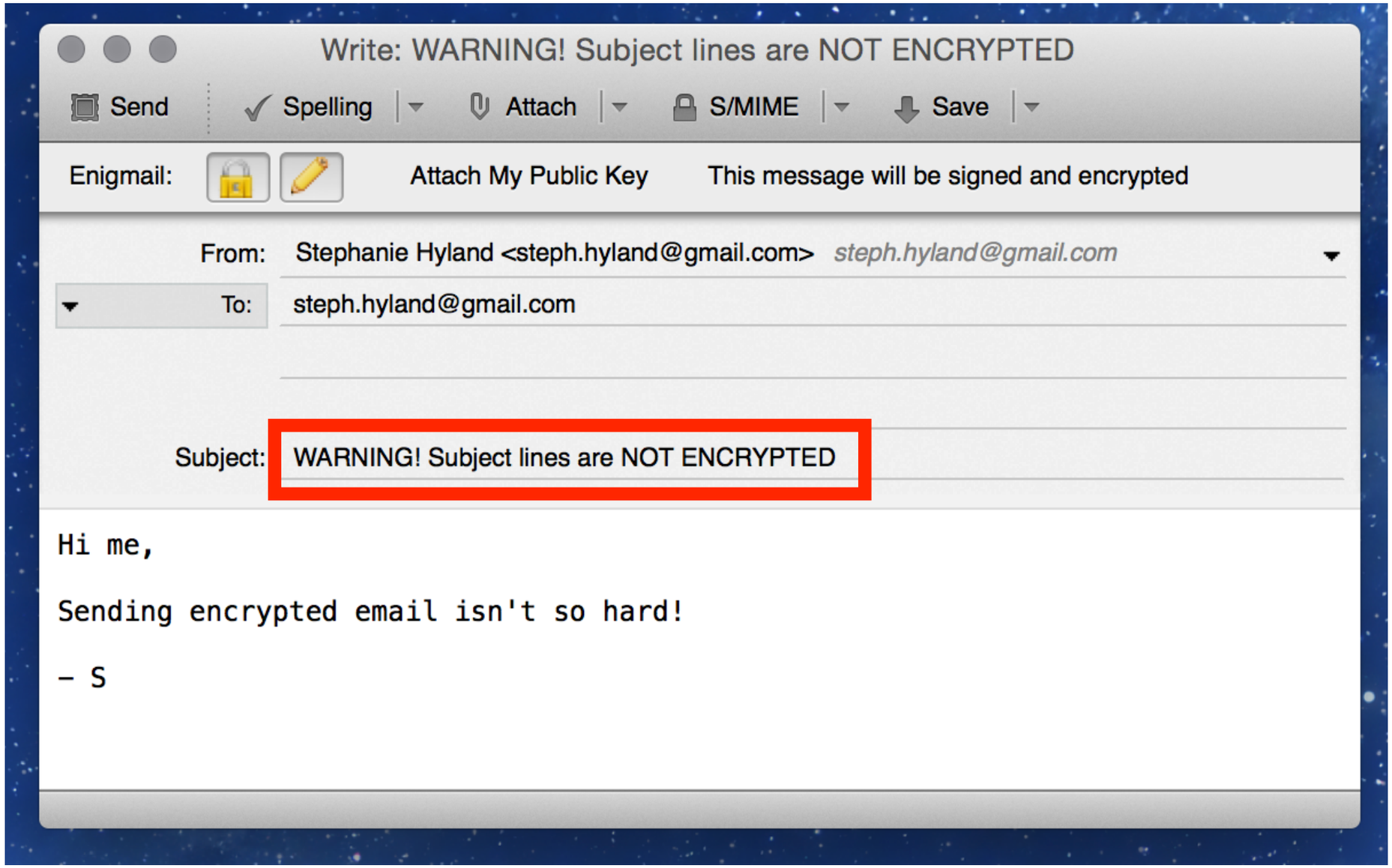
(warning: make sure it's the right key!)





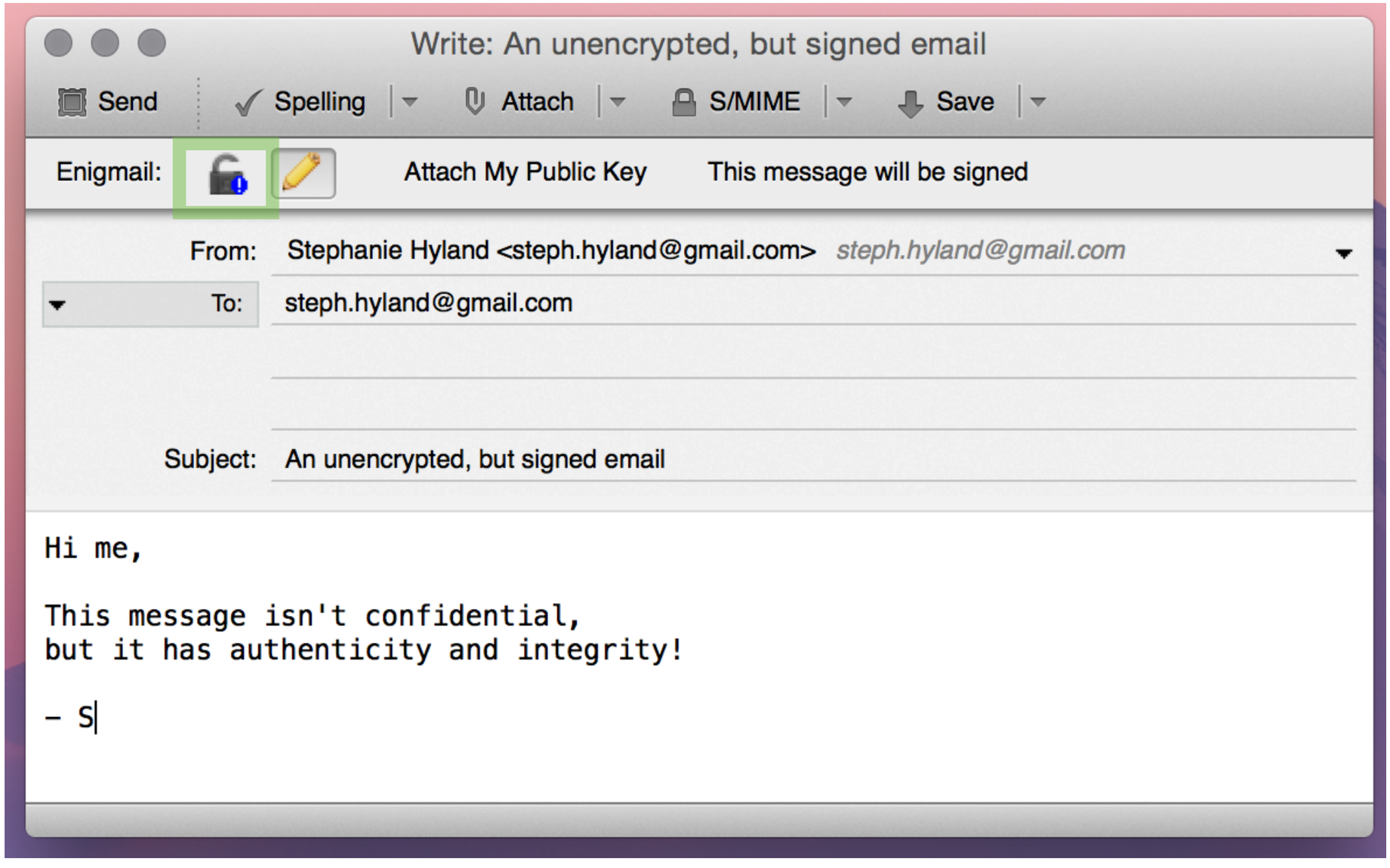
Mozilla Thunderbird + ENIGMAIL

Step 4: Send an encrypted email.



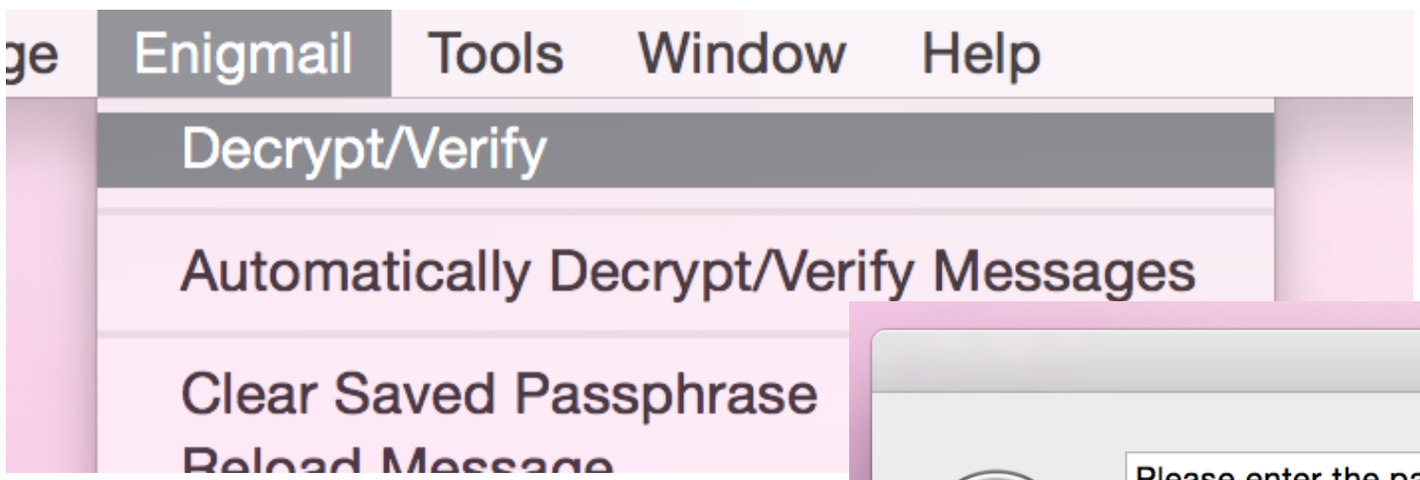
Mozilla Thunderbird + ENIGMAIL

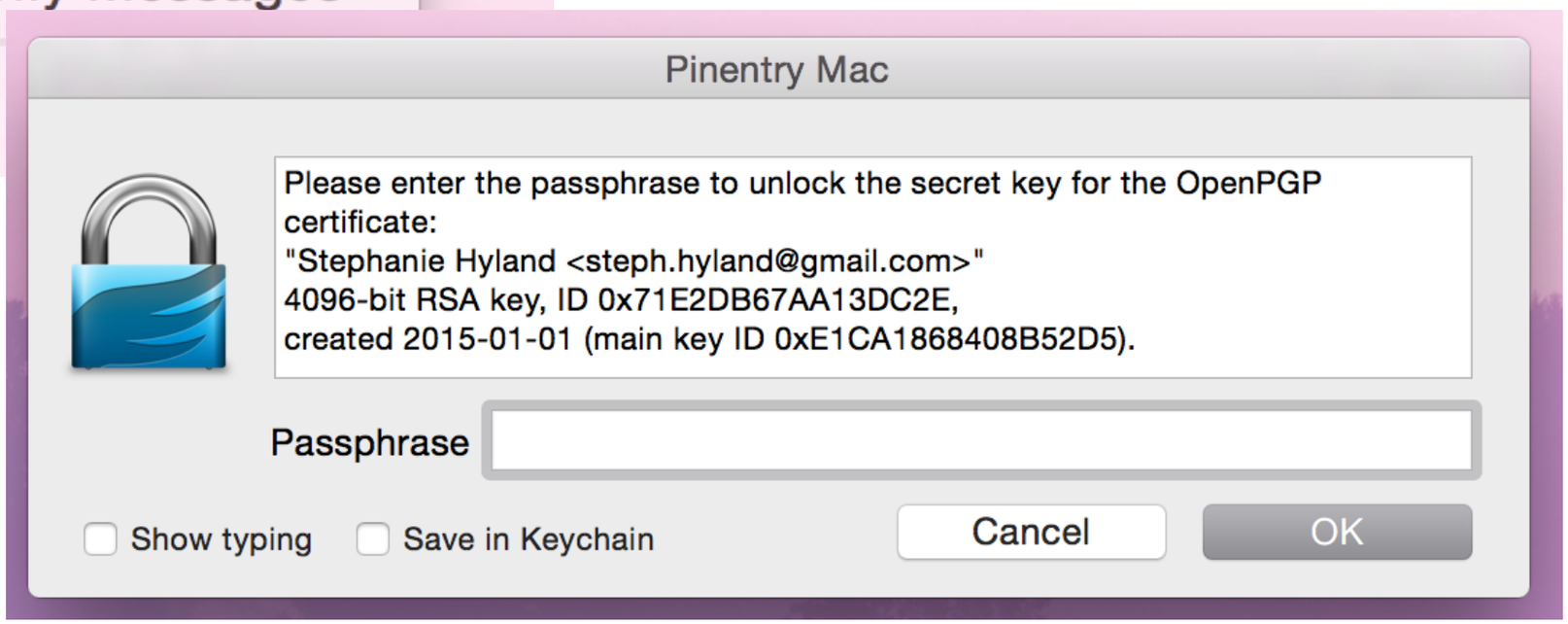
Bonus: Send an unencrypted, signed email.



Mozilla Thunderbird + ENIGMAIL

Step 5: Decrypt an email.





I'm using GPGTools

recap

Jonathan Zdziarski
@JZdziarski

PKI / PGP Primer:

🔑 Public Key

🗝 Private Key

📝 Message

📝 + 🔑 = 🔒✉️ Encrypted

🔒✉️ + 🗝 = 🔓📝 Decrypted

📝 + 🗝 = ✒️✉️ Signed

✒️✉️ + 🔑 = 👤 Authenticated

RETWEETS 3,266 LIKES 3,855

2:44 PM - 13 Jul 2016

3.3K 3.9K

in summary…

do you PGP?

Yes!

@corcra
Stephanie Hyland
12/4/16, NYC Resistor
(27/4/15, CryptoHarlem)